ACCESSIBILITY IN DISTANCE EDUCATION:
IMPLEMENTS OF UNIVERSAL DESIGN FOR LEARNING

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAIʻI AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

EDUCATION

MAY 2014

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Keywords: Universal Design for Learning, Online Accessibility, Andragogy

ACKNOWLEDGEMENTS

The past seven years have been quite an experience. First, and foremost, I thank God Almighty for His mercy, grace, and favor that continue to shower me to this day. As many dissertations have given their token of thanks to individuals in the past, I too would like to extend my appreciation to those who have touched this manuscript along the way.

I would like to thank the participants who initially helped with this study and who continued with me for the long haul by contributing their vast experiences in the realms of online teaching. I am grateful to the four online instructors who further continued this journey with me by offering their time and expertise by sharing their teaching and learning experiences with accessibility and UDL. Their valuable contribution created the rich discourse found in this dissertation.

A sincere thank you goes to my dissertation committee Chair, Curtis Ho, whose guidance and virtual presence became my constant connection with the university since moving away. Accommodating the 5 or 6 hour time zone gap was not easy to coordinate at times. I would like to also thank the rest of my committee, Ellen Hoffman, who guided me from the very beginning of this journey; Megan Conway, who made an impression in how accessibility and UDL can vastly impact a person's learning; and finally, Peter Leong and Peter Quigley who both helped me reach beyond the written word of *diversity* but rather assisted in defining how one word can make such an impact in learning.

A sincere and grateful heart goes to my ETEC O'hana, including my dear friend and editor, whose constant guidance and support continues to this day. Their time in pouring over multiple drafts of the same subject in order to provide helpful feedback is forever with me. Also to my extended O'hana who helped at a distance with providing me the much needed energy to finish the tail end of this dissertation.

Lastly and most importantly, if it were not for the continuous support from my mom and dad whose endless love and support gave me the strength to continue taking me beyond my goals and accomplishments, I would never have experienced this journey. Much love and gratitude go to my two sisters and two brothers, who were a constant rock

full of endless support during this journey. And if it were not for the constant love and laughter siblings bring this would have been a daunting task full of heart break. Their constant love and support showered me with the strength to continue.

However, with my whole heart, endless thanks, appreciation, and love go to my husband and soul mate, Manuel, and to my children, Laila, Arriana, and Sebastian who selflessly sacrificed their time by watching me day in and day out lag my laptop to the couch as if it were my life support system. Being a wife and mother is difficult enough on its own but to add to it the many, many hours of study, research, and writing that go into a dissertation, I could never thank my family enough. My husband's constant love, guidance, and support could never be measured with words. If it was not for my family, I would not have even begun this PhD program, nor would I have finished it. I dedicate this degree to my family-this is for you.

ABSTRACT

In recent years, upward shifts by universities to encourage faculty to teach in an online environment has increased tremendously. Those taking online courses have increased as well. Growing audiences enrolled in online courses have resulted in a wider and more diverse group of learners all who which have the right to learn, regardless of the means. Therefore, how does one meet the needs of these diverse learners and create an accessible online environment? This question began the foundation for this research study. A treatment module was used to introduce basic applications of Universal Design for Learning (UDL) principles that could be utilized in an online environment. Through this mixed-method, multi-case study, analysis of interviews, observations, field notes, collected artifacts, and correspondence with participants, the purpose was to understand the awareness, aim, and efforts of best practices in applying UDL principles by faculty teaching in an online learning environment or within a distance learning program. This study investigated the accessibility of online courses and the efforts of instructors teaching online in meeting the needs of diverse learners. This study presents UDL as a concept which implements teaching strategies to meet the needs of the *widest audience possible*. Nontraditional students, older/returning students, international students, and individuals with disabilities are all considered diverse learners and are to be considered when designing a course; the same holds true in an online environment. Overall results indicated that although there is a positive shift in attitudes towards creating accessible online materials, the content and resources that make up a course are more difficult to actually implement with respect to accessibility. Therefore, overall accessible online courses continue to lack in some areas, which have created gaps within learning all the necessary course content. However, also due to the positive shift in overall attitudes, efforts to close the gap have increased.

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CHAPTER 1. INTRODUCTION

Graveling with the idea of taking an online course may render much thought when considering the many technological and systematical changes that have occurred over recent years. Even more so, teaching an online course may be as equally consumed with anxiety considering the many changes that occur, especially when one may simply just want to teach. Since the world has evolved into the realms of technological dependency and constant change, online teaching and learning have had no choice but to follow suit. Technology continues to shape the face of higher education and consequently, it imposes new challenges for teaching (Groves & Zemel, 2000). Even as far back as fourteen years ago, Kessler and Keefe, (1999) stated, "Distance learning, the delivery of education through video, closed-circuit television (CCTV), or the Internet, has become one of the fastest growing trends in higher education." (Kessler and Keefe, 1999, p. 44) However, the phrase "growing trend" from the previous statement is a vast understatement considering the increase of distance education programs around the world, especially in the United States. In the 2000-2001 academic periods, more than three million students were enrolled in distance education courses in the U.S. The National Center for Education Statistics (NCES), (2011) predicted this number to increase to 18.2 million just this past year alone, 2013 (Gunes & Altintas, 2012). In other words, distance education has evolved and is here to stay.

As a result of increased online education, online courses have created more opportunities for an array of learners taking advantage of the online platform. Sequentially, these increased numbers of students may also be described as having different, or diverse, learning needs, terming the name, *diverse learners*. Diverse learners include practically everyone since we all learn differently; online participation includes individuals with disabilities, nontraditional students, older/returning students, and international students (Santovec, 2005). Multiple considerations within course design in reaching a wider audience are becoming increasingly necessary due to such a diverse audience.

However, students with certain learning needs are not being reached. For example, take into consideration the diverse learners described above, students with disabilities are the least considered when online courses are developed (Keeler & Horney 2007). Reports from the National Center for Education Statistics, (2004) indicated that 13.8% of all students are disabled. This means that a substantial numbers of students are being excluded from fully participating in distance education (Keeler & Horney 2007) because their needs are not fully considered during course development. Additionally, nontraditional learners, older/returning learners, and international learners have also had learning needs not being met with the current system. Examples of "nontraditional" learners include: people with full time jobs taking distance education courses to fulfill employment advancements, military personnel needing to take courses at various times due to deployments and combat, and stay-at-home parents who cannot leave home long enough to attend face-to-face classes due to responsibilities at home. Only in recent years has there been an increase in motivation of higher learning institutions to add basic features to increase diversity accessibility (Thompson, Burgstahler, and Moore, 2010). Distance education courses encompass students with broader needs than ever before.

In this study, Universal Design for Learning (UDL) was introduced and applied. Introduction and application were preceded with the question, "Could the needs of diverse learners be met online by using the principles of Universal Design for Learning (UDL)?" In the traditional classroom, UDL aims to provide course materials using various methods of delivery. Multiple means of delivery provide those with different learning styles the opportunity to participate and learn. Could the principles of UDL meet the needs of online learners?

Statement of the Problem

The rise of distance education has afforded diverse learning populations to take advantage of the virtual platforms of education. When taking a course online in the convenience of the individual's own environment, more learning opportunities occur (Richardson, J. E. 2009). However, a pressing question exists; since institutions of higher learning are reaching more students, are they retaining more students? Meeting students' learning needs, as well as retaining those taking advantage of online courses, may pose

challenges in the development of course design. Additionally, if remediation is needed, instructors may find course development to be even more challenging.

Retention has now clearly emerged not only as a classroom issue, but as an institution of higher learning issue. Retaining students is of concern because it produces monetary benefits and has become a multi-million dollar business within the university system (Bugeja, 2013). Although not a new concept for institutions of higher learning as a whole, retention and enrollment have become a new priority for many faculty members whose employers (institutions of higher learning) have equated increased enrollment with increased monetary benefits. Formerly, faculty members were inclined to believe that only the admissions office, the counselors, and the administration should be responsible for enrollment and retention issues. However, enrollment plays a critical role in terms of faculty workload and salary (Bugeja, 2013; Rouseff-Baker, 2002). As a result, reaching a new market of learners by providing the conveniences of a more flexible schedule in taking courses, and reduced travel time, have contributed to the explosion of online learning and the erection of distance education programs within almost every institution of higher learning. Some faculty members are even required by their institutions to begin teaching courses that were previously delivered face-to-face in a new online capacity, with little or no training in online delivery. Unfortunately, resistance by some seasoned and new faculty, along with their inexperience with teaching online, has led to inevitable challenges. Although many institutions have begun to implement solutions to assist faculty in creating online course environments, still many are struggling with meeting the needs of a diverse population with an array of learning needs.

While individuals may have increased access to education through online learning, course design often excludes addressing learning diversity and often, students with disabilities. For example, some designers believe assistive technologies are an all-around solution to barriers in course design when it comes to creating an accessible course. In contrast, there are others that believe this is simply not true (Keeler and Horney, 2007; Burgstahler, Corrigan, and McCarter, 2004). Burgstahler, et al. (2004) argue that "access alone does not provide adequate accommodations because poorly designed courses erect new barriers to equal participation in academics and careers" (pp. 61-62). Applying UDL principles may contribute to the retention of students and address

the needs of diverse learning. The concept of UDL is still a new concept to many educators and there is limited documentation in current research as to its use and evaluation.

Purpose

Therefore, the purpose of this mixed-method, multi-case study is to understand the applications of UDL strategies by faculty teaching in online learning environments or within a distance learning program. Though research should be an on-going effort, identifying current contributions in the area of accessibility in distance learning is the ultimate goal. This study sought to investigate if implementation of UDL benefited learners. Additionally, the researcher explored whether efforts of integrating UDL at the onset of course design could address diverse learning needs in hopes to retain student presence.

Research Questions

To explore current practices with faculty implementing UDL in an online environment, the research was driven by three research questions:

1. What elements of Universal Design for Learning, accessibility, and practices do faculty members already employ?
2. How does the awareness of UDL impact or affect instructor practices with respect to student learning?
3. Does incorporating supplemental support through collaboration efforts and resources (synchronous support through web-conferencing and asynchronous support) affect faculty use of UDL implementation in their online course(s)?

Significance of the Study

The preplanning design phase of course development usually focuses on course content material. In recent years, this focus has been expanded to include the consideration of potential students who may be taking the course. This consideration is intended to increase student interaction and engagement. However, potential students are

not thought of as having a disability, or barriers, which may prevent them from interacting and engaging. Navigating and accessing text on a course site or web page, accessing documents, viewing and listening to videos, or even listening to an audio recording may create challenges for many who are enrolled in the course, with or without a disability. As a result, the importance of providing accessibility by means of UDL may prove critical to the field of education. Applying UDL to their courses, instructors may have a higher chance of meeting the needs of their students while reducing some of the challenges when delivering a course online. However, in order to apply a concept or strategy, one must first understand how it operates, what results may occur, and the simple practicality of benefiting from such results.

There is insufficient understanding of how faculty instruct, learn, understand, or apply UDL. This study will provide insight on the introduction and application of UDL, and attempt to fill in the gap by implementing UDL principles in order to gain a more enlightened understanding of how UDL application affects learning and teaching. Implementation of UDL at the onset of course design, combined with UDL-based teaching strategies that provide opportunity for the diverse learning needs of students, could impact how course material is delivered in an online learning environment.

The Approach

The UDL module is the treatment in this study. Instructors teaching at institutions of higher learning were asked to view a UDL module created by the researcher and to implement basic UDL applications in their online course(s). Web-conferencing sessions were used as the meeting arena to hold and record discussions as well as to conduct the interviews. It was essential that the study provided an understanding of how the UDL training module enhanced teaching and learning and if UDL principles were being applied.

Figure 1 below depicts the flow of the study. Instructors were introduced to the concept of Universal Design for Learning and were asked to view the UDL module; the *treatment*. After going through the module, each online instructor was asked to apply one basic UDL principle in their online course within the means of their course delivery, university policy, and their respective learning management systems. The participants

were collectively analyzed through qualitative methods: one-on-one interviews, course observations, and field notes collected through artifacts and documentation.

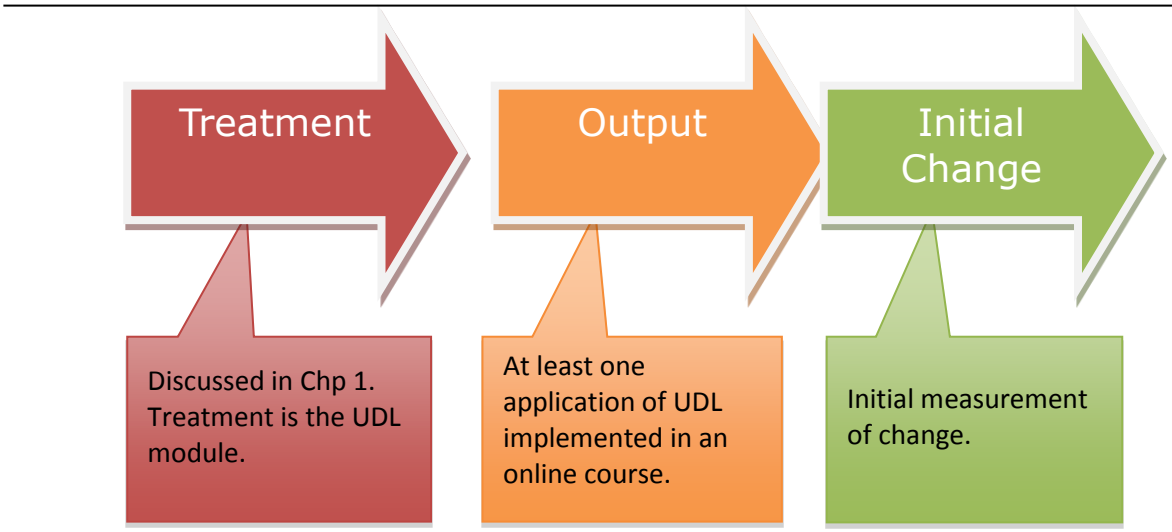


Figure 1. Procedural steps in research process

After the *treatment*, the process continued with the second component - the *output*, shown in Figure 1. Instructors were then analyzed in their utilization of UDL. Measuring *initial change* was the final step in the process. This was accomplished by examining each case in order to develop an in-depth understanding of where instructors' uses of UDL occurred. Attitudes and practices that supported using, or not using, UDL were recorded (Oreck, 2004). Participants were provided an additional week to view the module before meeting with the researcher for the first time in a synchronous environment. It took approximately 30 minutes to complete the module.

Conceptual Framework

Knowles's Adult Learning Theory (Knowles, 1970; Knowles, 1975) provided the conceptual framework for this study. This theory describes how adults learn. "Andragogy is defined as the art and science of helping adults learns." (Knowles, 1975, p. 19) The term andragogy refers to an approach that is learner-focused and self-directed and is common in adult education. In contrast, pedagogy refers to a teacher-focused and teacher-directed approach. Andragogy provides a set of assumptions for designing instruction with learners who are more self-directed than teacher-directed. (Birzer, 2004;

Conner, 2004; Taylor and Kroth, 2009)

Table 1 provides Knowles (1975) six key assumptions where self-concept, experience, readiness to learn, orientation to learn, motivation to learn, and need to know set the foundation for how adult learning occurred. The framework guided the research questions which affected how and what instructors were experiencing when applying basic UDL principles

Table 1. Knowles Six Key Elements of Andragogy: How Adults Learn

Self - Concept	As one matures his /her self-concept moves from a dependent personality towards more of a self-directing personality
Experience	An adult begins to accumulate a rich reservoir of experiences in which he/she can account for and use as resources for further learning.
Readiness to Learn	The readiness of an adult to learn is very much related to the developmental tasks of his/her own locus of control; work, social, family, etc.
Orientation to Learn	Time and perspectives change as people mature resulting in things learned to be applied and implemented immediately instead of waiting until one might need it.
Motivation to Learn	Adults are motivated to learn by internal rather than external factors. Curiosity may be a motivator for learning.
Need to know	Adult learners tend to learn when there is a need to know and an immediacy of implementing the information either for themselves or another individual

Knowles, M. S. (1975)

Summary of Methodology

A mixed-method, multi-case study design (Stake, 2006; Merriam, 1998) was used in this study. A two-phase data collection process was conducted (Seay, 2010). Phase I was a dissemination of a questionnaire to distance education programs across the United States.

A more in-depth analysis was done during the second phase, Phase II, which consisted of qualitative methods in collecting data on four case studies. Multiple-case analysis was used by implementing a step-by-step process of coding, categorizing, and creating themes to generate findings with the data (Stake, 2006; Merriam, 1998; Saldaña, 2009). Phase II followed multi-case research as described by Stake (2006). He stated that in multi-case research, the single case is of interest since it belongs to a collection of cases that share a common characteristic or condition. In this study, the common characteristic was that each participant had some extent of teaching online. "In a collective or multi-case study, the researcher again selects one issue or concern but also selects multiple case studies to illustrate the issue" (Creswell, 2008; Creswell, Hanson, Clark, & Plano, 2007, p. 246). Another characteristic is that these cases were bound together by time, place, or physical surroundings (Stake, 2006; Merriam, 1998; and Creswell, 2008). This research study was bound by time, place, and physical surroundings of institutions of higher learning with an online learning environment.

Role of the Researcher

As the researcher, two different roles were acquired during this study. Various questions were sought from an educator's perspective as well as from a student's perspective. Since I am a former teacher in the public school system who taught students with various disabilities, primarily hearing loss, I strongly believed in the connection of continuing education with success in learning - including students with a disability or diverse learning needs. I wondered, as a student continued on the path of education and continued into college-institutions of higher learning in general, would there be an acknowledgment or preparation for such a learner by institutions of higher learning? If a student decided to take an online course, would the institution, or instructor, be prepared to address diverse learning needs? Diverse learning needs take into account the multiple learning modes individuals use to acquire and retain information. In other words, people in general learn in multiple ways. Applying the term diverse learner takes into account these multiple learning ways and the many different people that encompass them.

Simultaneously, from a student's perspective, I am deeply rooted in my own cultural diversity and ethnicity. The impact of how and when I learn and have learned as I

participated in online courses intrigued me. The difference of success or nonsuccess depended on how the delivery of content occurred. Would the language be difficult to understand if I could not immediately ask a question? Would there be options for learning that focused on my specific learning strengths? These were questions that not only applied to me, but to others as well. Considering the perspectives as an educator and of a student, methods for best collecting and analyzing data evolved.

Addressing Bias

To not acknowledge bias would be erroneous. As an educator, primary concerns were to ensure the successes of all students. Connecting with participants whose thought process was different than my own was of concern; therefore, precautions were undertaken to avoid any bias actions in order to gain a true and accurate reflection of data and non-bias activity during the process of collecting and analyzing the data.

Triangulating the data was included within various responsibilities and methods during both the quantitative and qualitative portions of analyzing the data. During Phase I, a questionnaire (Appendix B) was created and disseminated through email to various distance education programs throughout the United States. I used HigherEd.com and Internet searches to find universities offering distance education degree programs. Once programs were isolated, contact was initiated by email to online instructors, heads of programs, and key individuals affiliated with distance learning. Phone calls were then made to identify key individuals in order to create a more personal connection for a possible increased return on completed questionnaires. Questionnaires were disseminated at three different times allowing for up to three weeks for completion, including reminder emails to initially contacted participants. Upon completion of the questionnaire, I began to collect the data and isolated individuals who were willing to continue on with the second phase of the study.

After recruitment of participants for the second phase of the study, a consent form was provided (Appendix B). The UDL treatment module remained accessible to participants for continuous support even after viewing the module. To better comprehend how implementing basic UDL applications affected online instruction and their experiences when applying UDL in their course, I proceeded with interviewing

participants, recording each interview, observing their courses, taking field notes, and collecting documents. After each interview, I transcribed the data from the recordings, verified the data, analyzed the data, and reported the data.

Limitations

This study held significant findings with regard to a positive shift towards attitudes and change in approaching how teaching has occurred in an online setting and the importance of having accessible content available at the onset of the course. The overarching goal is to contribute information on online accessibility through validation and strength of the study. Data stemmed from instructor interviews, course observations, and collection of artifacts and documentation that collectively carried merit and worth in their own rights have fulfilled this goal. However, with that said, this study also possessed its share of limitations. A more detailed account of limitations has been reserved for the Chapter 8.

Definition of Key Terms

Important terms used in this study are explained below.

Andragogy. "Andragogy is defined as the art and science of helping adults learns" (Knowles, 1975, p. 19).

Diverse Learners - include those with disabilities, second language learners, as well as traditional and nontraditional students (Santovec, 2005).

Guskey's Five Levels of Professional Development.

1. Level 1-Participants' reactions
2. Level 2-Participants' learning
3. Level 3-Organization support and change
4. Level 4-Participants' use of new knowledge and skills
5. Level 4-Student Learning Outcome

Guskey's Five Levels of Evaluation (Guskey, 2000, p. 182)

Online Environment-any form of instruction delivered to students that is not confined to a brick and mortar, traditional classroom environment. Ex. Web-based delivery

Universal Design for Learning (UDL) - A teaching concept that implements teaching strategies to meet the needs of *all* learners. "UDL provides a blueprint for creating flexible goals, methods, materials, and assessments that accommodate learner differences." (Center for Applied Special Technology, CAST, 2009a)

Summary

Distance education has afforded many diverse populations the opportunity to receive an education using an online platform that provides conveniences never experienced before. In Chapter 1, the researcher addressed the unexpected problems instructors and students may encounter when a course is delivered in an online format.

Therefore, the purpose of this study addressed how preplanning the design of a course is critical in meeting the diverse learning needs of students. Utilizing the framework of Andragogy in how adults learn as well as guidelines supported in Universal Design for Learning may allow instructors to deliver material to the widest audience possible without isolating any single population, or group, with respect to accommodations. Additionally, without time-consuming modifications if introduced later in a course.

Chapter 2 of this dissertation explores literature concerning ways in which adults learn (Andragogy), the definition and theoretical framework of Universal Design for Learning, and the influence of students and laws on how courses are erected. Additionally, empirical research of Universal Design for Learning is included. Chapter 3 discusses the methodology used, including an initial survey, one–on-one instructor interviews, course observations, artifacts, and documentations focusing on implementation of UDL by instructors. Chapter 4 discusses the treatment (the UDL module), and showcases its information and the role it played in the study. Chapter 5 describes each case study who further participated in Phase II of this study. Chapter 6 identifies the results and describes the data collection and analysis process of the study for Phase I. Chapter 7 explains the themes that emerged through coding and analyzing the data. And finally, Chapter 8 contains a discussion of the results, limitations of the study, further implications of study, and recommendations for further research.

Appendices are included at the end to display documentation used during this

study. Listed in order are copies of the:

1. Appendix A: Faculty Consent Form
2. Appendix B: IRB Approval Letter
3. Appendix C: Initial Survey Questionnaire
4. Appendix D: One – On – One Initial Interview Questions
5. Appendix E: UDL Checklist from CAST
6. Appendix F: Exit Interview Questionnaire

CHAPTER 2. LITERATURE REVIEW

The study in how individuals learn is something that has been occurring for decades. However, the means by which individuals learn, and subsequently use what is learned, has changed over the years-specifically in higher education distance education programs and online learning. Distance education has exploded into a lasting phenomenon that has encompassed not only how a course is delivered online, but who the audience may be, what learning styles and diverse needs will be encountered, and how meeting accessibility for all learners will be met. This chapter will address four major topics: Professional Development and Change, Distance Learning and Students with Disabilities, Diversity in Learning and Universal Design for Learning (UDL), and Knowles' andragogical theoretical framework of how adults learn. Nested within these major subjects will be discussions on issues and facts that affect teaching and learning in an online environment, including how the theoretical framework supports and aligns with the research questions.

Professional Development and Change

Professional development training has often afforded educators the opportunities to be exposed to new and innovative teaching strategies. The increase of distance learning, especially in higher education, has also joined the efforts in the professional development arena. Taking workshops or courses where instructors can receive training to teach online has multiplied. "Online environments are rapidly expanding as a venue for professional development in education, business, and industry". (Vrasidas and Zembylas, 2004, p. 326) As a result of keeping up with the movement of online education, along with ever-changing technology, an increasing number of instructors are leaning toward more innovative teaching approaches. According to Rogers' (1995), acceptance of new strategies and techniques takes on unique challenges. Being new to online invites opportunity for innovators, which allow opportunity for others to see if trying something new is worth the effort. This is critical in adoption of buy-in and may be the turning point

for a few laggards to jump on board.

Additionally, administrative support continues to critically influence instructors' actions in striving to achieve something innovative. The adoption of UDL follows suit. Implementing innovation means change occurs - changes in teaching and the way material is delivered in reaching a changing audience. Administrative efforts in supporting change also mean meeting the needs of students and addressing the diversity of change in students. Since participation of students with diverse abilities and disabilities has created an increase in enrollment, institutions are changing how traditional courses are being developed and delivered, including courses offered online.

More universities are recognizing the need for change. The University of Washington DO-IT program has accomplished various research venues; one being Systematic Change. This is when change occurs within a system or organization (Burgstahler, 2009). The University of Washington has implemented change through professional development by asking four questions:

- *Who are the people involved in the change?*
- *What are the organization's abilities and resources?*
- *What is the climate for change?*
- *What are the mandates/objectives of the organization?* (Burgstahler, 2009)

The DO-IT program continues to state that although change is inevitable, faculty may need to reform their understanding to academic quality, including the change of diversity reflected upon a new population of students. Nevertheless, conflict will continue to exist between diversity and quality in higher education until change occurs and aligning learners and their needs are established.

Instructor Attitudes and Student Accommodations

Although an increase of instructors is involved in professional development and distance education programs, the process of change can be slow. The lack of awareness and negative attitudes that fester in higher education can directly contribute to the lack of change when delivering course material. Increases in demand of delivering online courses have resulted in initial challenges when a course is designed, especially if little or no support is readily available. As a result, ramifications of such course offerings

compromise certain audiences on the receiving end from learning; a diverse populated audience where materials must be accessible to all those enrolled in the online course (Tobias, 2003). Students with disabilities are amongst those in the diverse learning population and addressing a student with a disability with regard to their learning needs has often been after the fact. Further discussion on students with disabilities will be discussed in a later section; however, the introduction of students being included amongst diverse learners is necessary to mention.

As little as eight years ago, programs only dealt with accommodation issues *after* a student with a disability enrolled in a course (Burgstahler, Corrigan, and McCarter, 2004). Traditionally, accommodations for accessibility were only created once a student in class was known to have a disability, creating a more time-consuming and possibly expensive solution to a problem that could have been eliminated from the beginning if actions of designing to include accessibility were initially implemented. During the planning stages of developing a course, potential students are not thought of as having a disability or any barriers that would prevent them from learning and implementing changes to how courses are developed can be a slow process especially if validation of research before change can occur, specifically at the legislative level. A study from the University of Washington's DO-IT program (Burgstahler, 2009) has concluded research where promoters and inhibitors of change can promote factors related with:

- Legislation
- Awareness
- Attitudes
- Diversity efforts
- Change
- Cost
- Market forces

Of the above, *awareness, attitudes, diversity efforts, and change* will be addressed in more detail when results are discussed. Apart from attitudes and change, Federal laws and accessibility play a crucial role in the development of courses and the way students are now receiving an education.

Distance Learning and Students with Disabilities

Since an increase in distance education creates a need to supply the demand of learning, changes to how courses are being taught are inevitable. Included are a diverse learning population who possess a wider range of learning modalities and styles. According to the recent publication of the United States Distance Learning Association (USDLS),

> Online learning is catching on at every level of schooling. The U.S. Department of Education, in a 2009 report, estimated that more than one million students from Kindergarten to Grade 12 were enrolled in online courses in 2007, and a study by "Project Tomorrow" found that the number of high school students taking an online class nearly doubled from 2008-2009. A nationwide survey by the Sloan Consortium found that three quarters of school districts surveyed in 2008 had students participating in some form of online coursework and another 15 percent expected to have students working online within three years. (Flores, 2010, p. 3)

Included within the increased online population in postsecondary education are those with disabilities. The most recent data documenting students with disabilities in postsecondary education were reported in a 1999 National Center for Education Statistics (NCES) report. The research for this report was conducted in 1996. Although an increase in enrollment amongst students with disabilities has risen, there has not been a more current research study documented by NCES. A study conducted by Horn and Nevill (2006), reported that 11.3% of undergraduate students reported themselves as having a disability. Of those 11.3%, the following breakup of specific disabilities disclosed was as follows:

> 3.8% visual, 5.0% hearing, .4% speech, 25.4% orthopedic, 7.5% specific learning disability, 11% Attention Deficit Disorder, 21.9% mental illness/depression, 17.3% health impairments/problems, and 7.8% other (p.134).

Creating accessible courses in a distance learning environment may meet the needs of all students by implementing accessible content through the use Universal Design for Learning. This may lessen the one-size-fits-all way of thinking. Students with disabilities would be included as part of the whole learning population alleviating anyone

from being singled out should an accommodation be necessary later in a course.

Students with Disabilities and the Federal Law

Standards mandated by Section 508 of the Rehabilitation Act Amendments (1998) (U.S. Department of Education, 1998), and guidelines from the World Wide Web Consortium (W3C, 2009), are amongst a few mandated laws and guidelines that have changed how websites and online accessibility have been implemented. Burgstahler, et. al, (2004) stated,

> In 1996, the United States Department of Justice clarified that the American with Disabilities Act of 1990 accessibility requirements apply to programs offered on the Internet by stating: Covered entities that use the internet for communication regarding their programs, goods, or services must be prepared to offer those communications through accessible means well.

Online courses must be made accessible to students with disabilities. Students with disabilities are enrolled in both face-to-face courses as well as online courses just as students without disabilities are. If collaboration activities are instituted by faculty of the course, the student with the disability is expected to participate. Including appropriate and accessible means of communication and collaboration at the onset of course design will allow for optimum participation by all learners in the course (Jaeger & Xie, 2009). Why is accessibility at the onset of course design the better solution? The difference between accommodation and accessibility will now be clarified.

Accommodation Versus Accessibility

According to many educators with a special education background (exceptionalities, special needs, or any other label that has been applied to the same profession), modifying course materials has been the norm in accommodating individuals with a disability. However, creating an accommodation and creating accessibility are *not* the same. One could misconstrue the meaning of accommodation and accessibility as interchangeable, but this would be inaccurate. Accommodations are typically related to advocacy and inaccessible environments, which are modified upon request (Edyburn, 2010). This includes accommodations made to materials used in courses regardless of K-12 or in higher education. The Americans with Disabilities Act (ADA), (1990) site

defines an accommodation as the act or state of adaptation. Creating an accommodation in itself creates an inequality and singles out a person with a disability when a modification, or accommodation, is made. For example, having text converted to Braille, or meeting at a new location for a class due to wheelchair inaccessibility, are accommodations made after a course has begun. Although accommodating an individual with a disability is, by law, mandated, the time it took to make the accommodation later in a course, or upon request, could have been used to create accessibility in the first place without having to go back once the course began (Burgsthaler, et. al, 2004).

As for accessibility, Edyburn (2010) explains that accessibility within an environment creates equality for *all* those in that environment. Access to an initial meeting place via accessible means of architecture such as ramps, allows entry for all, including people with wheelchairs, moms with strollers, or even those with bicycles. Meeting online in an asynchronous discussion forum or a synchronous platform, could also be considered a meeting place at the beginning of a course where accessible means of communicating is established. What other steps could an educator take to create accessibility for all learners, and how could this be accomplished? The concept of Universal Design for Learning involves the actions of faculty to incorporate accessibility within their courses and materials, to all students in order to benefit the most students possible: an array of diverse learners that may be comprised in a single course. What characteristics make up a diverse learner? Moreover, are we all considered to be diverse learners? Understanding how individuals learn can clarify how other individuals teach.

Diverse Learning: Brain Research and Learning Styles

We all learn using a combination of the same senses; we simultaneously have diverse learning needs and learning styles. “Individuals bring a huge variety of skills, needs, and interests to learning. Neuroscience reveals that these differences are as varied and unique as our DNA or fingerprints” (CAST, 2010). How the brain works may provide insight as to how individuals learn. CAST (2010) has detailed the “what, how and why” of learning. Table 2 describes in further detail the mechanics of how the brain works.

Table 2. Recognition, stratigic, and sffective networks explaining the what , how and why of learning, (CAST, 2010)

Recognition Networks	Strategic Networks	Affective Networks
		
The "what" of learning: How we gather facts and categorize what we see, hear, and read. Identifying letters, words, or an author's style are recognition tasks	**The "how" of learning:** Planning and performing tasks. How we organize and express our ideas. Writing an essay or solving a math problem is a strategic task.	**The "why" of learning:** How learners get engaged and stay motivated. How they are challenged, excited, or interested. These are affective dimensions.

Referring back to Table 2, Recognition Networks, the "what" of learning, explains how we gather facts and categorize what we see, hear, and read. Identifying letters, words, or an author's style, are recognition tasks. Strategic Networks address the "how" of learning in planning and performing tasks, and how we organize and express our ideas. Writing an essay or solving a math problem is a strategic task. Affective networks are the “why” of learning. These address how learners get engaged and stay motivated. Additionally, how learners are challenged, when they feel excitement, or when they are interested. These all include affective dimensions.

Our unique set of experiences allows each of us to learn in a different way. We choose to learn in ways that are most successful for us, in the same way we understand what goes on around us. It is the way we choose to absorb new information (Thurber, 2003; Callahan, 1999). Would UDL assist the unique learning styles of individuals? Additionally, would a UDL training module reach the diverse learning needs of its participants within this study in order for learning to occur, and transfer what is learned to others? Visual, auditory, and kinesthetic (motor) of the how’s, why’s, and what’s of learning modalities continue to direct our learning and guide our acceptance in innovative teaching and learning strategies. These questions will be considered after the definition

and theoretical framework of UDL are addressed.

Definition and Theoretical Framework of UDL

Following the principles of its architectural origin, and contributions of Ron Mace with respect to Universal Design (UD), Universal Design *for Learning* (UDL) applies to education as opposed to architecture. The concept was first defined by the Center for Applied Special Technology (CAST) in the 1990's (Orkwis & McLane, 1998). Universal Design for Learning is a teaching concept that implements teaching strategies to meet the needs of *all* learners. "UDL provides a blueprint for creating flexible goals, methods, materials, and assessments that accommodate learner differences" (CAST, 2009a). UDL was first implemented in face-to face classrooms where teachers began to recognize the benefits of creating courses that would benefit all learners at the onset of course design rather than having to create ways to accommodate individual learning needs later in the course. Figure 2 illustrates the theoretical framework of Universal Design for Learning.

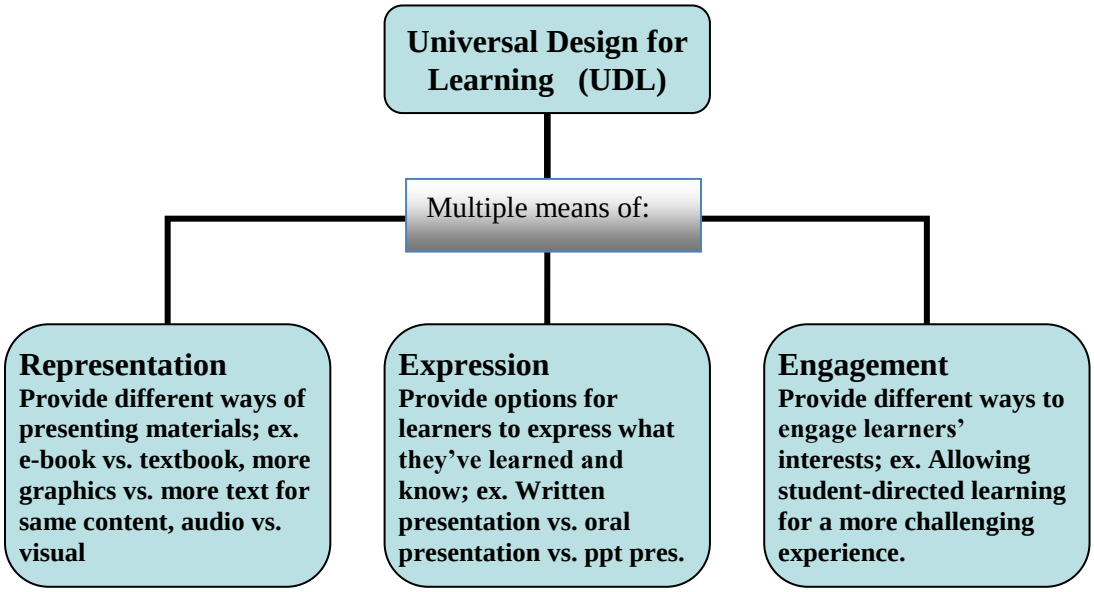


Figure 2. Theoretical Framework and Guidelines for UDL (Adapted from CAST, 2009a, http://www.cast.org/udl/index.html)

Referring to Figure 2, Universal Design for Learning (UDL) consists of how multiple means of Representation, Expression, and Engagement are represented using guidelines, or principles, represented by content and information exchange. Multiple

means of representation provide different ways of presenting materials. Examples include: e-book vs. textbook, more graphics vs. more text for the same content, and audio vs. visual. Multiple means of expression include options for learners to express what they have learned and know. Examples include: written presentation vs. oral presentation vs. a PowerPoint presentation, etc. Multiple means of engagement provide different ways to engage learners' interests. An example includes allowing student-directed learning for a more challenging experience.

A deeper explanation implementing multiple means of representation is addressed, allowing the reader to further examine its application. Figures 3 and 4 show a comparison of how content can be represented. Implementing *multiple means of representation* allows for course content and materials to be represented in multiple ways that engage the learner while still conveying the same meaning to a diverse learning audience. An example would be using graphical depiction of text, as opposed to using text alone, to convey the same meaning. Figure 3 shows how content is often displayed in a typical course using a PowerPoint slide, commonly seen in a distance education course.

Figure 3. Common format for listing words during content delivery

Using the same information, words can be displayed in a different manner but have the same meaning. Figure 4 shows a mean of representation by showing a graphical depiction of the same list of words; however, showing more of a visual relationship amongst them.

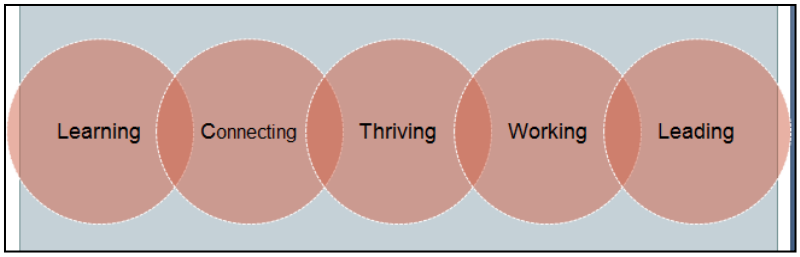


Figure 4. Graphical depiction of text

Not acquiring prior knowledge of why the above figures pose significance in meaning, one may assume the words are related by viewing the connecting circles in Figure 4 just by its graphical depiction, whereas Figure 3 may simply convey a list of unrelated words.

Applying *multiple means of engagement* allows the instructor to provide materials to students with diverse learning needs while still maintaining interest and engagement of the majority, if not all of the learners present. Additionally, student learning has more potential to increase when challenged with multiple means of engaging materials and content. As mentioned previously, examples include providing electronic books, as well as a hard copy of the same book, which can be available at a library for checkout. Both contain the same material; however, one student may prefer reading electronically, while the other may need something more tangible (Burgsthaler et. al, 2004; CAST, 2009b).

Overview of Guidelines and How They can be Applied

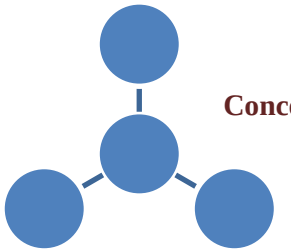
Guidelines comprise of *multiple means of representation*, *multiple means of expression*, and *multiple means of engagement*. Table 3 provides examples of each of the *multiple means* when applications of UDL are implemented.

Table 3. Multple Means of Representation, Gngaement, and Expression

Multiple Means of Representation	
Provide options for perception	
Offer ways of customizing the display of information	Examples
Size of text, images, graphics, tables, or other visual content	Fonts: sans serif fonts are typically the best to use; ex. Times New Roman, Arial, Calibri
Background/text contrast	White letters on black background
Color used for information or benefits/color benefits	Using red boxes and green circles
Offer alternatives for visual information	Examples
Provide descriptions for images, graphics, video, or animations	 Image of a cat lying on its stomach.
Use touch equivalents (tactile graphics or objects of reference) for key visuals that represent concepts	Rolling over a graphic to see image changes or descriptors 
Offer alternatives for auditory information	**Examples**
Use captioned or speech-to-text for spoken language	JAWS, Dragon Naturally Speaking software
Provide visual diagrams, charts, notations	 **Hierarchal flowchart**

Use of visual analogues to represent emphasis and prosody (emoticons, symbols, or images)	 Smiley face  No entrance

Multiple Means of Action or Expression	
Provide options for physical action	
Vary the methods for response and navigation	**Examples**
Provide alternatives for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control)	**1. Gender** ○ Male ○ Female
Optimize access to tools and assistive technologies	**Examples**
Provide alternate keyboard commands for mouse action	Ctrl + C……copy Ctrl + V……paste
Provide options for expression and communication	
Use multiple media for communication	**Examples**
Use physical manipulatives (blocks, 3-D model)	 **Gear: 3-D design**
Accessible asynchronous or synchronous environments for discussions	Discussion boards, wikis, Blackboard Collaborate, Adobe Connect, etc.

Use multiple tools for construction and composition	Examples
Provide spellcheckers, grammar checkers, word prediction software	**Acessibility……accessibility**
Use story webs, outlining tools, or concept mapping tools	 **Concept map**

Multiple Means of Engagement	
Provide options for recruiting interest	
Optimize individual choice and autonomy	**Examples**
Allow learners to participate in the design of classroom activities and academic tasks	Peer assessments
Involve learners, where and whenever possible, in setting their own personal academic and behavioral goals	Personal learning plan, journals, learning contracts
Optimize relevance, value, and authenticity	**Examples**
Vary activities and sources of information	• Personalized and contextualized to learners' lives • Culturally relevant and responsive • Socially relevant • Age and ability appropriate • Appropriate for different racial, cultural, ethnic, and gender groups

CAST (2011). A complete version can be found at http://www.udlcenter.org/aboutudl/udlguidelines

Examples of applying UDL under *multiple means of representation*, specifically by an instructor teaching in a distance learning environment, would include, but not be limited to, the following: Size of text, images, graphics, tables, or other visual content background/text contrast, color used for information or benefits/color benefits; provide descriptions for images, graphics, video, or animations, use of touch equivalents (tactile graphics or objects of reference) for key visuals that represent concepts; use captioned or speech-to-text for spoken language, provide visual diagrams, charts, notations, and use of visual analogues to represent emphasis and prosody (emoticons, symbols, or images)

Under *multiple means of expression* practices include: provide alternatives for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control), provide alternate keyboard commands for mouse action, use physical manipulatives (blocks, 3-D model), accessible asynchronous or synchronous environments for discussions, provide spellcheckers, grammar checkers, word prediction software, and use of story webs, outlining tools, or concept mapping tools.

Under multiple *means of engagement* practices include: allowing learners to participate in the design of classroom activities and academic tasks involving learners, where and whenever possible, in setting their own personal academic and behavioral goals. Engagement also means varying activities and sources of information by implementing content that is personalized and contextualized to learners' lives, culturally relevant and responsive, socially relevant, age and ability appropriate, and appropriate for different racial, cultural, ethnic, and gender groups (CAST, 2012).

Incorporating prior knowledge and experience of students' family origins and culture within a lesson also incorporates UDL. Applying UDL guidelines creates opportunities for educators to involve students who may not have otherwise participated, or put forth their best efforts if multiple ways of engagement were not available.

UDL's emphasis on teaching practices began long ago and was first introduced within the four walls of a traditional face-to-face classroom setting.

UDL in the Classroom

Educators have attempted to implement UDL in face-to-face classrooms, where

benefits have been recognized when incorporated at the onset of course design, as opposed to having to create ways to accommodate individual learning needs later in a course. However, it must be stated that UDL has not been scientifically validated, and literature involving UDL, especially in distance education, is limited. Most recent literature focuses more on *face-to-face* applications of UDL as opposed to online (Edyburn, 2010; McPherson, 2009; Rose, Harbour, Johnston, Daley, & Abarbanell, 2006). A study by Pace and Schwartz (2008) attempted to address accessibility in an asynchronous online environment by providing a preview of class presentations, an outline of class notes, a review for examinations, and access to readings online. However, the primary focus of their study involved face-to-face classroom technology using clickers to increase overall class discussions.

Several educational programs have implemented UDL within their curricula on a much larger scale; the Delaware Department of Education (K-12) and The Center for Universal Design at North Carolina State University (Delaware State Dept. of Education, 2004; Center for Universal Design, 1997) have used UDL principles in various schools throughout North Carolina and Delaware. These include providing various methods of delivering content; one can use a whiteboard, toothpicks, and cubes to demonstrate a math problem using multiple means of delivering content for various learning needs. Other examples are provided using various methods of delivery and presentation. Various other programs include UDL initiatives implemented in Kentucky, New York, California, and Ohio (Meo, 2008; Muller & Tschantz, 2003). Taking UDL a bit further to extend in an online environment makes for an even greater challenge in locating literature and is something educators are seeing as a new venture.

Benefits of UDL in Distance Education

Implementing UDL in distance education creates for a beneficial learning environment to those with diverse learning needs and backgrounds. Educators using best practices when delivering courses can gain leverage when the benefits of UDL are implemented first hand either through self-research, professional development workshops, or even being involved with colleagues in knowledge-sharing communities of practice where information becomes a valuable resource. Knowledge-sharing

communities of practice, specifically, have the potential to provide faculty with the trust, insights, and professional best practices to benefit the design, implementation and evaluation of distance learning (Lin, Lin, & Huang, 2008; Wenger, McDermott, & Snyder, 2002). Learning new avenues and implementing best practices in reaching diverse learners promote greater teaching advantages. Examples of best practices in teaching can include the use of text captioning, which not only benefits those who cannot hear, but also benefits second language learners, as well as those who endeavor to complete online assignments in the wee hours of the morning without disturb sleeping family members. In a distance learning environment, digital materials, font change options, screen reader accessibility, or even video can be accessed.

Taking these benefits into consideration, implements of a professional development UDL training module may increase the awareness of UDL as well as provide opportunities for it being applicable to educators teaching in distance education. A study by Don Finn on measuring the effectiveness of an online faculty development UDL module and integration after viewing a module was conducted with 75 online instructors within a community college in Virginia. Results indicated that 93% would include materials to integrate UDL in their courses and 96% claimed they developed new ideas after viewing the module (Finn, 2005).

To better understand how accessibility in distance education can be evident when using UDL in course design, creating awareness of what UDL is and how it can benefit all learners is necessary. In this study, basic concepts of UDL are introduced through an online training module where participants consented to using one application of UDL while simultaneously receiving supplemental support. Feedback from instructors was collected and analyzed. Finn (2005) discovered that the way adults learn not only affects their approaches to teaching, but also affects how they gain knowledge themselves. How one learns is often replicated in his or her own teaching. Andragogy, the theory of how adults learn, creates the theoretical framework for this study in demonstrating the reaction of instructors and their use of UDL. A discussion on Knowles's Andragogy follows.

Theoretical Framework

The theoretical framework provides a lens to help analyze issues about how

faculty become aware, utilize, and collaborate with respect to Universal Design for Learning as well as to provide a conceptual approach for organizing relationships and processes. Encompassed within the area of adult learning and, specifically, the art and science of how adults learn, Andragogy created the Theoretical Framework for this case study. Andragogy was appropriate given that the students are adults themselves, and the framework is well established in the literature. The theory of adult learning is supported by Malcolm Knowles' works, *The Modern Practice of Adult Education: Andragogy versus Pedagogy* (1970). Prominently used in the 1970s and 1980s, Andragogy was widely used to guide the teaching of adult learners (Davenport & Davenport, 1985; Conner, 2004). A movement from teacher-centered to learner-centered set the foundation for adult learning.

Discussions of Andragogy, including arguments for and against its uses, will be addressed in further detail. Additionally, the introduction of Thomas R. Guskey's evaluating professional development as best fitting the evaluation framework of a Universal Design for Learning (UDL) module will be discussed. Guskey's (2000) guidelines for evaluating professional development is the foundation of evaluating the treatment module in this study upon initial interaction when implemented in a distance learning environment.

Knowles's Andragody: Adult Learning Theory

Knowles's Adult Learning Theory (Knowles, 1970; Knowles, 1975) has been described as how adults learn. "Andragogy is defined as the art and science of helping adults learn" (Knowles, 1975, p. 19). Andragogy has differentiated between adult learning and that of how a child learns, referred to as pedagogy. It refers to an adult being learner-focused and self-directed, whereas pedagogy is referred to as teacher-focused and teacher-directed. Andragogy provides a set of assumptions for designing instruction with learners who are more self-directed than teacher-directed (Birzer, 2004; Conner, 2004; Taylor & Kroth, 2009).

Table 4 provides Knowles's (1975) six key assumptions where self-concept, experience, readiness to learn, orientation to learn, motivation to learn, and need to know set the foundation for how adult learning occurs. The framework guides the research

questions which may affect instructors' experiences when applying basic UDL guidelines; experiences which may result in continuance of its use.

Table 4. Knowles (1975) Six Key Assumptions

1. Self-concept-as one matures his /her self-concept moves from a dependent personality towards more of a self-directing personality. This includes how learning may begin to occur.
2. Experience-An adult begins to accumulate a rich reservoir of experiences in which he/she can account for and use as resources for further learning.
3. Readiness to learn-The readiness of an adult to learn is very much related to the developmental tasks of his/her own locus of control; work, social, family, etc.
4. Orientation to learn-Time and perspectives change as people mature resulting in things learned to be applied and implemented immediately instead of waiting until one might need it.
5. Motivations to learn-Adults are motivated to learn by internal rather than external factors. Curiosity may be a motivator for learning.
6. Need to know-Adult learners tend to learn when there is a need to know and an immediacy of implementing the information either for themselves or another individual

Knowles' adult learning theory supports the research questions and how learning may occur when participants view and interact with the UDL module. The module will be the treatment in this study with intentions of increasing knowledge and skills in the area of diverse learning (Desimone, 2009).

A visual representation shows the flow of this study in Figure 5. The first step, the *Treatment* module was the professional development training module which delivered ways of applying basic UDL principles. The second step, the *Output* portion of the study, was introduced after participants viewed the module and began the implementation process of at least one application of UDL within their online course(s). The third step was to measure the *Initial Change* supported by Desimone's (2009) efforts in her study on professional development and how change can be measured. Initial change will be further addressed in Chapter 7.

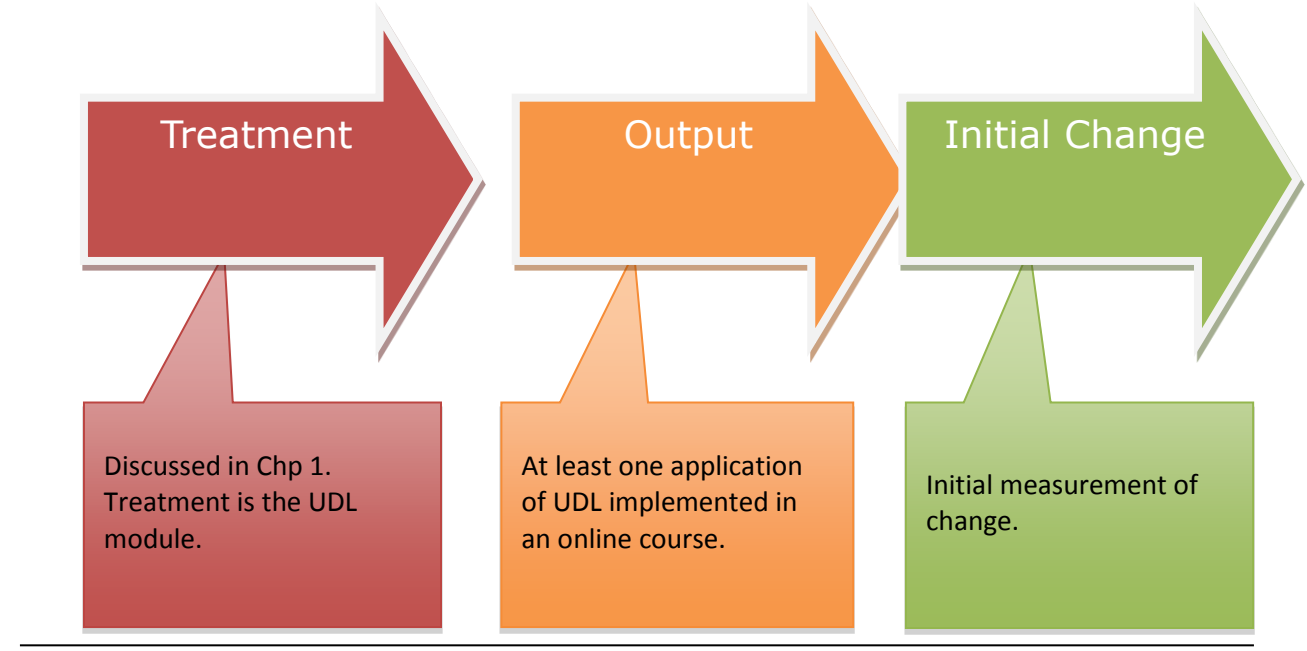


Figure 5. Treatment, Output, and Initial Change

Major Arguments for and against Knowles's Theory of Andragogy

Knowles's Theory of Andragogy has been criticized in the past due to the lack of documented research and lack of empirical studies (Davenport et. al, 1985; Houde, 2006; Taylor et. al, 2009). Other criticisms claim there is a lack of identifying and developing best practices in adults learning instructional strategies including appropriate instruments to measure Andragogy (Holton, Wilson, & Bates, 2009). Regardless of its criticism, Andragogy is still being used and new studies on developing instruments are currently underway (Holton et. al, 2009; Taylor & Kroth , 2009). Comparing it with other adult theories for validation creates a continuance of its use in adult learning and a starting point some educators may turn to (Houde, 2006; McGrath, 2009). Using Knowles' theory of Andragogy in this study was to provide additional documented research for contribution.

Alignment of Andragogy and Research Questions

To better understand how each research question aligns with Andragogy, a visual comparison is detailed in Table 5. Afterward, the same information is broken up in separate tables detailing each research question, Knowles's Theory, and the goal of the module.

Table 5. Research Questions and Their alignment with Andragogy

Research Question 1	What elements of Universal Design for Learning or accommodations/practices do faculty members already employ?
Knowles Adult Learning Theory	Self-concept moves from a dependent to a self-directing personality. Using past experiences adults begin to accumulate a rich reservoir of experiences in which he/she can account for and use as resources for further learning
Goal #1 in module	Introduce and discuss general UDL concepts
Research Question 2	How does the awareness of UDL impact or affect instructor practices with respect to student learning?
Knowles Adult Learning Theory	Readiness to learn- how participants will use what is learned in his/her own locus of control
Goal #2 in Module	Provide suggestions for using UDL relative to diverse learners, including individuals with disabilities in postsecondary education
Research Question 3	Does incorporating supplemental support through collaboration efforts (synchronous support through web-conferencing and asynchronous support), affect faculty use of UDL implementation in their online course (s)?
Knowles Adult Learning Theory	Orientation to learn- faculty can apply and implement strategies and materials immediately after receiving the training from the UDL module instead of waiting to see when it will become valuable in implementing.
Goal #3 in Module	To share instructional and interactive tools that can be immediately facilitated upon completion of the UDL training.
Goal #4 in Module	To learn why faculty may benefit from using UDL in teaching all students.
Knowles Adult Learning Theory	Motivation to learn-include internal rather than external factors; curiosity
Goal #5 in Module	To understand fundamental UDL concepts and basic applications used with diverse learners. And,
Goal #6 in Module	To understand why UDL is important for students with disabilities in postsecondary education.
Knowles Adult Learning Theory	The need to know- adult learners tend to learn when there is a need to know and an immediacy of implementing the information either for themselves or another individual.

A detailed explanation of the research questions and how they align with Knowles Adult Learning Theory will now be explained. Table 6 shows research question 1, Knowles Adult Learning Theory, and the 1st goal of the module. Knowles (1975)

mentions in his first element that as one matures his/her self-concept moves from a dependent to a self-directing personality.

Table 6. RQ1 and its Alignment with Knowles Andragogy

Research Question 1	What elements of Universal Design for Learning/accommodations/practices do faculty members already employ?
Knowles Adult Learning Theory	*1. Self-concept*- moves from a dependent to a self-directing personality. *2. Using past experiences*- adults begin to accumulate a rich reservoir of experiences in which he/she can account for and use as resources for further learning.
Goal #1 in Module	Introduce and discuss general UDL concepts

Some participants may have already tried to create their own teaching strategies that support UDL's theory and concept of meeting diverse learners' needs (even if they are unaware they are doing so). Knowles' second key element, referring again to Table 6, of *using past experiences that have accumulated over time,* may be utilized to support further learning. These concepts may already be implemented by the instructor.

Table 7. RQ2 and Its Alignment with Andragogy

Research Question 2	How does the awareness of UDL impact or affect instructor practices with respect to student learning?
Knowles Adult Learning Theory	*Readiness to learn*- how participants will use what is learned in his/her own locus of control
Goal #2 in Module	To provide suggestions for using UDL relative to diverse learners, including individuals with disabilities in postsecondary education.

Another goal and objective participants will be introduced to, is to provide suggestions for using UDL relative to diverse learners. It is the hopes of the researcher that at least one application of UDL will be implemented within an online course. In relation to Knowles's (1995) third assumption, in Table 7, *Readiness to learn,* applying what he/she has learned in his/her own locus of control would imply the self-directed initiative of implementation after viewing the training module. The purpose of the UDL

module was to provide basic applications under UDL guidelines that were relative to diverse learners enrolled in their course(s). The researcher hoped to gather information on how faculty provided best practices with respect to their students based on implements of UDL. After instructors implemented at least one application of UDL, follow-up support was provided to participants in the forms of supplemental resources, reputable university web sites and materials, discussions, and feedback through email. The third research question, referring to Table 8, questioned collaboration efforts and faculty use of UDL. Sharing instructional and interactive tools that could be immediately facilitated upon completion of the UDL training (module) was embedded within training.

Table 8. RQ 3 and Its Alignment with Andragogy

Research Question 3	Does incorporating supplemental support through collaboration efforts (synchronous support through web-conferencing and asynchronous support), affect faculty use of UDL implementation in their online course(s)?
Knowles Adult Learning Theory	*4. Orientation to learn*- faculty can apply and implement strategies and materials immediately after receiving the training from the UDL module instead of waiting to see when it will become valuable in implementing. *5. Motivation to learn*- include internal rather than external factors; curiosity
Goal #3 of Module	To share instructional and interactive tools that can be immediately facilitated upon completion of the UDL training
Goal #4 of Module	Learn why faculty may benefit from using UDL in teaching all students

According to Knowles' (1975) fourth and fifth assumptions, *orientation to learn* and *motivations to learn*, faculty can apply and implement strategies and materials immediately after being exposed to learning new concepts, including internal rather than external factors where curiosity drives the implementation of new concepts.

Goals five and six, shown in Table 9 below, can be supported by Knowles' sixth assumption: *the need to know*. Knowles (1975) states that adult learners tend to learn when there is a need to know and an immediacy of implementing the information is warranted either for themselves or another individual. Findings from this research study contributed to the existing empirical studies of Andragogy in providing further insight of how adults learn.

Table 9. RQ3 Cont'd and its Alignment with Andragogy

RQ3 continued… Goal #5 in the module	To understand fundamental UDL concepts and basic applications used with diverse learners. And,
Knowles Adult Learning Theory	*6. The need to know*- adult learners tend to learn when there is a need to know and an immediacy of implementing the information either for themselves or another individual.
Goal #6 in the Module	To understand why UDL is important for students with disabilities in postsecondary education.

Summary

Distance learning has afforded opportunities where education can be delivered in multiple ways affecting the benefits of how individuals learn. In this chapter, a discussion on how adults learn affects their actions of how they use what is learned. This includes delivery of content in an online course. Specifically, Andragogy impacts Professional development and change, Distance Learning and students with disabilities, how the law affects course development, definition and best practices of UDL, and theoretical framework. Researching one aspect of how to reach a broader audience in a distance learning environment is what the researcher would like to contribute with this study.

CHAPTER 3. METHODOLOGY

In order to explore teaching practices implemented in an online environment, data was collected and analyzed. A mixed-method research design using descriptive statistics and multi-case study methods (Stake, 2006; Merriam, 1998) were used in order to provide a more in-depth analysis of the data. A two phase data collection process was used. The first phase used a questionnaire where descriptive statistical data was analyzed. The second phase used qualitative case study analysis where a two cycle coding process occurred. As the researcher, data was collected and analyzed through a lens focused around Andragogy of how participants viewed, engaged, and utilized what they were exposed to and what was learned to implement within their own course(s). Additionally, how potential bias was minimized when analyzing data as well as how utilizing various instruments and methods to validate data collection and analysis will be covered.

Research Design

Mixed Methods

I sought to understand how online instructors conduct their online courses, including the materials used and methods of teaching. Further, I wondered about the effect these materials and methods had with respect to how students learn. Therefore, I chose to use a mixed methods research study approach: quantitative using descriptive statistics followed with a qualitative case study analysis for deeper insight. Venkatesh, Brown, and Bala (2013) agreed that by exploring a phenomenon through both quantitative and qualitative methods, one may "use findings from one approach to inform on the other approach." Furthermore, Ivankova, Creswell, and Stick (2006) stated that quantitative and qualitative design methods complement each other allowing for a more robust analysis, taking advantage of the strengths in each.

An overview of teaching practices online instructors currently used, followed by a deeper look into these same practices, offered further insight into the specifics of course accessibility. Additionally, the extent in which content delivery differed from a face – to

– face to an online environment addressed several factors - including concern for meeting the needs of diverse learners in an online environment. An overview of what was actually being used by online instructors set precedence and allowed for a wider look on current practices. After which, opportunity to delve deeper into actual methods of content delivery by four online instructors through case study analysis provided that further insight on whether online teaching strategies did include reaching diverse learning needs. I chose mixed methods to be most suitable in this study to best understand the research problem intuitive in online learning and accessibility. A mixed method approach provided pragmatic flexibility in understanding the situation, or problem, of online learning. Flexibility laid in the multiple methods used in collecting and analyzing the data from a broad sense to recognize and formulate themes using an inductive approach to coding the data. Creswell said, "Pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as to different forms of data collection and analysis in the mixed methods study" (2003, p. 12).

The study evolved into a two-phased sequential process. Creswell (2003) identifies this mixed methods approach a sequential explanatory design: the researcher first collects and analyzes the quantitative data, and then collects and analyzes the qualitative data consecutively. In the first phase of the study, a survey was used as the method for collecting data for a descriptive statistical analysis of *what* current practices online instructors were using. The second phase followed using qualitative case study data collection and analysis, which took a deeper look into *how* these practices were being utilized.

The purpose of this study was to understand the awareness, aim, and efforts of best practices of UDL strategies by higher education faculty teaching in online environments. Additionally, this research was to gain a deeper understanding of how instructors used newly learned material and applied it towards their locus of control by means of an intervention: a UDL professional development treatment module. Application guidelines were introduced as a means of reaching the widest audience possible. Utilizing Knowles' theory of Andragogy as the theoretical framework is discussed in detail in Chapter 2.

Research questions were:

1. What elements of Universal Design for Learning, accessibility, and practices do faculty members already employ?
2. How does the awareness of UDL impact or affect instructor practices with respect to student learning?
3. Does incorporating supplemental support through collaboration efforts and resources (synchronous support through web-conferencing and asynchronous support) affect faculty use of UDL implementation in their online course(s)?

Phase I: Descriptive Statistics Using a Web–Based Survey

The first phase used a web–based survey to collect quantitative data that explored demographic and general background information of the participants. Babbie (1990) states that surveys have included cross-sectional studies using questionnaires or structured interviews for data collection with the intent of generalizing from a sample to a population (as cited in Creswell, 2003). Structured interviews were not used, rather semi–structured interviews were. (This will be discussed in Phase II shortly.) In addition to demographics and general teaching background, the survey collected descriptive statistics relative to teaching practices online instructors utilized specific to providing accessible means of delivery and access to material within their course(s).

Phase II: Multi – Case Study

Universal Design for Learning (UDL) is a fairly new concept in education. Valid methods of researching professional development (Desimone, 2009) were critical in this study due to limited UDL published research as described by (Roberts, Park, Brown, & Cook (2010). Published research in the realm of distance learning is even more limited since outcomes of UDL are scarce. Although outcomes of UDL implementation within this study were not addressed in depth, the use of basic UDL applications by online instructors is emphasized. Source material used by instructors were analyzed through data collected via semi-structured one-on-one interviews, field notes and course observations, small group discussions, and artifacts and documentation; all these contributed to the study.

The methodology used in the second phase consisted of a multi - case study

analysis. Creswell made clear that multiple cases were necessary to truly understand the question at hand. “In a collective, or multi-case study, the researcher again selects one issue or concern but also selects multiple case studies to illustrate the issue” (Creswell, 2008; Creswell, et. al, 2007 p. 246). The issue in this study is the accessibility in online learning.

In moving from a general view delivered in Phase I, Phase II provided a more in-depth view of the quintain; the quintain was the application of Universal Design for Learning and accessibility teaching practices implemented by online instructors teaching in distance learning environments. The study also followed multi-case research as described by Stake (2006). Stake (2006) states that an in-depth study of a “quintain is to study its phenomena or condition through cases and to fully understand the quintain is to move away from the holistic viewing of cases towards a constrained view of cases where each single case is of interest since it belongs to a collection of cases that share a common characteristic or condition” (p. 6). He further states it is the quintain that researchers want to understand by intensely looking into the similarities and differences of the cases in order to understand the quintain as a whole. Similarities and differences through cross – case analysis of the four cases revealed interesting phenomena through each of the participants’ teaching practices. A cross – case analysis of the participants will be addressed in Chapter 5: Case Studies.

Furthermore, in multi–case studies, cases are bound together by time, place, or physical surroundings (Stake, 2006; Merriam, 1998; Creswell, 2008). This research study was bound by time, place, and physical surroundings of institutions of higher learning. Although the characteristic of “physical” does not apply in this case since distance learning can be accomplished in the convenience of one’s environment. Therefore, the computer, or media device, used could act as the physical place where one is bound since it is necessary to be *bound* to in an online teaching and learning environment.

Case studies are also described as particularistic, descriptive, and heuristic (Creswell, 2008; Merriam, 1998). Particularistic refers to when the study focuses on a particular situation, event, or program. The situation or event was the intervention of the UDL module and instructor application of UDL within his or her online course(s). The

UDL treatment module will be discussed in more detail in Chapter 4. “Descriptive refers to including variables portraying their interaction over a period of time and reporting findings not of numerical data, but those that describe techniques, elicit images, and analyze situations” (Merriam, 1998, p. 29). In addition to the general descriptive variables included in Phase I, descriptive variables at this stage refer to first the awareness of their own teaching practices and the evolvement, if any, to the techniques and teaching practices changing over a period of time. Merriam (1998) describes heuristic as not only understanding the phenomenon that is occurring, but rather the reader is provided a deeper grasp of concepts that emerge and illuminate, or pleasantly increase, the understanding of the phenomenon. Through analyzing the data, additional findings included unexpected occurrences of actions, thoughts, and teaching methods participants were involved in that went beyond what I originally intended. These findings went beyond expectations, which provided deeper insight as to the acceptance of not only one basic principle of UDL or accessible means sparingly implemented; but the desire to provide an accessible course on a broader scale. Aligning characteristics of a particularistic, descriptive, and heuristic study, this research study focused on how UDL applications affected the teaching practices of online instructors teaching in distance learning environments.

Criticisms of Mixed Methods

Using a mixed methods approach has had its criticisms. In 2002, Kidd for example noted that certain disciplines, such as in counseling and psychology, insist on using more science–based research These disciplines argue that using qualitative methods is not appropriate due to "paradigmatic and methodological differences [that] could not be negotiated or reconciled” (as cited in McLafferty, Slate, & Onwuegbuzie, 2012, p. 48). Further quantitative purists believe the observer should be objective, that is, “separate from the entity being observed” (Johnson & Onwuegbuzie, 2004, p.14). Therefore, not utilizing qualitative research as a means of subjective observation and mixing the two is of least interest. Using mixed methods for this study is well-suited for allowing the broad overview of teaching practices to shape the more detailed view of participants and their subjective views of implementing UDL. Although some researchers contend that using

both research methodologies limit one or the other, the goal of mixed methods is to draw from each of their strengths while minimizing their weaknesses across studies (Johnson & Onwuegbuzie, 2004).

Conceptual Framework

Knowles' adult learning theory, Andragogy, is the conceptual framework used in this study (Knowles, 1975). A more detailed description of Knowles' conceptual framework and all it entails are described in Chapter 2. Andragogy supports this study by providing a framework on how adults learn information and use that information. In other words, after participants were exposed to UDL and accessibility practices, did what they learn affect their teaching practices?

Knowles adult learning theory describes six key elements as seen in Figure 6 below. These elements are self–concept, experience, readiness to learn, orientation to learn, motivation to learn, and a need to know. All these elements establish the foundation for how adult learning occurs. Since participants were asked to engage in the treatment (a UDL module) along with supplemental resources on accessibility, the need to understand how methods of teaching online were affected, and to what extent, supported Knowles' theory of how adults learn and use what was learned. The option to utilize all the provided resources delivered a profound alignment with Knowles' elements in supporting the way adults learn and use what has been learned within familiar realms of his or her own environment. The research questions are supported by Knowles' Andragogy as well as the structure of how the UDL treatment module was created and used.

Figure 6. Knowles' Six Key Elements of Andragogy in how Adults Learn

Participants and Context

Since there were two phases in this study, this also afforded two sets of participants. There were those who participated only in the web-survey (Phase I); there were those who further participated as a case study (Phase II). Initially, several recruiting methods were used. Four individuals who completed the web-survey in Phase I continued as case study participants for Phase II.

Participants: Web - Survey

The reason for choosing distance education programs to recruit participants was because non-traditional students with diverse learning needs were more prominent in online courses of higher learning and where online instructors had the most direct contact. Participants were recruited by contacting department chairs and heads of programs at various universities in order to obtain directive assistance in dissemination of the survey from the top down. Direct contact with online instructors themselves was also part of the recruitment process since one of the criteria was to be an online instructor. If someone was not, the option to discontinue the survey was provided. Forty-one (n=41) responses gradually emerged after a 5-week dissemination process and after contacting various distance education programs and key individuals within those programs.

A purposive sampling (Merriam, 1998; McMillan, 1992) of instructors teaching in

an online environment was the target sampling of this research study. Merriam (1998) states that “purposeful sampling is based on the assumption that the investigator wants to discover, understand, gain insight and therefore must select a sample from which the most can be learned" (p. 61). The selection criteria for instructors were (1) that he/she must be teaching in distance education programs and (2) he/she must be employed at institutions of higher learning located in the continental United States.

Table 10 summarizes the demographic data collected through the survey. These data included the respondent’s gender, age, roles at their university, department, years teaching, and years teaching online.

Table 10. Demographic and Professional Information of Respondents

Characteristic		Frequency	Percent
Gender	Male	9	21
	Female	32	74
Age	18-25	2	5
	26-30	3	7
	31-35	1	2
	36-40	6	14
	41-45	7	16
	46-50	2	5
	51-55	10	23
	56-60	7	16
	61+	4	9
Role at University	Tenured Faculty	10	23
	Non-tenured Faculty	11	26
	Part-time Adjunct	15	35
	Teacher Assistant	0	0
	Graduate Assistant	1	2
	Staff	3	7
Department	Business	8	19
	Criminal Justice	0	0
	Curriculum Studies	2	5
	Educational Administration	1	2
	Educational Foundations	2	5
	Educational Instructions/ Technologies	1	2
	Health Sciences	4	9
	Special Education	2	5
	Sociology	2	5
	Other	21	49
Years Teaching	0-5	11	26
	6-10	10	23
	11-15	8	19
	16-20	7	16
	21-25	4	9
	26-30	2	5
	31+	0	0
Years Teaching Online	Less than 2 years	8	19
	2-4	8	19

5-7	11	26
8-10	4	9
11-13	5	12
14-16	0	0
More than 16 years	0	0
I do not teach an online course nor have taught an online course.	6	14

N=41

Of the instructors responding to the survey, 9 (21%) were male and 32 (74%) were female. The highest percentages of participants completing the study were those ranging from 51-55 years of age. This age group represented 23% of those completing the survey. Sixteen percent of those responding were in the ages ranging from 41-45 and 56-60 years. When describing the roles of those who participated, part-time adjuncts accounted for the highest (35%) contributors to this survey. Unfortunately, the description of those working in specific departments is not truly reflected since the highest of those responding accounted for 49% choosing *Other* as the Department in which they worked. The average years of teaching were 7 years, while the average years of teaching online were 5 years.

Participants: Case Study

After finalizing the recruitment process, three males and one female agreed to continue with Phase II of the study. Table 11 describes basic characteristics of the four participants. Each participant's current teaching location was in four-year institutions that were located in the following locations: the mid-Pacific, north-central, and south-eastern parts of the United States. A more detailed view of their teaching strategies, awareness, and efforts of best practices will be described in Chapter 5: Case Studies.

Table 11. Participant Description: Case Study

Cases	Age Range	Background	Years Teaching	Years Teaching Online
Case 1: JE (FL)	51 - 55 years	Business specializing in Organizational Leadership/Management	5	2
Case 2: LE (HI)	56 - 60 years	Kinesiology and Sports Science specializing in Sports Marketing/Management	16	11
Case 3: ME (NC)	46 - 50 years	Education and Technology specializing in Culturally Responsive Teaching and ESL	10	7
Case 4: DE (FL)	51 - 55 years	Education specializing in adult education and future teachers	5	2

An online collaborative scheduling tool, Doodle, was used to allow for participants to choose up to three convenient times to meet online. The online meetings took place in a web-based synchronous environment where permission from each participant allowed for sessions to be recorded. During the initial meetings, the consent form was discussed and participants were informed they were not obligated in any way to remain in the study and could choose to withdraw at any time. Additional discussion included what to expect for the remainder of the study. The primary focus was to discuss applications of Universal Design for Learning (UDL) and implementing UDL within their online course(s). Initial introduction to UDL applications were described by the treatment module of the study (the intervention). Additional discussion included what to expect for the remainder of the study.

Participants were asked if they had interacted with the module, since those taking the survey had access to it. All participants had seen the module and had gone through an initial introduction to the basics of UDL. Participants were asked about any prior experiences with UDL, and if one application could be implemented within their online

course(s). All participants agreed, and some acknowledged they may have already been using UDL; however, they were not aware of doing so prior to interacting with the module. Supplemental materials and resources, comprised of links to videos, websites, documents, and articles that focused on UDL and accessibility were sent via email to all the participants on three different occasions throughout the duration of the study. The first list of resources was sent approximately one week after the initial meeting. Participants also had continuous access to the treatment UDL module.

To ensure safety to the participants, the application packet to acquire permission to conduct the study was made to the Institutional Review Board (IRB). This study was determined as exempt from the IRB committee due to no harm being caused to the participants and nature of the study was deemed appropriate . A monetary incentive of $50.00 was also provided for those completing the study.

Time devoted by each participant was greatly appreciated. Their participation was essential for the researcher to collect an ample amount of data to answer the established research questions.

Study Setting

The survey, intervention, and interviews all took place in an online environment. The survey was initially disseminated to distance education programs and key individuals within those programs, as described in the previous section. The survey was also embedded at the beginning of the UDL treatment module (intervention). The module was introduced later in the study to allow for potential participants to be recruited for the second phase of the study. It was also available online. One–on–one interviews, initial and exit interviews took place online in a synchronous (same time, different location) virtual office environment. Interviews were recorded with consent from each participant.

Role of the Researcher

As the researcher, two different roles were important in doing this study. I took both the role of an educator and that of a student. I am a former teacher in the public school system who has taught students with various disabilities, primarily students with hearing loss. As a result of this experience, I believe that continuing education is

strongly connected with success in learning, especially for students with diverse learning needs.

I am also a student. I am deeply rooted in cultural diversity and ethnicity. As such, the impact of how and when I learned created the difference of success or nonsuccess. Much depended on the delivery of content. Based on my own experience, the questions that resonated for me included: would language be an issue? Would learning styles affect what was learned and how it was learned? These questions contributed to the methods used to collect and analyze the data. In addition, how to reduce bias was of concern.

Multiple methods of collecting data were a means to alleviate concerns and reduce bias that directly impacted the reported outcomes by participants. In the first phase, I had no contact with the individuals. I was a neutral observer analyzing the descriptive data generated from the survey. During the qualitative part of the study, Phase II, preconceived steps or protocols were not implemented. Gathering the data to analyze and code for categories and themes to emerge reduced bias since there were unknown expectations of procedures. Not establishing set procedures or protocols in terms of the kind of data that was collected, coded, and analyzed created what Merriam (1998) refers to as, "tolerance for ambiguity." (p. 20) I was ambiguous of what data would be collected and analyzed.

Triangulated methods were also used to minimize bias and to validate the findings. Data was collected using multiple methods of data collection instruments and implementing careful procedures during the process.

Instrumentation and Procedures

Data were collected using three different instruments and four different methods of data collection: an initial web-based survey (Appendix C), one-one-one interviews (Appendix D), course observations using a UDL Checklist (Appendix E), and open–ended exit interview questions (Appendix F). An intervention, a UDL module, was used as the treatment and will be discussed in more detail in Chapter 4.

Web-Based Survey

The survey was used to address the first research question as well as to gather information on the demographics, teaching experience, and general background information of participants' awareness, attitudes, practices of Universal Design for Learning (UDL), and any experience or exposure to teaching students with a disability.

Content validity of the survey was derived from using a modified version of the initial survey that was used in a research study in 2009 by the researcher and two other individuals who provided valuable input to creating and implementing the initial survey questionnaire. Since 2009, the instrument was further modified, piloted among graduate students and faculty, then adjusted based on their feedback and suggestions. The survey may be found in Appendix C.

Providing a questionnaire survey validates the reasons supporting its use in this study. Olsen (2004) states three reasons for using a questionnaire survey. One is that it is based on an in-depth inquiry, or pilot study. Before disseminating to distance education programs, the survey had been piloted to instructors teaching at the same institution and inquired about UDL accessibility and accommodations. The instrument was modified specifically for this study. Secondly, questionnaire surveys are established after examining relevant literature (Fink, 2003; Olsen, 2004). And finally, surveys can include nominal categorical data that can interact with qualitative case studies providing first a rounded view alongside an extensive view of cases (Olsen, 2004, p. 13). Overall, it was designed to examine awareness and practices of UDL when creating accessible features within their online courses.

One-on-One Interviews

Two semi-structured interviews were conducted with each of the four participants; an initial interview at the beginning of the study, and an exit interview at the end of the study. A copy of the interview questions can be found in Appendix D and were included in the IRB application. The primary goal of the interview was to establish trust between the participants and the researcher as well as gain understanding on the participants' backgrounds, teaching practices, attitudes and uses of accessibility, and actual practices of providing accessible material within their course(s). The initial semi–

structured, open–ended interview was conducted using questions supported by Guskey's (2000) five levels of evaluating professional development.

Guskey's Role in Instrumentation. Illustrated in Figure 7 are Guskey's five levels of evaluating professional development that explicitly guided educators on evaluating their own professional goals. These same levels of questioning were applied towards instructors' views of the UDL module, which impacted instructor use. For the purpose of this study, only levels 1, 2, 3, and 4, from Figure 7, were used to support the methodology of this research study.

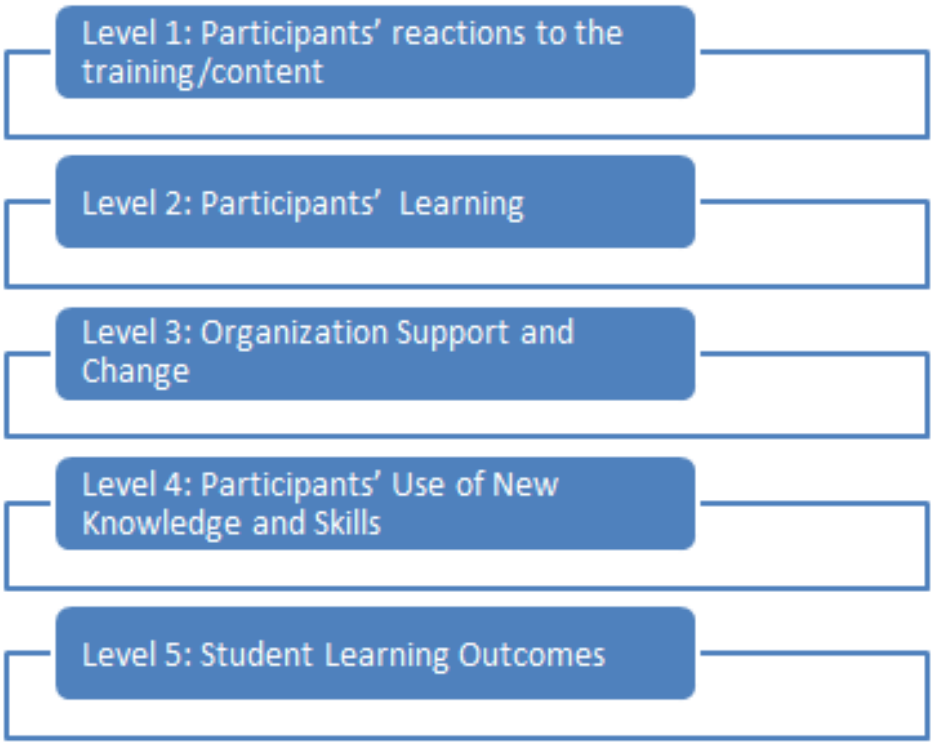


Figure 7. Guskey's Five Leveles Of Professional Develpment

After the initial interviews, course observations, and analyzing documents occurred. Exit interviews were the final actions done in the study with each participant and follow–up questions were generated once the initial interviews were coded. The exit interviews collected information on feedback and experiences with UDL and provided closure for the participants and myself. Knowles' (1975) Andragogy theory directed the questions during the exit interview process since insight relevant to any implementation of UDL and accessible materials occurred. Desimone's change in professional

development also validated any change in teaching practices amongst the participants. A copy of the questions is in Appendix F.

Each set of interviews were recorded with participant consent and transcribed immediately after the interviews in order for rich and in-depth analysis and opportunity for emerging themes to occur (Patton & Patton, 2002).

Course Observations: UDL Checklist

Participants were asked if the researcher could observe one, or more, of their online course(s). Two participants were available for observation during two class times each. Field notes (Merriam, 1998; Creswell, 2008; Stake, 2006) provided opportunity for prospective UDL use. The instrument used was a form titled, UDL Guidelines-Educator Worksheet, which was created by the Center for Applied Special Technologies (CAST, 2012), and seen in Appendix E. The form was used for taking field notes during the observations. It provided a list of applications describing multiple means of representation, multiple means for action and expression, and multiple means for engagement. I was able to note where UDL applications were being utilized by following the descriptions listed on the form. One instructor provided recordings from the previous summer. One instructor was unable to have me observe his course since it was primarily asynchronous (different time, different locations)in nature.

Follow–up documentation including artifacts and material was also collected immediately following the course observations through email correspondence. Artifacts consisted of screen shots of actual PowerPoint slides and documents used during course sessions. Field notes were also taken while observing the courses. Continuous correspondence occurred through email, providing opportunity for documenting discussions on UDL applications. Opportunity to ask questions regarding UDL guidelines, and comments about supplemental resources, were made available. Sharing experiences, regardless of it being negative or positive, made more of an impact on the instructors' whole UDL experiences (Borko, 2004). Understanding the concept of UDL in order to incorporate it within their course(s) was not a simple task.

Treatment

As the researcher, I had no control over the utilization of the treatment module. It was the hope that participants utilized UDL applications learned from the UDL module to apply within the constructs of their course design. "Given that technology increases opportunities for interaction; among tutors, learners, content, and technological tools, it was important to design relevant learning environments for rich interaction in the context of e-learning" (Vrasidas and Zembylas, 2004, p. 327). Interactive learning is important for higher-level cognitive processes for problem solving. It is difficult to teach problem solving from textbooks alone because they rarely have real problems (Finn, 2005). While textbooks in traditional classrooms include real problem scenarios, one of the benefits of interactive, media-based curricula is that Web-based and interactive technologies offer opportunities for engaging activities that simulate and model real world problem-solving in multiple formats. The ways and the process of how adults learn were instrumental in the execution of how the content provided in the UDL, along with supplemental material, was utilized by the participants within their course(s). Table 12 illustrates the instruments and purpose for use in this study.

Table 12. Instruments, Uses, and Purpose

Instrument	Used For	Purpose
Survey Questionnaire	Phase I for descriptive statistical analysis; supported by Knowles' Andragogy	Demographic, Teaching Experience, General background information of participants' awareness, attitudes, practices of (UDL), and any exposure to individuals with a disability
Open – ended semi – structured initial interview	Phase II questioning supported by Guskey's Professional Development; coded for themes	Feedback on UDL module and resource material
Open – ended semi – structured exit interview	Phase II questioning supported by Knowles Andragogy; coded for themes and Desimone's change in Professional Development	Participants' experiences after exposure to UDL and accessibility resources
Course Observations: UDL Checklist	Course Observations	Document UDL implementation
UDL module	Treatment/Intervention	Introducing basic applications of UDL

Data Collection

A two-phase data collection process occurred. First, an initial quantitative survey questionnaire was disseminated to distance education programs. To generate a greater response, the survey was then included at the beginning of a UDL module, which was carefully disseminated to specific distance education programs initially contacted through telephone and email. The second phase of data collection consisted of qualitative methods. To better comprehend how implementing basic UDL applications affected online instruction, the researcher (1) conducted recorded sessions of one-on-one interviews where each participant was asked to describe his or her experiences with UDL, (2) observed participants' interaction with students within their courses, (3) observed and recorded small group discussions, (4) and collected artifacts and documentation from

instructors. (I cut out the last item (#5) because it was about analysis, not collection.)

Quantitative Data Collection: The Survey

The Phase I questionnaire consisted of 30 items. The first part of the survey focused on demographic and professional background information of teachers, including their years of experience. Next, a few questions asked about participants' experiences with people with disabilities. Questions also asked participants about their implementation of UDL and accommodations/accessibility practices within their course(s). The final few questions recruited participants to participate in Phase II of the study; participants were told that Phase II would involve professional development training and case study research.

Survey design techniques (Doherty, 2010) were used to enable participants to navigate quickly through the survey. These included the survey structure, the order of the questions, and an automatic routing feature (Bertot, 2009). Structure of the questions provided opportunity for respondents to prematurely end the survey should their role as an educator not include online instruction. The automatic routing feature moved the participant through the survey based upon their answers to certain questions. For example, question number 6 asked, "How many years have you been teaching online or distance education courses?" If the participant chose this option (one of 8 provided), "*I do not teach an online course, nor have I taught an online course*," the answer would trigger automatic routing and the participant would be rerouted to the end of the survey thanking them for their participation. Had any of the other options been chosen, the participant would simply proceed with the rest of the survey continuing on in numerical order with number 7 being the next in sequence.

To generate a greater response, the survey was then included at the beginning of the UDL module, which was carefully disseminated to specific distance education programs initially contacted through telephone and email. Descriptive statistical analysis was generated by a feature within the online survey tools.

Qualitative Data Collection: Case Study

Patton (1987) and Yin (2003) recommend six types of methods to collect data: documents, archival records, interviews, direct observations, participant observations,

and physical artifacts. To better comprehend how implementing basic UDL applications affected online instruction, participants were interviewed twice: once at the beginning of the study, and once four to five months later for the exit interview. Interview questions were tailored to apply toward each individual participant. As Patton (1990) describes, in the interim time before the exit interview, multiple sources of information were used since using a combination of "interviewing, observations, and document analysis, the fieldworker is able to use different data sources to cross-check findings" (p. 244). Therefore, I (1) conducted recorded sessions of one-on-one interviews where each participant was asked to describe their experiences with UDL, including the treatment module, (2) observed participants' interaction with students within their courses during live and recorded small group discussions, (3) and collected artifacts and documentation from instructors, The following describe the data collection process in detail.

Initial meetings and interviews were conducted at the beginning of the study in late July and early August 2012 after the recruitment process resulted in the continuation of four consenting participants to Phase II. These participants represented four case studies. Participants were provided with the Universal Design for Learning (UDL) professional development training module in which they were asked to view if they had not already done so when taking the initial survey. They were then provided an additional week to view the module before meeting. It took approximately 30 minutes to complete the module.

A first of two web-based interviews was conducted one week after viewing the module. Two goals for this first interview were to (1) discuss the answers to the survey pertaining to the module itself, and (2) propose and finalize an agreement that faculty would implement at least one UDL application within their course for at least the remainder of the semester.

Course observations occurred where I conducted two to three course observations for three of the four cases. I was unable to observe one participant's course since it was asynchronous in nature. The UDL checklist was utilized to collect data on styles of teaching and learning that allowed for further insight as to what could be identified as UDL. The checklist aided in course observation by separating multiple means of expression, representation, and engagement.

Artifacts and documents were collected from each of the cases: student input from one instructor, materials used in each participant's course, and documentation collected through email. **Course materials** included documents and PowerPoint slides used during lessons as well as student responses to questions asked by their instructor. All four participants generated interesting documentation on how students perceived information and their choices of learning. One participant was able to disseminate questions pertaining to students' perspective of UDL use and how it affected their learning.

The exit interview was conducted with the same four participants in November and December 2012, providing approximately a full semester, about 4 months, to consider and apply UDL principles within their course(s). The exit interview was performed in order to gain a deeper understanding of instructor practices and if any changes in attitude, teaching practices, or an overall awareness of how course material was delivered, occurred. It also provided closure and opportunity for reflection and for each participant to address any concerns, issues, or final discussions not addressed during the study.

Each interview was transcribed immediately afterwards for increased accuracy and context of the interview. All data collection methods were coded for emerging themes to occur.

Data Analysis

Data analysis was a lengthy process for both phases of the study. Descriptive statistical analysis was used to assist in understanding elements of UDL and/or accommodation practices instructors already employed. Coding the data for the second phase was based on Saldaña's (2009) coding manual for qualitative research.

The questionnaire used in Phase I to not only provide descriptive analysis of the findings, but to also provide comparisons, contrasts, and possible unknown characteristics raised throughout the study.I was aware in the first phase of the study that the participants' levels of knowledge, understanding, and experiences of UDL and accessibility would range. Therefore, questions were adapted to provide descriptions of UDL implementation, including accessibility features, in order to provide assistance in

case a participant knew the action but was unfamiliar with the terminology. Another set of questions delineated several examples of accessibility including how UDL could be implemented. Descriptive statistics of the initial survey were generated using the website's calculation features and were used to generate tables, charts, and graphs. These visuals represented the descriptive data featuring frequencies and percentages. Primary attention was drawn to the actual uses describing UDL and accessibility applications. For easier analysis and viewing, information from each descriptive graph or chart initially generated was transferred to a table. The table was representative of the entire picture where comparisons and contrasts could be viewed simultaneously. (See the Results section for these tables.)

For the qualitative phase, data collection and analysis were conducted simultaneously (Merriam, 1998) in order for formative and summative assessments to occur. Additionally, Saldaña's (2009) coding manual was used for coding the data. Evaluation measures used throughout the qualitative portion of the study were planning, formative, and summative measures (Guskey, 2000; Doherty, 2010). More specifically, (1) planning-evaluation takes place before a program begins and can be ongoing, (2) formative evaluates if things are going as planned and if progress is being made, and (3) summative is conducted at the end of a program or activity underway. The advantages and means of conducting planning and formative evaluations were cultivated through interviews, course observations, and email correspondence. Summative evaluations occurred towards the end of the study through exit interviews, including participant feedback and field notes collected through correspondence and artifacts. Questions took on a somewhat different emphasis based on the formative assessments that had already been implemented (Merriam, 1988; McMillan and Wergin, 2006).

Saldaña (2009) describes the analysis process as "streamlining codes – to – theory" (p. 12). In other words, start with coding to create categories, which may create subcategories, then code for themes generated from the categories. A theory also may be generated from the themes as the ultimate end to the process. Saldaña (2009) cites Auerbach and Silverman (2003) in their recommendations to keep a set of concerns, theoretical framework, research questions, purpose of the research, as well as other major concerns visibly in front of you while coding so as to not deviate and remain focused

when making coding decisions. This proved valuable advice since coding multiple forms of data initially posed overwhelming challenges of organization and structure.

Data from one-one-one interviews was collected using a synchronous virtual room where permission to record the interviews was obtained from each participant. Since the interviews were recorded, I was able to stop, listen, and transcribe each interview accurately to avoid any bias in documentation. Raw data also included documentation from course observations, small group discussions, artifacts and documentation, and email correspondence that was collected for data analysis. If further clarification was necessary, entire or partial transcriptions were emailed to participants for accuracy and validation. I also maintained continuous email correspondence with the participants. Two graduate students in my cohort were asked to randomly code part of the data to assist with validating the codes and to check coding analysis procedures and symmetry. Feedback was collected and incorporated. There was a general consensus on coding procedures and themes that were developing.

Coding the raw data, and then categorizing into themes, involved a two-cycle process--an initial cycle of coding and a second cycle of coding. Saldaña (2009) describes the initial cycle by coding the raw data into "seven subcategories: Grammatical, Elemental, Affective, Literary and Language, Exploratory, Procedural, and Themeing the Data" (p. 44). Under the category Elemental Methods, Structural Coding and Descriptive Coding best supported the data. Under Affective Methods of initial coding, Values Coding supported the data. For the second cycle coding, I used Pattern Coding to find patterns that ultimately showed comparisons and contrasts amongst the data. Second cycle coding will be addressed further in Chapter 6: Results.

Detailing the initial coding process, Structural Coding provided a "grand overview" of the study by reviewing for themes, categories, patterns, and relationships. The initial thought process involved identifying data relative to the conceptual framework of Andragogy and connecting to information in my literature review. Descriptive coding supported the field notes, documentation, and artifacts also collected. Since I had transcriptions, course observation notes, field notes, email correspondence, and artifacts, organizing the data became imperative as to not lose myself and to pay close attention to data as well as the process.

Values Coding, defined by Saldaña (2009), "reflects a person's values, attitudes, and beliefs" (p. 89). Since a major goal was to determine the attitudes, awareness, and aims of UDL practices, Values Coding made a profound impact on how the data was perceived and ultimately structured; a majority of coded data was appropriately placed under Values Coding. Finally, Theming the Data also emerged and involved just that--finding emerging themes within the data using "phrases" or "themes" to explain what the data was about (Saldaña, 2009; Patton, 1987; Merriam, 1997). Data was coded and analyzed until saturation (Stake, 1995 ; Merriam, 1997; Creswell, 2008) of data occurred.

Before the second cycle of coding began to form within the coding process, I chose to manually code the data by entering information on a Word document using tables for organization. The process of organizing the data became easier to digest once the tables were created to house four columns to describe the data. In column one, I labeled each participant by their first name. (Entire names were not included in any form at any time during documentation in order to protect participants' identities.) Column two listed the number to each question asked during each interview; column three listed participants' responses to the questions, as well as additional information or data relative to the response. This column also included information from field notes and artifacts collected that were relevant to the emerging theme. Finally, column four listed primary concepts, or words that were derived out of the responses. A hard copy was printed in order to have greater control both literally and figuratively " in handling" the data and to continue to seek for additional information that emerged. An inductive analysis coding process assisted with emergent codes. These became apparent in reviewing the data when themes began to emerge. Reemerging themes were used as the initial codes. The initial coding process was discussed with colleagues and with members of my dissertation committee.

Initial Coding Cycle

Since the purpose of this study was to determine the awareness, aim, and efforts of best practices of UDL strategies by higher education faculty teaching distance education courses, it was deemed appropriate to determine the current mind-set of the participants involved when initial coding began. In Values Coding, data was coded

according to values, attitudes, and beliefs (Saldaña, 2009). The following initial codes and categories emerged from the data:

Values in teaching for content: (a) validity, (b) structure, (c) clarity

Attitudes in teaching: (a) teaching is diverse, (b) awareness in student learning, (c) sharing teaching strategies, (d) face-to-face teaching versus online teaching

Beliefs and philosophies: (a) student-centered, (b) assessments, (c) flexible teaching, (d) non-traditional teaching methods/ innovative teaching

Upon reviewing the data multiple times, Theming the Data involved creating themes from the data initially coded. Themes are interpretive and enlightened discoveries to gain deeper meaning of the phenomenon (Saldaña, 2009). The following themes emerged from the data and were categorized with reflection of their relationships to one another:

Importance in content delivery: (a) validity of content delivery, (b) structure of content delivery, and (c) clarity of content delivery

Diversity in teaching and learning: (a) teaching strategies, (b**)** awareness of learners' needs

Importance in content innovation: (a) innovation in content for student-centered learning, (b) content should address instructor self-assessment, (c) innovation in supporting non-traditional teaching methods, (d) innovation in collaborating new ideas with colleagues. Table 13, below, illustrates the process of initial and second cycle coding described.

Continuing to attune the focus on Andragogy while analyzing the data, sub-categories and themes relative to how adults learn and use information influenced the coding system. Creswell (1998) would call this an *a priori* theoretical orientation. In other words, the conceptual framework would frame questions and influence the structure of data. Therefore, the following sub-categories will be further addressed in Chapter 6, the Results chapter, followed by a discussion of their alignment with Andragogy:

(a) validity of content delivery, (b) structure of content delivery, (c) clarity of content delivery, (d) teaching strategies, (e) awareness of learners' needs, (f) innovation in supporting non-traditional teaching methods, and (g) innovation in collaborating new ideas with colleagues.

Table 13. Initial and Second Cycle Coding

Initial Cycle of Codes	Description of Codes that Emerged	Second Cycle of Codes
Val 5	Validity of content delivery	COURSE DESIGN AND CONTENT DELIVERY
Struc 3	Structure of content	
SAC 1	Self-assessment of content delivery	
IDCC 7	Identified content clarity for presentation delivery	
SA 7	Student appreciation for structure of content delivery	
UDL! 11	Known specific UDL strategies	BEST PRACTICES IN GENERAL TEACHING
UDL?	Unknown specific UDL strategies	
PEx	Past experience to support teaching	PREVIOUS TEACHING EXPERIENCE , COLLEAGUES, AND ENVIRONMENTS
ConCol 2	Connecting colleagues with services, materials, resources/mentoring	
F2Fvs Del 2	Face-to-face Vs Online delivery of content	
Awa 7	Developing awareness of student learning with respect to content delivery	AWARENESS FOR STUDENTS' LEARNING NEEDS
LN	Meeting students' learning needs	
UDL=OTS 2	Alignment of UDL strategies with other teaching strategies	INNOVATION IN TEACHING STRATEGIES
UDL=uni 4	UDL allowing for uniqueness of teaching style	

Validity

The initial purpose for conducting mixed methods research aligned with gaining additional insight on findings from the survey questionnaire used in Phase I to gain complementary views about the same phenomena or relationship from Phase II. In other words, "a qualitative study was used to gain additional insights on the findings from a quantitative study" (Venkatesh, et al., 2013, p. 40). Since descriptive statistical analysis from the survey displayed UDL and accessibility practices by online instructors, we were

clear on **what** was being used. Further insight as to **how**, **when**, and **why** (or **why not**) still remained to be discovered. Therefore, conducting case study analysis (Phase II) proved to be critical.

Lincoln and Guba (1985) state that validating principles used in qualitative research have recently been developed since there were not established principles as in quantitative studies – even less so in mixed methods research (as cited in Venkatesh, et al., 2013). Establishing validity and reliability in qualitative research decreases misunderstandings and develops a research community appropriately placing a consensus on methods and terminologies used as a result of establishing commonalities in establishing validity and reliability. Maxwell (1992) suggests developing a common scientific body of knowledge when describing research methodologies.

Further validating mixed methods research, Maxwell proposes a complementary purpose in which quantitative and qualitative analyses not only provide their own results, but complement each other's strengths in creating a meta–inference, or "theoretical statements, narratives, or a story inferred from an integration of findings from quantitative and qualitative strands of mixed methods research" (Venkatesh, et al., 2013 p. 34) In this study, the narrations and statements supporting the theoretical frameworks of Andragoy and UDL establish meta–inferences by including the **what** of teaching practices followed by the decisions to utilize them on a continual basis—the **when** and **how**.

Lincoln and Guba, 1985, stated that "consistency" and "dependability" of data and analysis are accepted terms that are conceptually similar to the "reliability" used in quantitative studies (as cited by Venkatesh, et al., 2013). In other words, to be valid, data must be plausible, credible, and trustworthy and can be defended when challenged. In this study, participants' contributions to this study are plausible, credible, and trustworthy due to the rigorous methods of collecting and analyzing the data. Coding the raw data using Saldaña's (2009) Qualitative Research coding manual in using a two coding-cycle process and labeling the categories and themes that emerged validated the initial and second coding processes.

After going through the first cycle of coding, patterns in the second cycle of coding began to emerge through different forms of the data. They created a triangulation

process of validity. Patton (1987) describes four basic types of triangulation: (1) data triangulation where different forms, or a variety of data sources are used, (2) investigator triangulation where several different evaluators are used to analyze data, (3) theory triangulation where multiple perspectives are used to analyze a single set of data, and (4) methodological triangulation where multiple methods are used to study a single problem, such as interviews, documents, observations, and questionnaires. In this study, data triangulations and methodological triangulation were used. For data triangulation, using four individuals, each teaching at different institutions of higher learning, to conduct case study analysis created the variety of data sources. Methodological triangulation involved multiple methods were used to analyze the problems that occur when providing accessible content to diverse learners in an online environment.

Summary

In conclusion, Chapter 3 addressed the steps of how research was achieved using a two phase, mixed–methods data collection process. Methods used to analyze the data and reasons for choosing a mixed–method, multi–case study research design were discussed, including the procedures implemented in phases I and II. Chapter 4 will discuss the treatment: the UDL module used in this study. Chapter 5 addresses each case for cross–case comparison. Chapter 6 discusses Phase I--the quantitative findings and discussion, and Chapter 7 discusses Phase II--qualitative findings and discussion.

CHAPTER 4. TREATMENT

The approach to the study was introduced in Chapter 1. The UDL module was used as the treatment, the output referred to the participant's application of UDL, and initial change referred to shifts in teaching strategies of the participants. Chapter 4 details the treatment that was used and details the basic features of the UDL treatment module. This chapter provides information and of what participants experienced as they navigated through the content.

Without knowing background knowledge participants possessed prior to the study, the UDL module was used to level the playing field and provide an equal foundation exposing UDL to each of the participants regardless of their past experiences. Participants were asked to apply UDL within the constructs of their course design and/or teaching. The module provided information on basic applications of UDL and defined its origination and the benefits of UDL. Applications included how to engage students through the three primary principles of UDL - multiple means of expression, engagement, and representation. Vrasidas and Zembylas (2004) stated, given that technology increases opportunities for interaction among learners and technological tools, it was also important to design relevant learning environments for rich interaction in the context of e-learning." (p. 327) Opportunities afforded participants further insight into the principles supported by UDL.

Alignment of Goals with Andgragogy

At the beginning of the module, a consent form was provided along with an identification feature that assigned participants numbers for anonymity when taking a brief pre and post- test identifying UDL knowledge. Instructions on how to navigate through the module and expectations of what would be experienced were included as part of the introduction. The structure and layout of the module allowed for navigational ease and presented new information in a scaffold structure. Goals of the module were designed to incorporate Knowles' Adult Learning Theory: Andragogy. Participants were gradually

exposed to the definition of UDL and purpose of the module. See Table 14 below.

Table 14. Alignment of Andragogy and Module Goals

Knowles Adult Learning Theory	Goals
Self-concept - moves from a dependent to a self-directing personality. *Using past experiences* - adults begin to accumulate a rich reservoir of experiences in which he/she can account for and use as resources for further learning.	Introduce and connect with general UDL concepts
Readiness to learn - how participants will use what is learned in his/her own locus of control	Provide suggestions for using UDL relative to diverse learners, including individuals with disabilities in postsecondary education.
Orientation to learn - faculty can apply and implement strategies and materials immediately after receiving the training from the UDL module instead of waiting to see when it will become valuable in implementing.	Share instructional and interactive tools that can be immediately facilitated upon completion of the UDL training.
Motivation to learn - include internal rather than external factors; curiosity	Identify benefits from using UDL in teaching all students
The need to know- adult learners tend to learn when there is a need to know and an immediacy of implementing the information either for themselves or another individual.	Recognize fundamental UDL concepts and basic applications used with diverse learners. Recognize why UDL is important for students with disabilities in postsecondary education.

Structure, Layout, and Examples

Interactive learning is important for higher-level cognitive processes for problem solving. It is difficult to teach problem solving from textbooks alone because they rarely have real problems (Finn, 2005). While textbooks in traditional classrooms include real problem scenarios, one of the benefits of interactive, media-based curricula is that Web-

based and interactive technologies offer opportunities for engaging activities that simulate and model real world problem solving in multiple formats. The ways and the processes of how adults learn were instrumental in the execution of how the content was provided in the UDL module, along with how the supplemental material was utilized by the participants within their course(s).

Introduction to UDL Module

As participants logged on to the UDL module website, the first image seen was the title page displaying the title, *Applying Basic UDL in a Distance Learning Environment*. Figure 8 shows the title page at the beginning of the module.

Figure 8. Title Page of UDL Treatment Module

As participants scrolled further on the page, an Initial Survey invited them to participate in a questionnaire where they could assess questions that included information on their awareness, aim, and practices of UDL. Figure 9 displays the first two questions of the demographic portion of the survey.

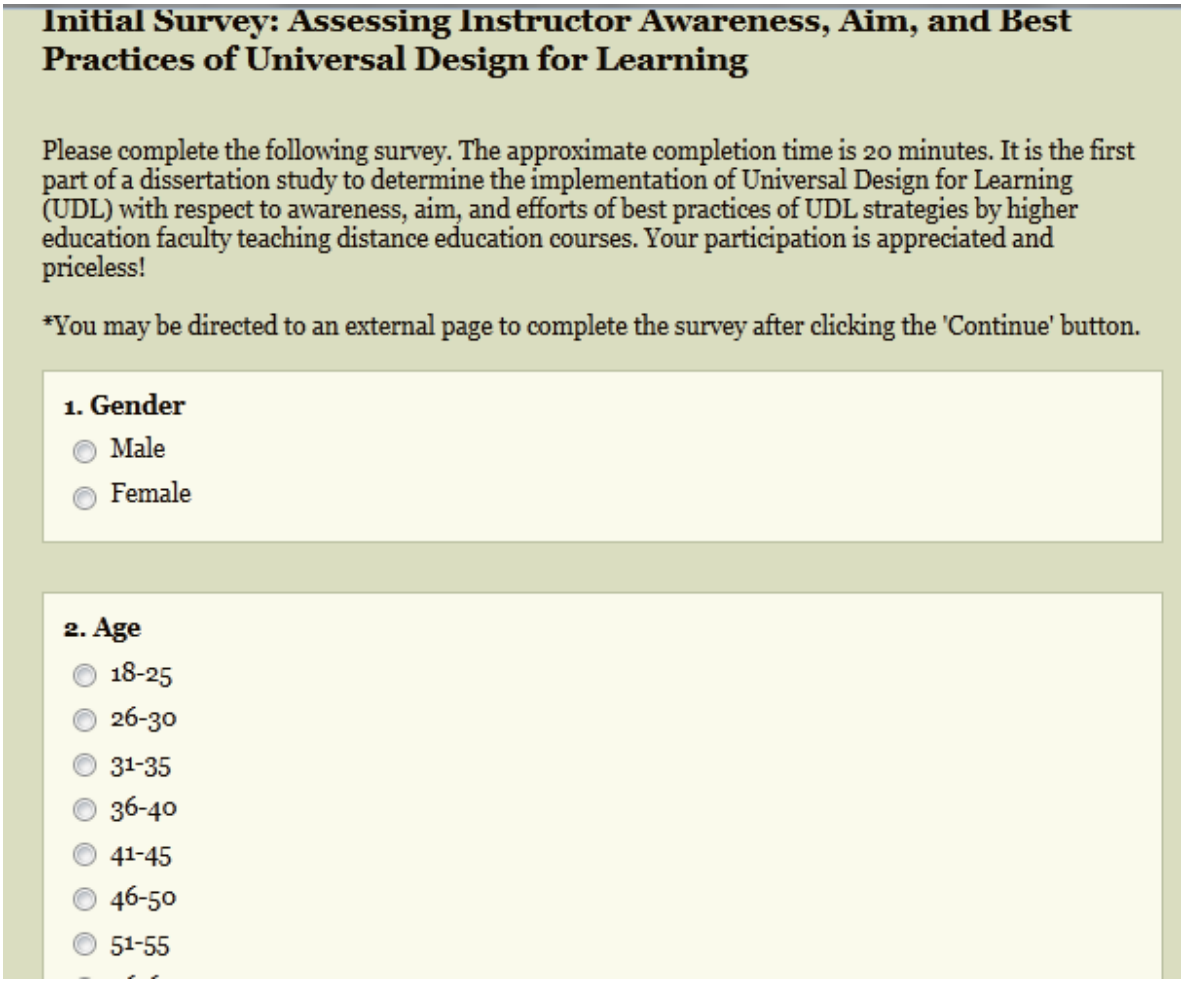


Figure 9. Image of Initial Survey - Demographic Questions

Before participants proceeded through the rest of the module, they were first presented with logistical information that linked to a consent form, a pretest, and an anonymous identification generator. The identification generator (ID generator) provided participants with a number that could be used in place of a "name" The purpose of the ID generator provided anonymity by automatically assigning a participant number to each person taking the survey. This allowed for data to be collected for analysis while maintaining participant privacy.

Figure 10 displays the instructions page of the module. On the instructions page, participants were informed of what to do before beginning the module, what to expect during the module, and final steps after completing the questionnaire.

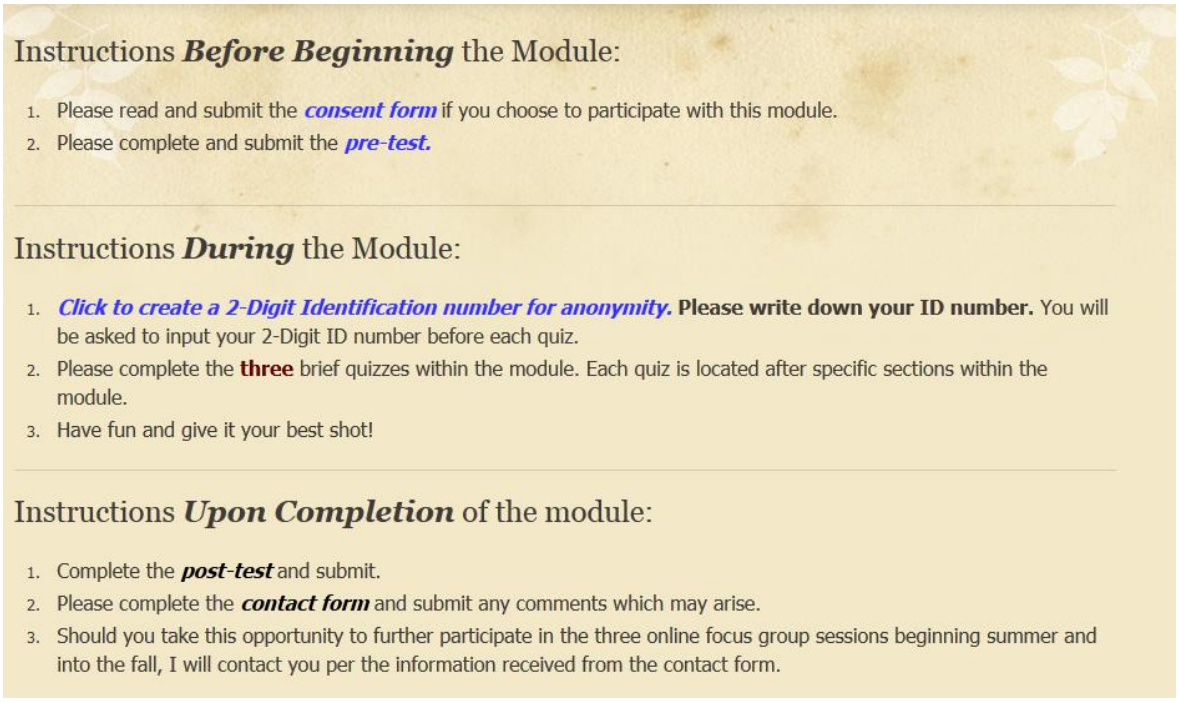


Figure 10. Instructions on Before, During, and After the Survey

Primary Principles of UDL

A definition of Universal Design for Learning and goals of the module were presented at the beginning to inform participants of expectations and purpose of the module. This was followed by the three main principles of UDL - multiple means of representation, multiple means of expression, and multiple means of engagement. Displayed below in Figures 11, 12, and 13, are content pages that included images, definitions, and uses of the three principles of UDL. An overview of Multiple Means of Representation is seen in Figure 13. Participants were introduced to the definition of the two primary instructional platforms of where lectures take place – synchronous and asynchronous. A link leading to further explanation of these two were included. Additionally, images and links displayed options for further information on incorporating UDL when lecturing, as well as how multimedia tools could be utilized.

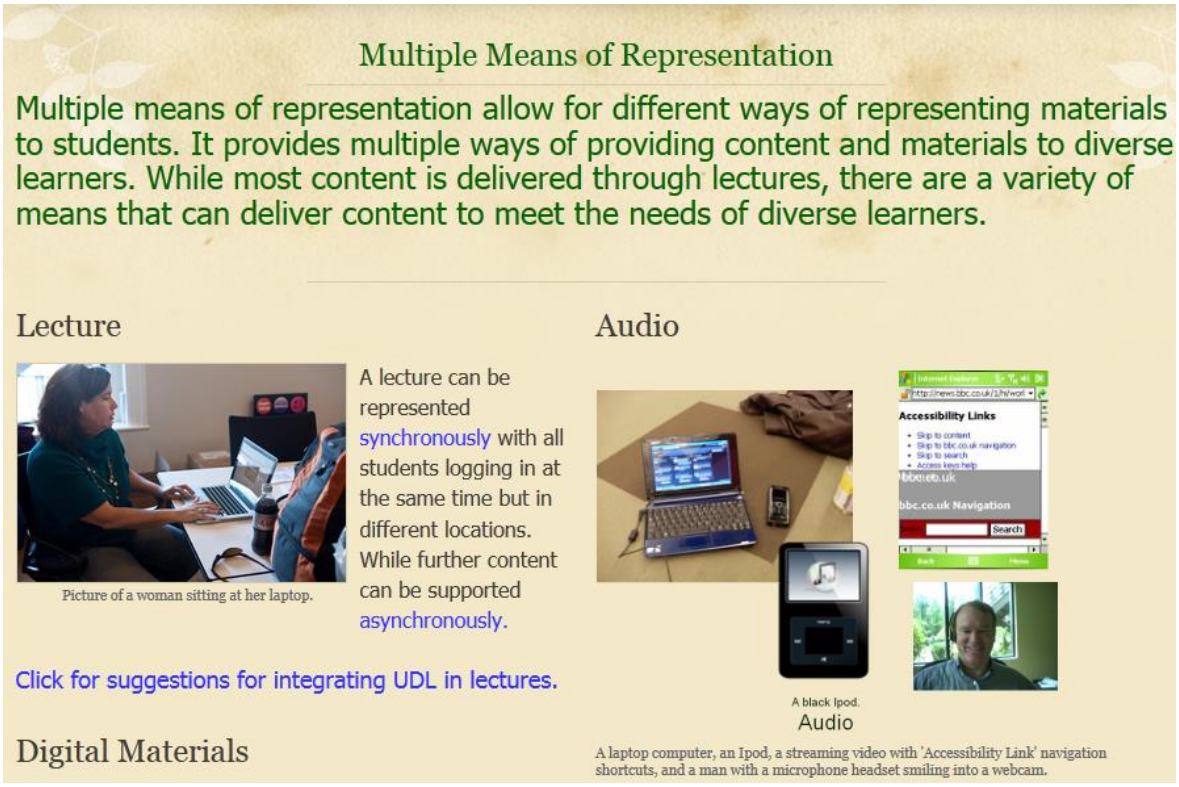


Figure 11. Examples of Multiple Means of Representation

Figure 12 displays the image of what participants saw when introduced to the definition and examples of multiple means of expression. Participants were provided with a variety of options in how students may present what they have learned. Options other than the traditional methods of delivery were provided. Examples included role-playing as well as a variety of multimedia tools that allowed for students to show what they have learned supporting their strengths in learning.

Figure 12. Examples of Multiple Means of Expression

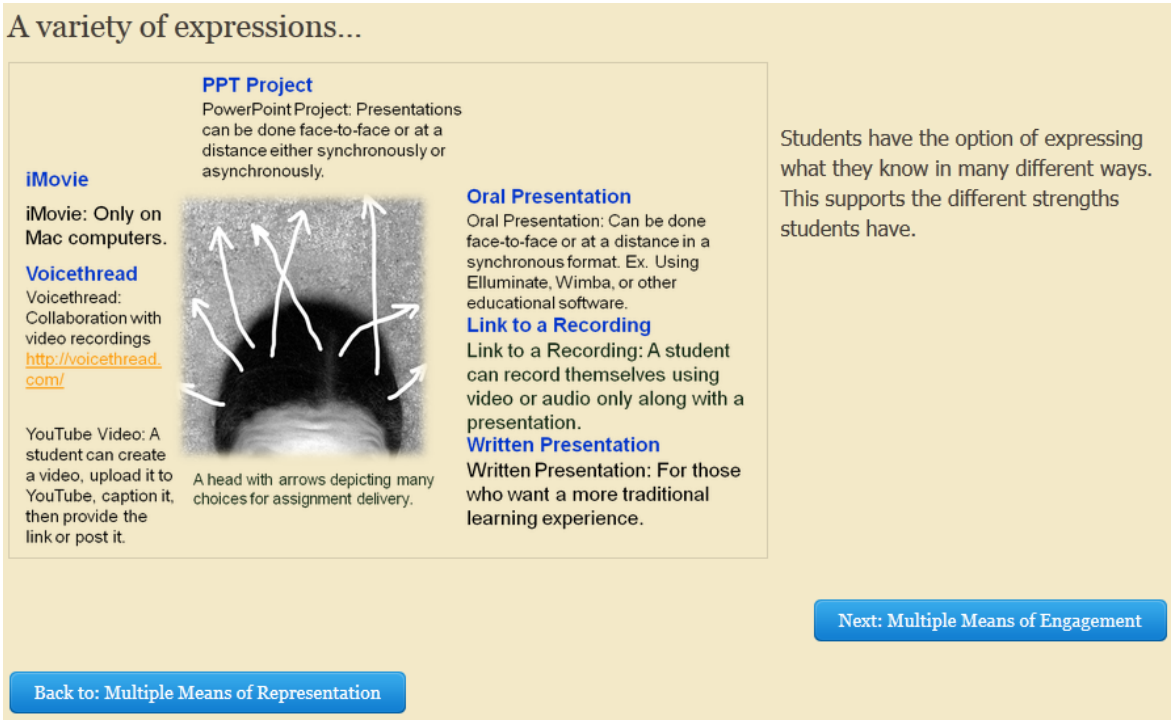


Figure 13. More Examples of Multiple Means of Expression

After multiple means of engagement and expression were addressed, multiple means of engagement was introduced. Figure 16 shows examples options that were

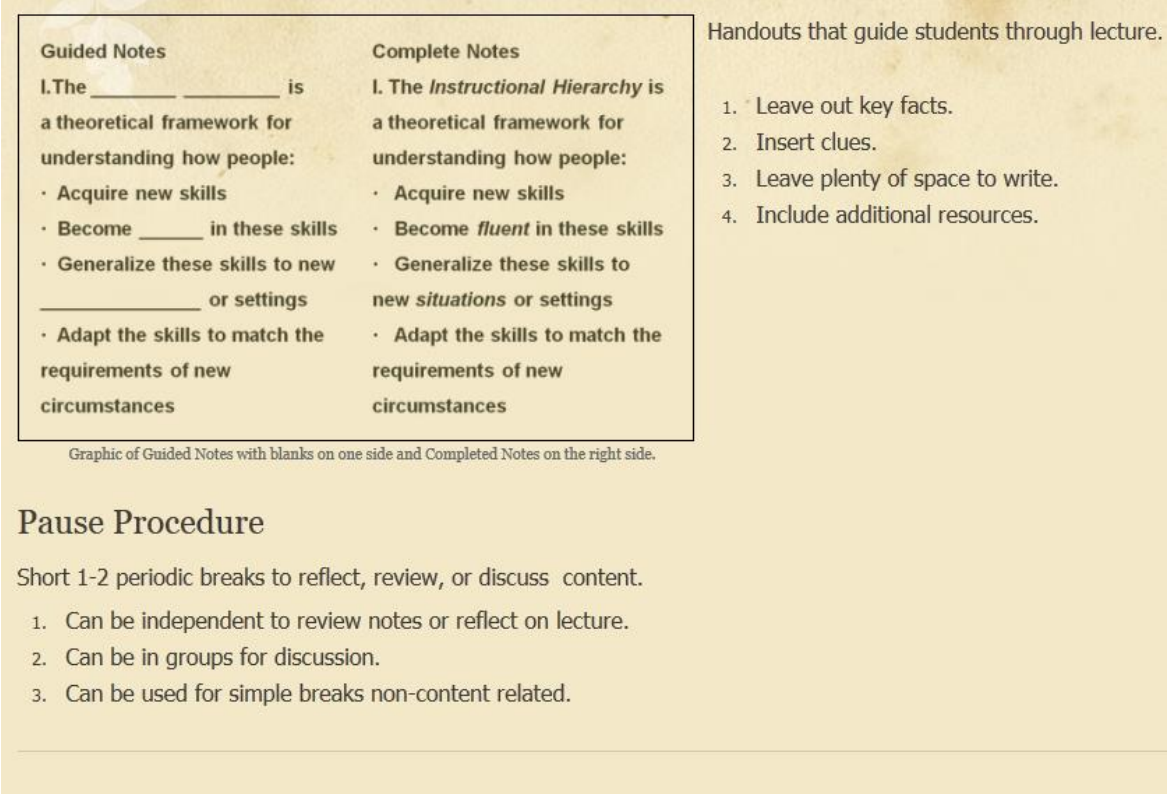
provided of how to engage students using virtual field trips, debates, and brainstorming.

Figure 14. Multiple Means of Engagement

Specific Examples: Multiple Means of Representation, Expression, and Engagement

The initial goal was for participants to view and interact with the material. The ideal outcome was to have a collective resource of instructor feedback that would contribute to the application of UDL and show how benefits of using UDL were apparent.

Examples of student engagement and interaction are shown in Figure 15 using Guided Notes and Pause Procedure.



Graphic of Guided Notes with blanks on one side and Completed Notes on the right side.

Figure 15. Examples of Guided Notes and Pause Procedure

Feedback quizzes were embedded in between topics to provide learning checks as participants proceeded throughout the module as shown in Figure 16. Feedback was in the form of short, mini quizzes. Before beginning any quiz, participants were asked to input their identification number they received at the beginning of the module. This is how their answers could be tracked for further data analysis if needed. Figure 16 displays an example of questions from a quiz.

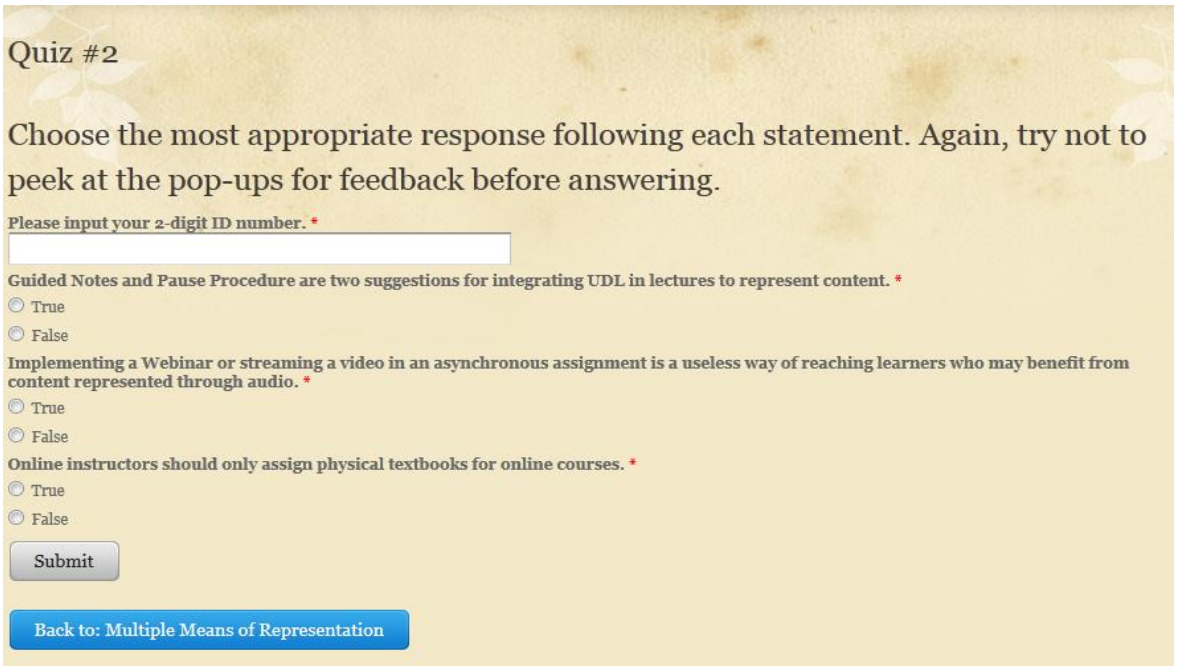


Figure 16. Example of Feedback Quiz

Navigation and Tools

Immersed in different locations throughout the site were optional links to specific instructional pages. This included a link that returned participants back to the main page. Links were created to provide options in navigation while still attempting to apply the fewest actions necessary when navigating to a desired location.

One of the primary purposes of conducting this research is to provide contributions in the area of accessibility in distance learning. The researcher anticipated that it was possible that by implementing UDL, some learners, or at least most individuals in some way or another could benefit from its use. Additionally, diverse learning needs could be addressed with minimal effort if integrated at the onset of course design.

Tools for Accessibility

The following images feature tools that could be used to implement accessible online features. Figures 17, 18, and 19 provide examples of different hardware, software, and assistive technologies that could be used to provide the best options for accessing an online learning environment. Figure 17 shows hands on activities where physical

activities to assist with learning could be provided. An example is a training module. Figure 18 discusses tools from using graphics to actual hardware manipulation aiding in accessible features and components that otherwise would remain inaccessible if not for the means by which software and hardware were implemented for uses.

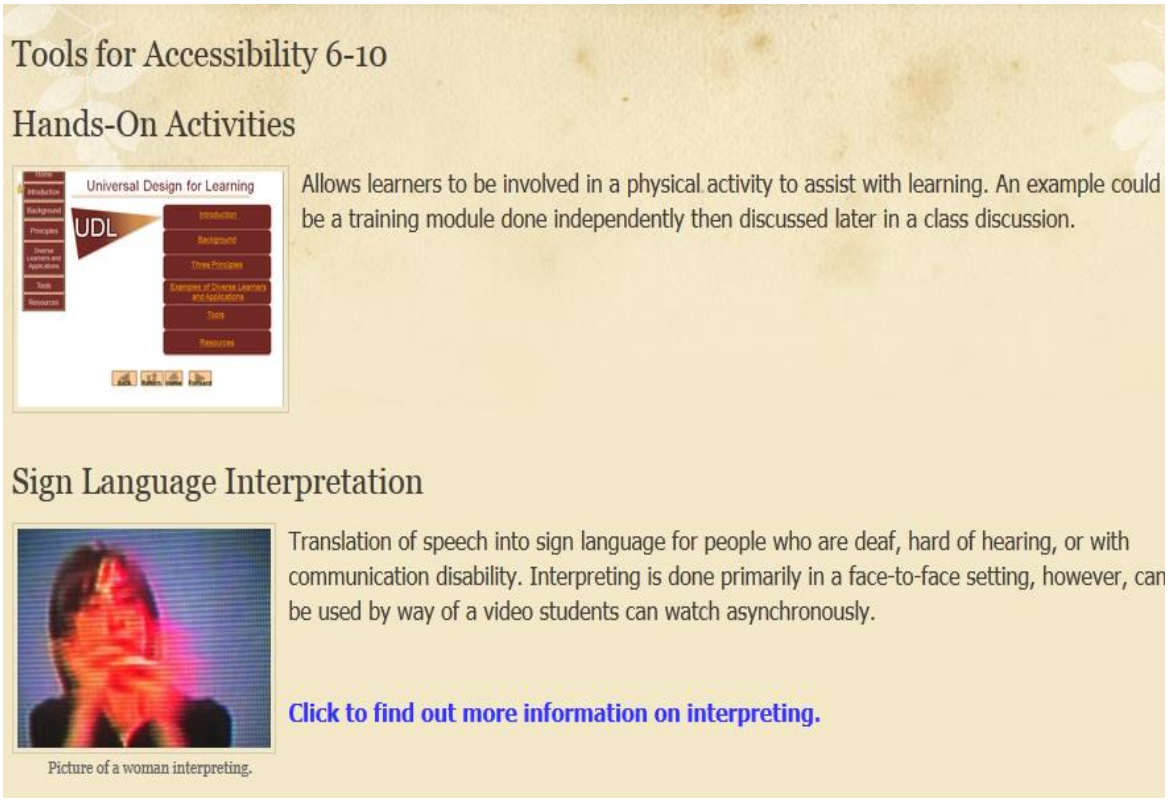


Figure 17. Language Options and Sign Language Interpreter

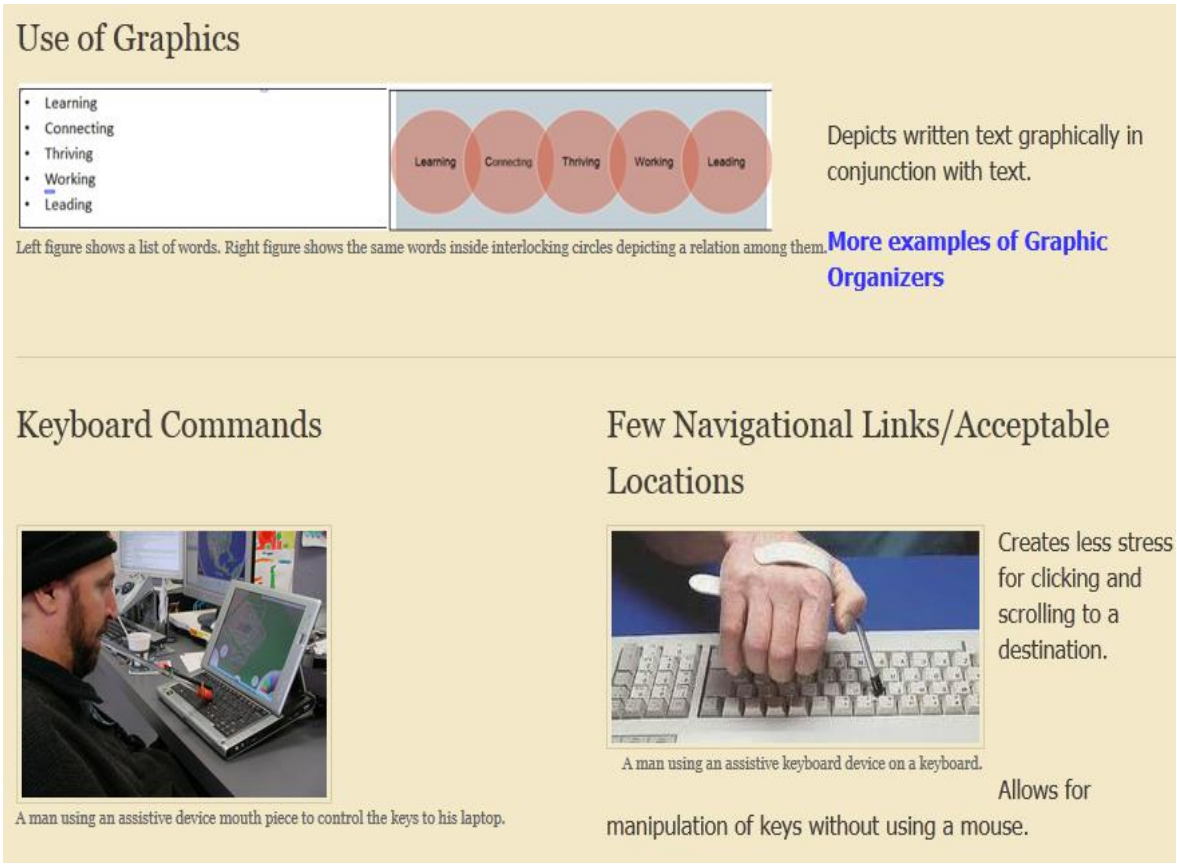


Figure 18. Use of Graphics and Keyboard Commands

Figure 19 lists suggested tools for diverse learners' needs. Diversity in learners does not isolate those learners who could benefit from a feature that creates the greatest options for accessing content and material.

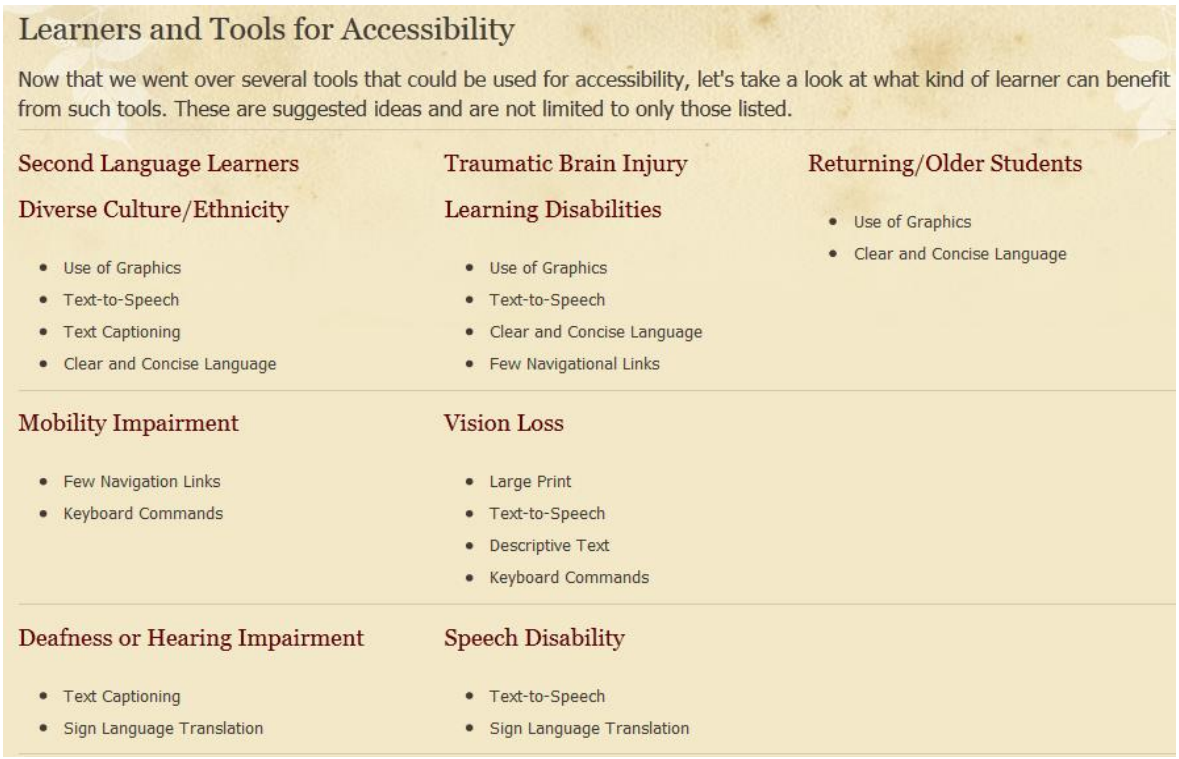


Figure 19. Diverse Learners and Benficial Tools for Learning

Module Conclusion

Figures 20 and 21 provided concluding features of the module. A post-test with feedback features allowed participants to self-assess their knowledge of material acquired compared with knowledge known prior to viewing the module. The post-test also provided the researcher with information on knowledge learned as a result of the module. Figure 23 offered the participant the option to provide contact information to the researcher should they be interested in participating in further research.

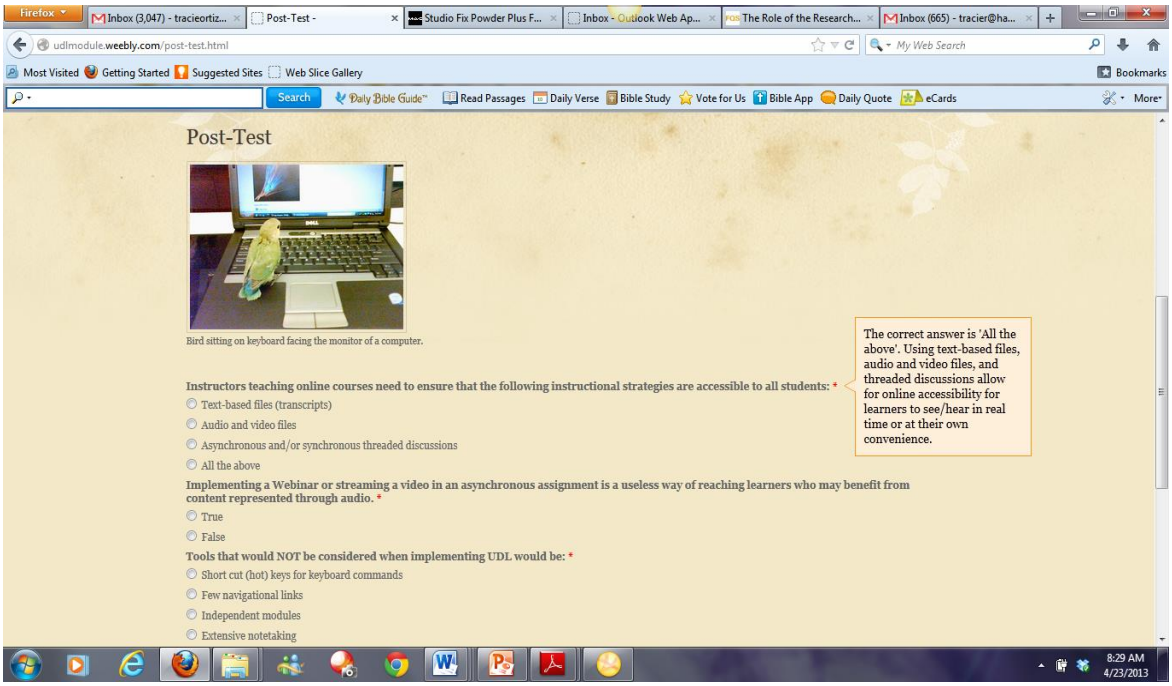


Figure 20.Post-test with Feedback Call-Out Features

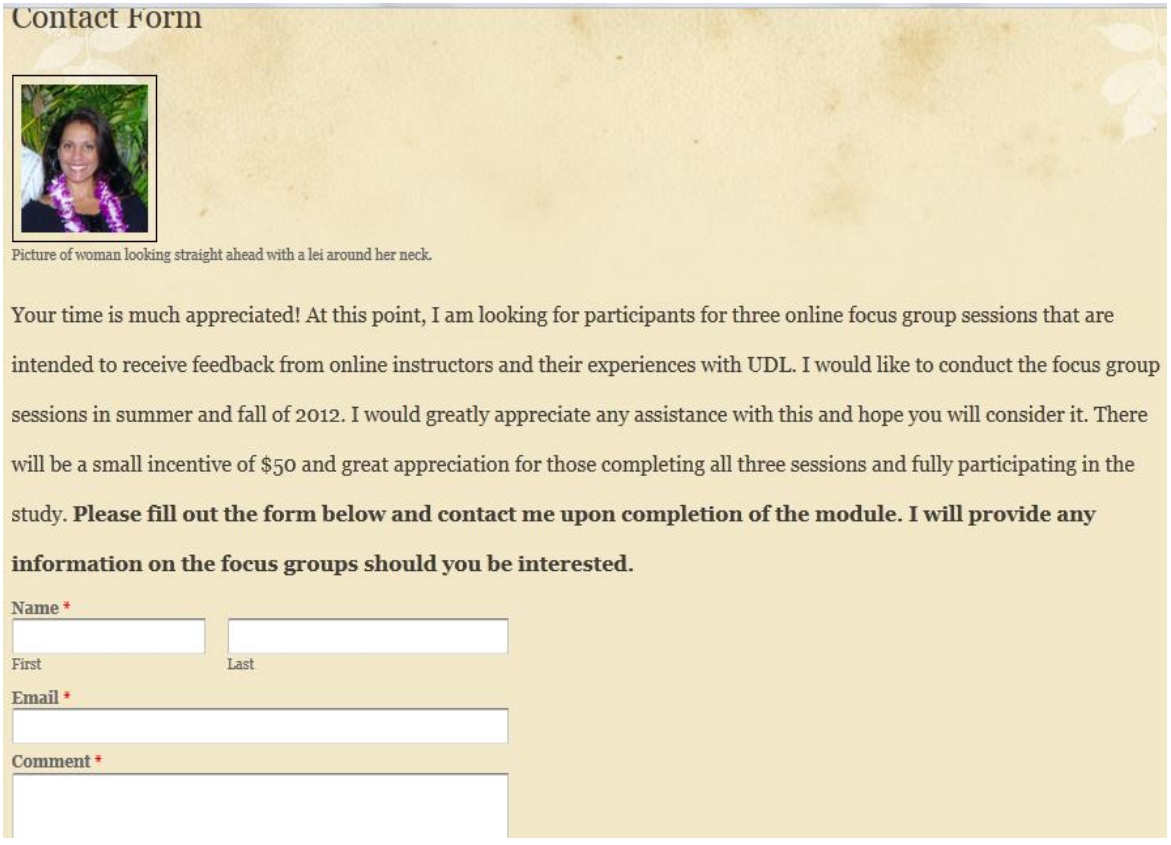


Figure 21. Optional Contact Form

SUMMARY

The UDL module was used as the treatment in this study. The module introduced participants to the concept of UDL and how basic applications and practices could be implemented. The module was used as the initial introduction and allowed participants to navigate through information on UDL, its origination, its definition, and its components. Basic features of the module were highlighted, including the initial survey, which was located at the beginning of the module.

CHAPTER 5. CASE STUDIES

Chapter 5 will describe each case as they participated in the study. Background information pertaining to online teaching experience as well as themes that emerged through coding will be included. A list of themes will be compared and described in Chapter 7. This chapter describes each of the four instructors who continued into Phase II of the study with each instructor representing a case.

Participants

Each case had either taught or was currently teaching online and consented to participate in Phase II of the study. They comprised of being tenured, non-tenured, or adjunct faculty members. Some taught part-time while others taught full-time. Each of the instructors had experience teaching face-to-face and online at four–year universities. The instructors themselves were adult learners willing to implement new ideas and teaching practices to impact how content was delivered in an online environment. Of the four, three were male and one was female. Years of experience teaching online ranged from 12 years to just under 2 years. Three of the participants held Ph.D. degrees while a fourth one earned her Ph.D. during the course of this study. Participants taught undergraduate and graduate courses in the areas of Business and Management, Kinesiology and Sports Marketing/Management, Educational Technology, and Pedagogy and Future Teachers. Each case was provided with an identifier with respect to personal names and names of their institutions of employment for anonymity.

Participants were asked to describe their teaching background as well as what influenced their decisions to become educators. Participants were also asked to discuss their experiences when engaging with the UDL treatment module including their overall impressions. Feedback from participants allowed me to gauge their level of familiarity with UDL. Each participant's overall impression of the treatment module, including its content and navigational accessibility, was also of interest. Participants were asked about any experiences they had in teaching students with various learning needs, including

individuals with disabilities. This information provided certain insight into their assessment of why, or how, their teaching practices would be affected by UDL. Table 15 provides a visual snapshot of demographic information. After introducing the case studies in Chapter 5, Chapter 6 will discuss descriptive findings of the uses and practices of UDL and/or accessibility features utilized by each case study, and Chapter 7 will describe the themes and comparative findings that emerged from each of the cases.

Table 15. Participant Characteristics

Cases	Age Range	Location	Background	Years Teaching	Years Teaching Online
JE	51 - 55 years	FL	Business specializing in Organizational Leadership/Management	5	2
ME	56 - 60 years	NC	Kinesiology and Sports Science specializing in Sports Marketing/Management	16	11
LE	46 - 50 years	HI	Education and Technology specializing in Culturally Responsive Teaching and ESL	10	7
DE	51 - 55 years	FL	Education specializing in adult education and future teachers	5	2

Case 1: J.E.

Background Information

J.E. is a male between the ages of 51-55 years. He greatly contributed to this study with respect to his professional background; he has spent an enormous amount of time in the business sector. JE has earned an Ed.D., MBA, BS, BA, and AA degrees and he currently specializes in Organizational Leadership and Management. His professional experience has kept him very busy traveling to various locations to share his expertise. In addition to contributions in the business world, his commitment to teaching undergraduate students at a university in Florida adds to his vignette of responsibilities. He is a part-time adjunct instructor in the Business department. and has been teaching less than 5 years in higher education with approximately two of those years teaching online. His courses in business range from introductory, to a more advanced economics

course, as well as a course in finance.

Participant's Reaction to the UDL Treatment Module

J.E.'s first impression of the module was its navigational structure. He was satisfied with its features and the ease of navigation. Initially J.E. stated the module was what he had anticipated. When asked to explain further, his response included that the anticipation prior to going through the module was what he had expected as far as navigation and information provided. When asked about his interpretation of the basic concepts of UDL, he transferred that information to his own course mentioning how the PowerPoint slides he used in his course, along with audio and video, could be considered UDL. Specifically referring to his interpretation of the term UDL, he indicated he had not heard of the term prior to the module. When asked to elaborate, he stated,

> I had no idea what UDL meant but after reading it and going through it, it does make sense and I can see how it can be used and some of the applications I've used that I didn't think were UDL are actually UDL-like. For example, the PPT in Khan-academy, where students are able to use, provide graphics and have supplemental materials to enhance the learning experience for the students. That's specifically how close I can come to UDL for me. So far, in the year that I've taught, that's the closest I've come to something that's UDL online.

He had used Khan Academy, and perceived this as his supplemental support that could be related with using the UDL principle--multiple means of engagement--in providing multiple ways to engage learners. His last response to this question was interesting. "That is what would be related to UDL. Correct?" This statement made a profound finding, which will later be part of a discussion in Chapter 7.

Experience with Accessibility And Diverse Learning Needs

It was necessary to describe specific accessibility features that would allow content to be accessible. When asked about transcripts or closed captioning, J.E. could not recall needing to implement either transcripts or closed captioning. From the time the interview took place he stated he had not needed to accommodate anyone with "those types" of disabilities. He continued to state that videos from the curriculum he used provided a step-by-step process to solutions of problems. In other words, if he did have a

person with a hearing loss he would not have to worry about the problem of not being able to hear. One could see the presenter actually performing the calculations on the screen. Therefore, one did not need a transcript or closed captioning since the visual representation of the videos would be sufficient in providing information.

Later in our discussion, J.E. recalled that while teaching an introduction to an economics course in the spring semester of 2012, a student with a "medical condition" was enrolled. J.E. stated that the student had problems with dexterity and experienced difficulty using the computer's keyboard for completing her assignments. He modified the material in order to accommodate the student's needs; however, did not specify what he did. He added more information by saying he encouraged her, as well as previous students, to utilize services through the university's student disabilities office where professionally trained faculty and staff could provide additional services. Services included utilizing assistive technologies and software designed to enhance content accessibility. J.E. had not experienced using or implementing any other accommodation or accessibility practices either online or face–to–face.

Course Design and Student Appreciation

J.E. had been teaching online for less than two years and his experiences were fairly new. When asked about applications of UDL, J.E. stated he used a specific curriculum provided by the university and believed providing supplemental materials to the students during the semester was something he could control. He taught an asynchronous economics course where students accessed PowerPoint and links to supplemental material for further comprehension. Students had access to the PowerPoint and material at all times during the course, as well as having access prior to the course beginning in case students needed to print material. J.E. used PowerPoint at the onset of the semester and made them available while he was still designing future sections of the course. The material consisted of an outline of the chapter, hence the PowerPoint presentations. The material J.E. used were provided by the publisher and consisted of supplemental PowerPoint that outlined the chapter contents. J.E. provided these PowerPoint slides to his students as an optional visual support while reading the textbook.

Students could access the modules and complete their assignments for the week using the materials provided. He did not have much direct interaction with his students since most of the instruction included him providing feedback by posting grades to submitted assignments. He later stated that feedback was delayed on occasion due to the structure of the course. However, the conveniences of providing material in such a manner, in J.E.'s perspective, also afforded students leverage in their own learning. He received some feedback from students acknowledging their appreciation for the supplemental materials. He stated, "Most if not all the students thank me for the PowerPoint. They really appreciate the supplemental material. I would classify that as UDL." He knew his actions in providing additional materials when he could meant something, but was not sure at the time of UDL's principles.

Influences in Current Teaching

When asked about professional preparation that influenced current teaching, J.E. stated he was inspired to teach by one of his own professors. He stated his doctoral minor was in human resource development (HRD) which provided opportunity to study and learn about the various methods for teaching adults. Knowledge obtained from an HRD minor as well as the self-development courses taken through the American Society for Training and Development (ASTD) also influenced his attitude and philosophy of teaching adults in higher education. Although having a vast amount of experience in the business sector, being an online, adjunct instructor was a new experience and validation was important to him.

Although multiple sources of material were used for teaching a course, J.E. continued to make reference to his limitations in providing more to students due to the constraints imposed by the university. J.E. described 'constraints' as not having the flexibility to develop and design his own content in order to include his personal creativity in course development. He liked the materials provided to him; however, he felt he was limited in providing only the materials from the university and the publisher of the textbook. Although his delivery approach was limited by university regulations, his recognition of what could be defined as UDL principles became more evident along with a heightened perspective of diverse teaching methods.

Due to the asynchronous nature of his course, I could not directly observe him teaching. Email correspondence and phone conversations compensated for this. J.E. also graciously provided multiple artifacts and course materials that assisted in the data collection process.

Online vs. Face–to–Face

Of the three courses J.E. had taught, one had been online. He had been teaching online for a year. His recollection in teaching online compared to that of a face-to-face environment was very contrasting, "So yeah, I can tell you for a fact that teaching online is different than teaching face-to-face. It calls for different skill sets. You're a Subject Matter Expert reaching out to the online student and communicating." J.E. continued to express how lessons are completely different due to different mechanisms in place. For example, he stated there was no immediate feedback since everything was asynchronous. Feedback was not spontaneous as when sitting in a class and lecturing. He expressed,

> I've got the student when I'm lecturing that has a question, I can get immediate responses and tell if they're grasping the material, you know the concepts that I'm trying to explain in the class. And the greatest thing I've noticed is immediate feedback that is not noticed when online versus a live class.

In his online course, he had provided his syllabus in large print and in electronic format and had not integrated any other accessible feature in his course that he was aware of.

Clarity and Content Delivery

In conjunction with the method of course delivery, clarifying content and how material was understood by students was important to J.E. He indicated how his interpretation of applying UDL principles clarified his intended teaching strategy to deliver a desired student learning outcome. He stated, "Yes, actually, the whole idea of the collaborative approach to the problem-solving, not telling the students what to think, providing information allowing them to give feedback." He felt his objectives were better structured and were supported by the content. Delivery of content became clearer resulting in him not having to provide additional and unnecessary instructions since expectations were established prior to content delivery when it came to learning for his students.

Innovation in Collaborating

When teaching online, strategies sometime involve non-traditional teaching methods. The importance of altering teaching strategies, and to be open to non-traditional teaching methods, involves innovative thinking. JE had experienced not only teaching students, but being the technology expert and sole support person to many of his students taking classes online.

The university where J.E. is affiliated has embraced an online discussion forum, which is similar to a blog, where instructors can communicate and ask questions. He indicated the term UDL specifically has never surfaced in conversation with colleagues; however, JE indicated he had been asked about using additional resources for supplemental reinforcement for teaching. He had recently developed an online and face–toface strategic management course. The person in charge of the on–campus course asked for supplemental materials in which he recommended PowerPoint presentations in addition to other external websites. JE commented to his colleague that…in addition to providing the PowerPoint presentations, she could go online, click the link, and walk through the problems of the examples and concepts for the students to grasp the material."

JE's perspective of having additional materials, such as a PowerPoint, to supplement course content, supported UDL principles by providing multiple means of engagement. JE mentioned that through his years of teaching, he has used different methods of delivering material with PowerPoints being the primary method; however, he now realizes the need for multiple methods of delivery to reach a greater group of students.

Case 2: M.E.

Background Information

M.E. is a male between the ages of 56-60 years. M.E. greatly contributed to this study with respect to his professional background in Kinesiology and Sport Science. M.E. is an Associate Professor with a Ph.D., specializing in Sports Marketing and Management, and a MBA in Marketing Finance.

His professional experience includes teaching in higher education between 16-20 years where approximately 11-13 years have been specifically teaching online. M.E. is

tenured faculty and currently teaches undergraduate and graduate students at a university in the eastern part of the United Sates. His expertise in courses taught lies in the areas of Research Methods, Finance, Sales, Marketing, and Facility Management. His previous experience includes being a Graduate Coordinator of Sports Management where he coordinated a program of 75 graduate students.

Participant's Reaction to the UDL Treatment Module

M.E. indicated the module was structurally easy to navigate. When presented with the concept of UDL, his response was included his use of chats. His reasoning of using text chats was due to some students not having audio capabilities or access when in a synchronous environment. He referred to his chat sessions as a form of UDL. In addition to utilizing the chat feature, M.E. recognized other UDL influences within his course. He stated, "I do PowerPoints, discussion boards, expert chat, and lecture notes are ways....."

Online chats and posting documents and recorded chats enabled M.E. to utilize the UDL principle of providing multiple means of representation. M.E. further exclaimed, "I think another way to improve is to use my voice, supplemented with an online PowerPoint." He further stated that "over time" one learns different approaches. The fact that he had been teaching online for 12 years showed in his agility in teaching using only the chat feature for communication.

Experience with Accessibility And Diverse Learning Needs

M.E. has personal experience with disability since he is a tenured faculty member with a physical disability. M.E. has also experienced having students with learning and physical disabilities taking his courses. His personal and professional experience with teaching has afforded him expertise in providing accommodations when students request it. Additionally, he has encouraged students to use services through the university's student disabilities office. I asked about his applications of UDL and his attentiveness to meeting the needs of his online students by offering unique chat-only sessions. He explained that his chat-only sessions were the result of his desire to use a visual form of communication to reach students who could not use audio to speak or hear. His intentions were to level the playing field by using chat only in his synchronous meetings as the only method of communication. His students could chime in using the microphone; however,

he responded only by texting back to them. He believed students were able to view the chat box, review the conversation, ask questions, review other students' comments and questions, and reread lesson information as the class progressed. He continued to state, "Yes, I believe my UDL approach is an asset to student learning." He felt confident in his application and role of using UDL.

Course Design and Student Appreciation

M.E. posted guided notes in Blackboard to help students with key terms from his lessons. He also provided options for students to show what they had learned, and he provided various formats for documents and course materials used in the class. He also invited guest speakers quite often to speak to the class. When guest speakers where invited, students had the options of using the chat feature once again, or speak into the microphone to ask questions. The guest speaker used a microphone as well and responded back accordingly. M.E. varied his content delivery approach in hopes of providing more opportunities for his students to communicate.

Influences In Current Teaching

In M.E.'s 12 years of online teaching it became apparent to him, over time, that he needed to provide multiple means of content delivery. When asked about the UDL module (after viewing it), he stated that although he knew he was providing various formats of material for students, it validated his use and increased his awareness of using UDL. M.E. stated he set his goals in becoming an educator and was persistent in achieving these goals. Additionally, he stated, "My doctoral and post-doctoral training prepared me well for a career as a professor and scholar." Future changes he expressed he wanted to make were to upgrade his audio and use more graphics to supplement his text when using PowerPoint. He used PowerPoint in his f ace-to-f ace courses as well as guided notes. These would be strategies he wanted to incorporate more into his online course.

Online vs. Face-to-Face

M.E. has taught research methods, finance, facility management, and marketing classes all in an online environment. Of the four case studies, M.E. was the one with the

most online teaching experience. His 12 years of teaching online surpassed his face-to-face experiences, but he still continues to teach face-to-face. In his online courses, he provides his syllabus in large print and in electronic format and will sometimes provide transcriptions, or text format, when audio is used. He is very active in recruiting guest speakers to enlighten students' interests as well as their professional careers. His interest lies in teaching in an online environment where he feels comfortable doing.

Clarity in Content Delivery

I had the opportunity to observe two synchronous sessions M.E. taught. He chose to communicate with his students using the "chat" feature through his virtual classroom where students logged in all at the same time but in different locations. During one particular session, communication centered on an upcoming major assignment. Clarification of information occurred as the discourse amongst the chat session continued. Students were able to view questions and "piggy back" on previous questions allowing for further clarity of information.

Innovation in Supporting Non-Traditional Teaching Methods

As previously mentioned, M.E. had a non-traditional strategy even in the online environment. He used chat in his synchronous courses. Using the chat feature is not a new method of communication; however, delivering a class session in a chat-only environment was. During several course observations, students were still engaged and used the chat to their advantage by being able to search previous answers to questions without having to interrupt the flow of class instruction. When asked why he used chats on most occasions when in a synchronous online course, he stated, "I use chats because some students don't have audio so I use online chats. I would like to see caption technology established or technology that converts impaired speech to normal speech." M.E. has a physical disability whereby he is very interested in technology innovation in speech development, especially where technological devices can express speech. He also expressed interest in working with colleagues doing research in online environments as well as with other assistive technologies that support speech-to-text conversions.

Case 3: L.E.

Background Information

L.E. is a female between the ages of 46-50 years. Her contribution to the study involved a deep cultural perspective with respect to her professional background in education and technology. L.E. has a BA in History and Language, an MA in Educational Administration, and a Ph.D. in Educational Technology.

L.E. is tenured faculty and currently teaches undergraduate students at a university in the Pacific region. Her areas of expertise and research interests lie in Culturally Responsive Teaching, English as a Second Language (ESL) / Teaching English to Speakers of Other Languages (TESOL), and Media Literacy including labor issues in teaching with technology. She has previously worked in the K-12 arena where she taught 3rd and 4th grade for two years. She was principal of a public kindergarten school (400 students) for two years, and principal of a small, rural public village school (70 students) for two years. She also taught for six years in a secondary school at a Native American Preparatory School, and was Dean of Student Development for two years. Additionally, she has taught speech at the Kamehameha Schools summer program (9th and 10th grade), and has taught writing in Iolani Summer Programs (7th and 8th grade). She has also provided special needs support to 1st graders specific classroom environments.

Participant's Reaction to the UDL Treatment Module

What caught LE's attention about the module was the connection of being able to validate "things", meaning her methods of delivering content and using strategies she referred to as UDL. The module helped to describe what actions took place during teaching. "Reading through the definitions of what this approach was called provided some of the key terminology for the things that I try to do in class. It was not only validating but it helped me to describe one of the things I do in teaching and label what this approach is called." L.E. reminisced on teaching methods and strategies used while teaching elementary and high school that translated over to the university. These methods included using concept maps and relaying expectations for students. Even though UDL was throughout, it helped to not only conceptualize her teaching but also aided in

explaining topics "better." Her experience in working with diverse populations provided colorful insight to how her transfer of teaching integrated into her overall practices of teaching in both the K-12 and higher education environments.

Experience with Accessibility and Diverse Learning Needs

The first experiences L.E. remembers were not from teaching students, but rather from a more personal perspective. She indicated that her great-grandmother lost her eyesight to glaucoma before she was born. She raised L.E. from the time she was an infant and remembers playing listening games with her grandmother, where she would hide and her grandmother could find her based on sound. "I was her eyes, but she was my *everything*. We were partners." Her grandmother also had a great sense of humor. L.E. mentioned one instance when she found her grandmother watering a fencepost she thought was a tree. They laughed all day about that. "She made tortillas and cooked for me, again, completely blind! I'm still blown away by her tremendous patience, humor and grace." L.E. continued to describe her family experiences. L.E. had a cousin who was deprived of oxygen during birth and suffered brain damage. He is now 37 years old and works washing dishes at a Pizza Hut where he has worked for the past 15 years. He lives with his mom and dad and has always been a special loving cousin to L.E. She considers her cousin as a blessing to the family – teaching them patience and grace.

Having been exposed to someone with a disability at a young age, L.E. recognized the need for student–centered and student–guided content material. L.E. has had about 500 students come through the university program where she works. She recalls several students with exceptionalities (disabilities) coming through the program to become pre-service or secondary teachers.

Course Design and Student Appreciation

Having taught online for a number of years, L.E. believes that course design has been a trial and error process. Her perspective has allowed for flexibility to build on concepts and ideals she is passionate about. She has had the opportunity to engage students on a deeper level considering her design flexibilities and teaching experience.

Over the years, LE regarded her agendas as something that benefited not only her students, but herself as well.

> I've always used graphic organizers to structure my overall course agenda when I teach. So I use a flowchart with what's happening in the flowchart in sequence so the students know what's happening. I also use graphic organizers to brainstorm and to categorize information in the class and also to analyze. So that stood out to me.

L.E. expressed the reason for using graphic organizers was because it was something she did while teaching elementary school. She claimed that they were very affective with her students in maintaining organization. She acknowledged the fact that professors have typically associated graphic organizers with K-12; however, in reality they do help explain complex topics. She continued to state, "I mean we call them, what, conceptual frameworks? Conceptual frameworks are basically graphic organizers, right?" Additionally, by utilizing multiple means of delivering content, information in a course that operated on a routine, not to the point of doing the same thing at every class, but students know there would be a sequence and they knew what to expect. "You know a few minutes of lecture, then an activity. Like they knew it would be the structure of the class."

She noticed, not right away because it took some time to figure out, but sequencing content and providing expectations was the best way to structure her online course. As she began experimenting with different ways of presenting content she confirmed she was getting "better and better." Students expressed their appreciation for the graphic organizers presented to them at the beginning of the course since they knew what to expect. Students also remained engaged during the lecture since they knew LE would embed learning checks within the content for self-assessment. Anticipation heightened as a result of an upcoming learning check. Students could also pause, collaborate with each other, and engage in their own learning strategies. LE recognized these methods may not have reached all her students; however, the ones she did reach appreciated her efforts. "So whether or not it benefited one, you know the thing I like about UDL is that it benefits all students and for me it definitely improved my student evaluations."

Influences in Current Teaching

L.E. stated that in the first grade she was placed in special education for being "too quiet." Her teacher didn't know she was already reading by that age. That experience, plus seeing discriminatory treatment of second language speakers being misdiagnosed as students with learning disabilities, motivated her to become a teacher in order to address disproportionate representation of culturally and linguistically diverse students in special education. L.E. completed traditional teacher preparation program where a bilingual endorsement for all teachers was required. The additional endorsement addressed issues in cultural mismatch between school and home and encouraged the use of instructional strategies to address that mismatch. LE attributes the student–teaching phase as critical and instrumental in effectively preparing teachers:

> Exceptional mentor/teacher experiences add meaning and agency to the profession for pre-service teachers. This can have lasting impacts on teacher attrition and student instruction. Given the multiple and overlapping skill sets require of teaching, fast-track preparation programs do nothing more than undermine the profession.

Online vs. Face-to-Face

L.E. reflected on her past teaching experience. She has been teaching for approximately 10 years, including 7 years online. She has taught over 30 sections of a teaching course to future teachers; about half of these courses were hybrid and the other half completely online. Online courses have reached those in isolated areas where the only option is to teach in an online format. L.E. shared her teaching methods since modifications between teaching face-to-face and online have occurred to meet her students' needs. L.E. stated, "…In online, in terms of content, I try to provide it in multiple formats for students and present it in different ways where students can look at it or engage with it according to their needs."

Clarity and Content Delivery

When delivering in an online environment, much of the work is produced at the front end, before a course even begins. L.E.'s strategies involved sequencing her class delivery content so students were aware of what activity would be approaching. In doing

so, careful planning initiated the clarity of content delivery, which became essential in order to minimize confusion. L.E. stated,

> Reading through the definitions of what this approach was called provided me some of the key terminology for the things I try to do in class. It was not only validating but it helped me to describe one of the things I do in teaching and to provide a label for what this approach is called.

L.E. stated how she could provide information in course content that was routine, but not to the point that she was doing the same thing in every class; the students still knew there would be a sequence. She said,

> A course should be structured but not repetitive. There's a certain art and science in teaching that is very individualized and complex. It's not formulated. I noticed from semester to semester, student groups and certain group dynamics can change. So you know the same formula that works one semester may need to be adjusted or something may need to change for the fall semester.

Clarity of content delivery emerged when instructors explained how concepts became clearer as teaching occurred. L.E. stated, "It helped not only conceptualize my own teaching but it helped me to explain it better." She also commented how, after reviewing the UDL applications, clarity of teaching strategies and how they were implemented, was more defined. She continued by stating,

> So I use a flowchart with what's happening in the flowchart in sequence so the students know what's happening. I also use graphic organizers to brainstorm and to categorize information in the class and also to analyze - so that [UDL applications] stood out to me.

Innovation in Collaborating Ideas

L.E. stated that she worked with other professors, and she has recommended they use UDL in their courses.

> I credit the module for helping me with the language in explaining UDL to them more clearly. I mean we're grappling with this intersection of technology and pedagogy and we're not quite sure how to do that because there are folks who are

content area experts and great teachers that don't necessarily know how to teach online. And so that's the conflict, right?

Case 4: D.E.

Background Information

D.E. is a male between the ages of 51-55 years. D.E. greatly contributed to this study with respect to his skilled background dedicating his professional time in working with adults in higher education. D.E. has earned his PhD where he currently specializes in teaching future educators in a graduate teacher education program at a university in Florida where he has been a professor for over 4 years. Prior to teaching in higher education, D.E. was a Social Studies teacher for middle school students and later became Dean, overseeing security, transportation, and multiple other responsibilities.

Participant's Reaction to the UDL Treatment Module

When asked about the UDL module D.E. expressed how the module reinforced what he did in class. He stated,

> Actually, I thought the site was good. There was no difficulty; it was easy to navigate and find and manage information. The best part is that it's laid out very simply. If you get lost, you could go to 'Home.' I believe that as a result after looking over the UDL curriculum and the content, it helped me to gain a better appreciation for going slow, making sure all the students are on board, checking for the comprehension, and not assuming everyone understands what's expected or how to do it.

Experience with Accessibility And Diverse Learning Needs

As of the date of our conversation, D.E. had not experienced specifically accommodating anyone with a disability. D.E. stated that everyone has a disability in something. Some have been diagnosed, and some have not. Patience, kindness, and compassion have been effective bridges through these experiences. D.E. additionally mentioned that he has also encouraged students to use student services, including those to assist with students with disabilities through the university's student disabilities services center. D.E. also described his current teaching style and what worked best with his

students as far as delivering material in which he presented in a question and answers method. He stated,

> Yes, we have to understand how we and others learn in order to be the most effective teachers. I try to avoid the lecture style teaching so I prefer the Socratic Method and would develop that more, use a bit slower pace, and review that next time we met. I would review and not assume you [the student] knew everything from the last meeting. I would review and check for comprehension.

Course Design and Student Appreciation

Students shared appreciation for collaborating with each other and D.E. encouraged his students to share their ideas without having to tell them information immediately about a subject. "Actually, the whole idea of the collaborative approach to problem-solving, not telling the students what to think, but providing information while allowing them to give feedback and adjust my own delivery and explanations based upon their needs." He supported students learning from each.

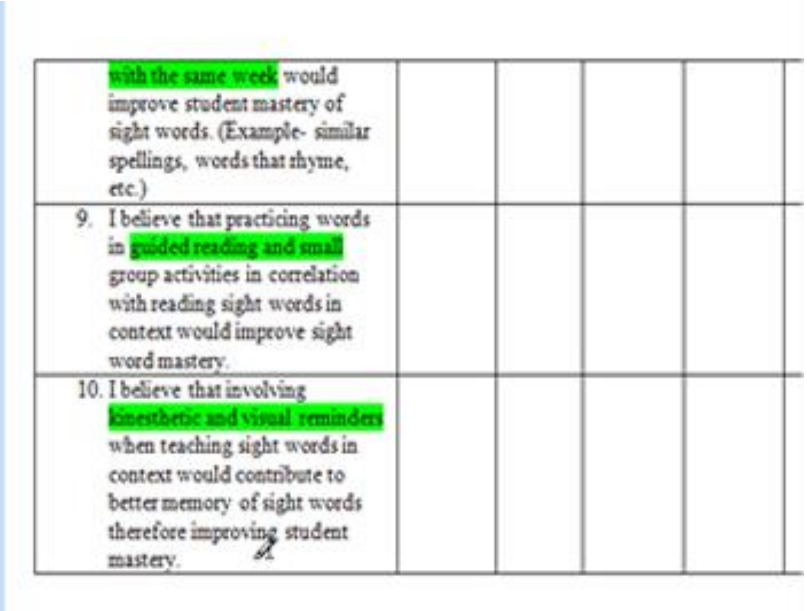
Influences in Current Teaching

When asked why he decided to become a teacher, his response was, "To help others learn. Good teachers are usually good students so I like to learn more effective techniques from others." D.E.'s passion for teaching was obvious as he discussed his class arrangement, his students, and how content delivery is an integral part of the content itself. D.E. was also passionate about continuing to learn as an educator. He indicated he still had to practice his teaching techniques. He continues to use the Socratic method of teaching and tries to consider his pace while lecturing.

Online vs. Face-to-Face

When teaching in an online environment, D.E. commonly provides an agenda at the beginning of each class meeting. He uses a synchronous environment to conduct some of his class meetings where he utilizes a few of the interactive features allowing for students to interact with each other as well as with him. He often uses the 'chat' feature within the meeting space. D.E. explained that when conducting his online course, communication and establishing student expectations set the foundation for online

discussions. He commonly uses visuals when discussing key concepts, such as documents that are manipulated using the whiteboard and highlights. (features in the virtual meeting space) as seen in Figure 22.



	with the same week would improve student mastery of sight words. (Example- similar spellings, words that rhyme, etc.)				
9.	I believe that practicing words in guided reading and small group activities in correlation with reading sight words in context would improve sight word mastery.				
10.	I believe that involving kinesthetic and visual reminders when teaching sight words in context would contribute to better memory of sight words therefore improving student mastery.				

Figure 22. Example of Highlights

He also does web tours where he will navigate outside the online meeting environment on to a website to show examples that support the topic at hand. Using these described strategies has helped D.E. to relay concepts and information to students.

Clarity and Content Delivery

Participants were sensitive to the fact their students possessed diverse learning needs; however, how to meet those needs was not always apparent. DE commented on how his approach had changed over time. His method before was to go straight into the next lesson without first reviewing previous material. His delivery methods later changed. He commented that, "By going slow, making sure all the students are on board, checking for the comprehension, and not assuming everyone understands what's expected or how to do it has helped with retention and meeting the needs of diverse learners."

Innovation in Collaborating

D.E. has shared ideas about teaching with colleagues and recognizes his

limitations in areas he would like to improve upon. His idea of being innovative includes learning about new telecommunication products and multimedia to deliver content. He has collaborated with a curriculum designer from his university to integrate further methods of delivering content other than PowerPoint. About this process, D.E. said, Making more interactive technology so students get a more multisensory, interactive experience in a unified way is something I would like to do. I didn't want to regurgitate the content from the textbook so I have asked the ID [Instructional Designer] to help me create program overviews; these are guides that someone could appreciate and use regardless what the textbook was.

CHAPTER 6. RESULTS: PHASE I

In the previous chapter, we explored case studies of four instructors teaching online. Their demographic information, teaching experiences, and teaching practices allowed for unique contributions and enhanced the development of the study. This chapter, and the next, will address findings presented in the same structure as the study itself. Chapter 6 is dedicated to Phase I, focusing on the results from the web-based questionnaire, while Chapter 7 addresses Phase II in which comparative findings are addressed.

In Phase I, 41 participants completed the web-based questionnaire. Participants either were currently teaching, or had previously taught an online course. A broad understanding of how online instructors applied UDL, accessibility, and practices in teaching was sought by the dissemination of a 30-question, web-based survey. As the researcher, I was aware that the participants' levels of knowledge, understanding, and experiences of UDL and accessibility would range. Therefore, 13 of the 30 questions were dedicated to gathering descriptions of UDL implementation and accessibility features. Taking into consideration that a participant may have been familiar with an action, but unfamiliar with the terminology of that action, the survey presented several examples of accessibility and UDL and how each could be implemented. Instructors were asked about the specific characteristics of their teaching practices in order to avoid ambiguity of accessibility practices. A provision of clarity to generate a more accurate response rate was the desired result. A general description and comparison of participants (N=41) and their practices of using accessible practices and/or techniques in their courses will now be addressed.

Practices and Techniques

As discussed in Chapter 5, CAST (2013) provides a checklist titled UDL Guidelines – Educator Worksheet that is provided by the World Wide Web Consortium (W3C), shown in Appendix E. W3C (2013) has established requirements that align with

what the law deems accessible. To be compliant, websites are mandated to follow these requirements for accessibility. An overview of W3C's requirements is shown in Figure 23 where a division of accessibility guidelines and requirements are separated into four categories; they are Perceivable, Operable, Understandable, and Robust. Utilizing the following categories, along with the UDL guidelines, provided a valid and reliable foundation in aligning the tools and practices participants used in their online course(s).

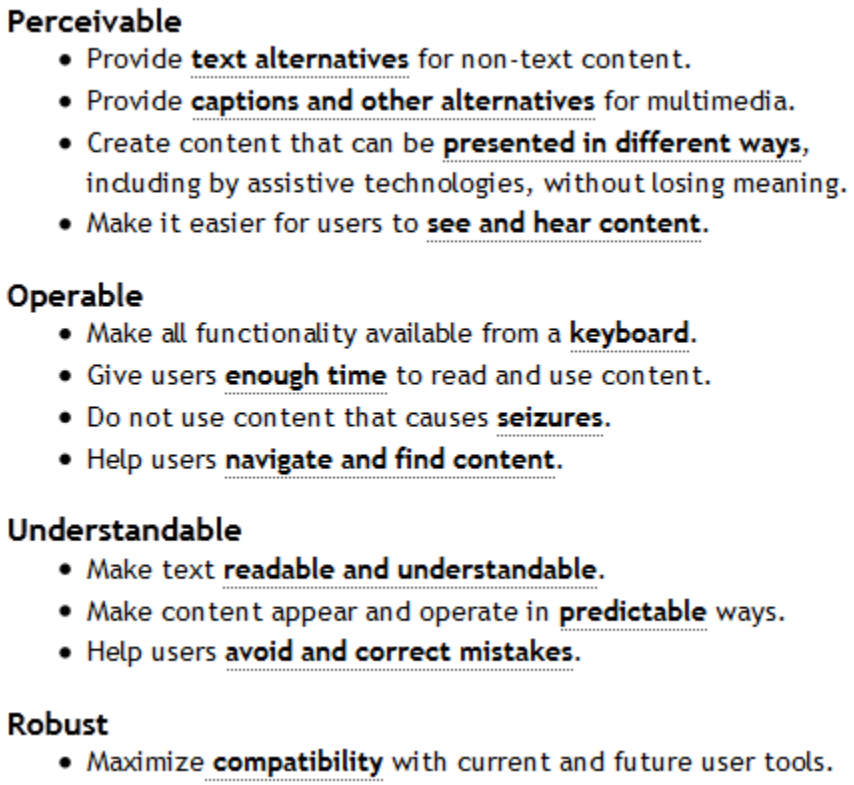


Figure 23.Web Content Accessibility Guidelines (WCAG) Overview

The structure of the questionnaire was designed to randomly display questions that addressed accessibilities that benefited specific sensory strengths; these were visual, motor or kinesthetic, auditory, and cognitive or hidden. This structure was implemented in order for participants to experience a variety of questions pertaining to accessibility practices. The same structure was then used to describe the results. Categories of results consisted of visual benefits, auditory benefits, motor/kinesthetic benefits, and cognitive benefits. Table 16 reflects a compiled list of uses by participants and is detailed in the topics below.

Visual Benefits

Participants were asked how printed material, including the syllabus, was delivered, as well as options for retrieving the material, as in text-to-speech delivery. Referring to Table 16, providing a digital format of the syllabus was reported 11 times (27%). Nine responses (22%) reported their syllabus as being screen-reader accessible. Providing a syllabus in large print accounted for 6 responses (15%), while 5 responses (12%) accounted for having their syllabus in PDF format. And finally, 10 responses (24%) were reported as miscellaneous, or not providing an accessible syllabus at all. It should be considered that although participants believed their syllabus provided accessibility, having a digital format of a document does not necessarily make it accessible since it would need to align with requirements established through W3C.

Text-to-speech software converts written text into audio output. Participants were asked if text-to-speech software was available to students. Referring to Table 16, sixty percent (60%) answered *no* they did not implement text-to-speech software in their course. Considerably fewer, nineteen percent (19%), did implement text-to-speech software in their course. The question of how text-to-speech software was implemented is uncertain. Therefore, the ability for a screen reader to read documents, including a syllabus, could have either been through the accessibility feature within the hard drive of the computer or laptop itself, or through commercial software such as JAWS or Kurzweil.

When asked about accessible printed material, this included: large print options, Braille, audio/video of the same text (or vice-versa), and electronic format. Results indicated seventy-eight (78%) of participants provided *large print* as an option to view documents. The highest percentage was at eighty-one (81%), which provided the options for documents to be in *electronic format*. It should be noted that participants were able to check any applicable option resulting in the possibility that the same participant could have checked more than one selection. Another consideration is that teaching an online course would commonly generate materials in electronic format for all students to access.

Another form of visual benefit is color and shape selection. Information conveyed using color uses more than one method for students to visually receive information. For example, using red boxes or green circles as possibilities to provide information,

contribute to more than one visual option to choose from. Color would not be the only differentiation of information delivered and received. Information being emphasized would also include having a shape as a visual indicator as well.

Results for using color benefits indicated the highest percentage was thirty percent (30%) meaning they *sometimes* provided information with, and without, color benefits. Twenty-one percent (21%) indicated they *always* provided information with color benefits, while nineteen percent (19%) indicated they *never* provided information with color benefits. Twelve percent (12%) reported as *rarely* providing color benefits.

Visual benefits and their alignment with UDL and W3C guidelines. According to UDL guidelines presented by CAST (2013), the syllabus should provide options for perception by creating content that could be perceived in different ways. Students would have the option to print the syllabus, or simply view it as a document on the computer monitor. Text-to-speech provides options for perceptions by offering alternatives for auditory information. The printed material was perceivable by providing options of offering ways to customize the display of information. With regard to color benefits, providing options for perceptions was present by also offering ways of customizing the display of information. Implementing text-to-speech and visual benefits as options to display information both support multiple means of engagement in receiving information.

According to W3C (2013) guidelines, delivering the syllabus in digital format as well as providing text-to-speech features provided "perceivable" content that could be perceived in different ways without losing any meaning. The printed material was also perceived as presenting material that was easier for others to see and hear content. Providing color benefits delivered understandable text making it readable and understandable. Guidelines for both CAST and W3C were supported relative to the visual benefits displayed that were implemented by online instructors.

Auditory Benefits

When any kind of audio output is used, text captioning or transcription accessibility is mandated to be available to users who cannot access audio, or sound. Information is displayed in Table 16. The highest percentage reported was thirty percent

(30%), indicating they *sometimes* provided closed captioning or transcriptions for their audio or video content. Application decreased to twenty-one (21%) of those who reported as *never* having utilized closed captioning, or transcriptions to accompany audio and/or video delivery of content. Nineteen percent (19%) claimed they *rarely* provided closed captioning or transcriptions, and only five percent (5%) claimed they *always* provided closed captioning and transcriptions with their audio and video content.

Having real-time captioning or a sign language interpreter who is available to students who may request it would necessitate external resources since only certified professionals are qualified to perform such duties. The two highest answers were at both ends of the spectrum with forty-two percent (42%) claiming they *never* provided the option, while twenty-six percent (26%) claimed they *always* provided the option of real-time captioning or sign language interpreter availability to those who requested it. The highest percentage of instructors, at forty-two (42%), that did not provide the option of real-time captioning, or interpreter services, could be indicating that they were unaware services were available.

Auditory Benefits in Alignment with UDL and W3C Guidelines

According to W3C (2013) having audio with captioning, or transcription accessibility, provides options for perceptions in varying the methods for response and navigation of content. Real-time captioning or having a sign language interpreter provides options for perceptions by offering alternatives for auditory information.

W3C guidelines are supported when audio output is perceivable by providing captions and other alternatives for multimedia. Real-time captioning or sign language interpreter is also perceivable in creating content that can be understandable in different ways. Since 42% did not provide the option for closed captioning or sign language interpreting, this could be an indicator their media, primarily videos, are not captioned, thus limiting the benefits for learners who may use them if available.

Motor/Kinesthetic and Cognitive Benefits

Participants were asked about the structure of their course site and if they provided the fewest links possible to reach a desired page. Referring to Table 16, results indicated forty-two (42%) percent *always* provided the fewest links possible, thirty-three

(33%) indicated they *sometimes* provided the fewest links possible, and 1% indicated as *never* providing the fewest links possible for their online course. Utilizing navigational benefits to link through a course, or module, that is multi-layered, would reduce the physical action of clicking through multiple web pages to reach a desired page. An individual with a motor disability could benefit from reduced navigational links. Additionally, a person with a cognitive or hidden disability could also benefit considering that one would not be required to navigate through scaffold pages of a website to reach a desired page.

A further consideration relevant to cognitive or hidden disabilities is the use of simple language, which carries hefty weight. Avoiding the use of jargon only known to individuals of a specific field or interest would level the playing field for individuals having less experience with the content. It eliminates guess-work and establishes expectations from the instructor. Again, referring to Table 16, forty-two percent (42%) was the highest rating indicating respondents *always* used clear and simple language on web pages, while thirty-five percent (35%) indicated as *sometimes* using clear and simple language. *Rarely* using and *never* using clear and simple language was less than five percent (5%) indicating instructors may be conscious of language usage when creating content to be delivered.

Motor/Kinesthetic and Cognitive in Alignment with UDL and W3C Guidelines

According to UDL guidelines, using strategically structured navigational links provides options for physical action varying the methods for response and navigation use. Using clear and simple language is supported by UDL guidelines in providing options for language, including mathematical expressions, to clarify vocabulary and symbols.

According to W3C (2013), providing few navigational links promotes operability and helps users to navigate and find content. Using clear and simple language makes text easier to understand. Since 42% indicated they always use clear and simple language, while 35% claim sometimes using it, cumulatively a majority of online instructors were implementing UDL and W3C guidelines whether they realized it or not.

Table 16. Practices and Techniques Used by Online Instructors

	Applied Method	Frequency	Percent	UDL Guidelines 2.0 Applications	Web Content Accessibility Guidelines (WCAG) Overview Guide
Syllabus					
	Digital	11	27	Provides options for perception	Perceivable-provide content that can be presented in different ways without losing any meaning
	Screen Reader Accessible	9	22	Perceivable-creating content that can be perceived in different ways, including assistive technologies	
	Enlarged Print	6	15		
	PDF	5	12	NA	
	Miscellaneous, or did not answer	10	24	NA	
Text-to-speech software implementation					
	Yes	8	19	Provide options for perceptions-Offer alternatives for auditory information	Perceivable-provide content that can be presented in different ways without losing any meaning
	No	26	60		
Accessible Printed Materials					
	Large Print	28	78	Provide options for perceptions-Offer ways of customizing the display of information	Perceivable-Make it easier for others to see and hear content
	Braille	12	33		
	Audio-tape or books	13	36		
	Electronic Format	29	81		
	None of the above at this time	3	8		
Fewest links possible					

	Always	18	42	Provide options for physical action- Vary the methods for response and navigation	Operable-help users to navigate and find content
	Sometimes	14	33		
	Rarely	2	5		
	Never	1	2		
Audio with text captioning/transcription accessibility					
	Always	5	12	Provide options for perceptions- Vary the methods for response and navigation	Perceivable-provide captions and other alternatives for multimedia
	Sometimes	13	30		
	Rarely	2	5		
	Never	9	21		
Use of clear and simple language on web pages					
	Always	18	42	Provide options for language, mathematical expressions, and symbols- Clarify vocabulary and symbols	Understandable-make text easier and understandable
	Sometimes	15	35		
	Rarely	1	2		
	Never	1	2		
Information portrayed using color/non-color benefits					
	Always	9	21	Provide options for perceptions- Offer ways of customizing the display of information	Understandable-make text readable and understandable
	Sometimes	13	30		
	Rarely	5	12		
	Never	8	19		
Available options for real-time captioning or sign language interpreter upon request					
	Always	11	26	Provide options for perceptions- Offer alternatives for auditory information	Perceivable-Create content that can be understandable in different ways
	Sometimes	3	7		
	Rarely	1	2		
	Never	18	42		

N = 41 (CAST, 2013)

Interpretation of Findings

The desire to create accessible materials was evident; however, the application of such materials was unknown in some instances. The three highest forms of accessible practices from the results of the survey were: providing a digital syllabus (27%),

providing electronic accessible materials (81%), and providing large print options (78%). Since these were perceived as providing accessibility, is there more action needed to incorporate more accessibility? Overall desire to implement accessibility was consistent; however, UDL and accessibility practices varied depending on what participants perceived as being truly accessible.

Participant Perception of Accommodation and Accessibility Practices

Participants were asked how difficult it would be to implement accommodations and/or accessibility practices for individuals in their online courses as well as how they would rate the actual implementation of these practices on a more consistent level. The primary purpose for asking these two questions was to gather a perception of how instructors felt about implementing accommodations and/or accessibility practices, assuming some instructors had not yet been provided the opportunity of implementing such practices within their course(s) but still had opinions, or perceptions, about incorporating accessibility on a general basis. I also wanted to gather information on the actual level of difficulty perceived by instructors who had experienced utilizing accommodation and/or accessibility practices within their course(s) and their perspective on the difficulty it was to consistently provide accessibility within their course(s). Due to very similar responses to the two questions, I concluded the questions were not clear enough to differentiate; therefore, participants interpreted the questions as asking for the same information, resulting in very similar responses.

The highest percentages of rating the level of difficulty were twenty-six percent (26%) with both *moderately difficult* and *neutral* as being the level of difficulty to implement. Nineteen percent (19%) rated the level of difficulty as being *moderately simple* to implement, and two percent (2%) as being *simple* to implement. Only nine (9%) indicated it would be *extremely difficult* leading to the conclusion as to why the option may not have been initially presented to students. The awareness of needing, or providing options to students may have not been apparent if direct exposure to a student requesting accommodations had never before been experienced by the instructor. Moreover, implementation at the onset of course design may have not been evident to the instructor prior to answering the survey due to the lack of exposure and experience with

students with a disability or with students with diverse learning needs.

Perception of Effectiveness and Actual Implementation of Accessibility Practices

Referring back to the mentioned accessibility and/or UDL practices, participants were asked to determine how they would rate the effectiveness of such practices if they had been implemented in a course. The key word is "effectiveness." A *positive* rating of fifty-three percent (53%) was the highest with regard to "effectiveness" of implementation. In descending order, sixteen percent (16%) rated "effectiveness" as *neutral*, twelve (12%) rated it as *extremely positive*, two (2%) rated it as *negative*, and zero percent (0%) rated practices as *extremely negative.* Since participants rated effectiveness of implementing at 53%, instructors view implementation as a more positive action and may be willing to venture out of their comfort zones in creating a more accessible course due to a new awareness of the need for accessibility.

Participants were then asked to rate their actual implementation of accessibility and/or UDL practices. Referring to Table 17, thirty-five percent (35%) stated they *sometimes implemented* practices in their course(s). This was the highest percentage of implementation. Nineteen percent (19%) stated they *never implemented* practices in courses taught online, and twelve (12%) of instructors rated themselves as *always* or *occasionally* implementing accessibility and/or UDL in their online course(s). Only 7% stated they *rarely* implemented such practices.

Table 17. Instructors Self-rate their Practices of Accommodations

Self - Rate	Frequency	Percent
I always implement accessibility and/or UDL in my course(s)	5	12
I sometimes implement accessibility and/or UDL in my course(s)	15	35
I occasionally implement accessibility and/or UDL in my courses	5	12
I rarely implement accessibility and/or UDL in my courses	3	7
I have never implemented accessibility and/or UDL in my courses	8	19

N=41

Based on the above results, 19% admitted to never having implemented accessibility and /or UDL practices within a course. Again, the awareness level of implementation may have been low to begin with resulting in the lack of accessibility not because of intent, but because of the lack of awareness and exposure based on the fact that the same participants rated the effectiveness of accessibility at 53%, which is slightly more than half of the participants.

The next chapter, Chapter 7, will compare findings amongst the four case studies and provide further insight as to the practices of implementing accessibility and/or UDL practices within their course(s). Additionally, Knowles theory on how adults learn will also be discussed in supporting the experiences of when and how the four cases perceived their own application of such practices.

CHAPTER 7. RESULTS: PHASE II COMPARATIVE FINDINGS

Chapter 6 explored the results of accessibility and UDL practices used by online instructors in their course(s). This chapter will explore findings and common themes that emerged with emphasis on Knowles' (1975) Andragogical Adult Learning Theory. Furthermore, several other topics will be discussed, including findings that stemmed from the process in how utilizing UDL evolved, being introduced to the treatment module, implementing one basic application of UDL, and documenting any change that occurred as a result of applying accessible and/or UDL practices.

Measuring initial change was guided by using Desimone's (2009) model of change as shown in Figure 24. Introduction and engagement with the UDL treatment module supported participants' learning and exploration of basic UDL applications. The model also initiated the alignment of the four changing processes of Desimone's model.

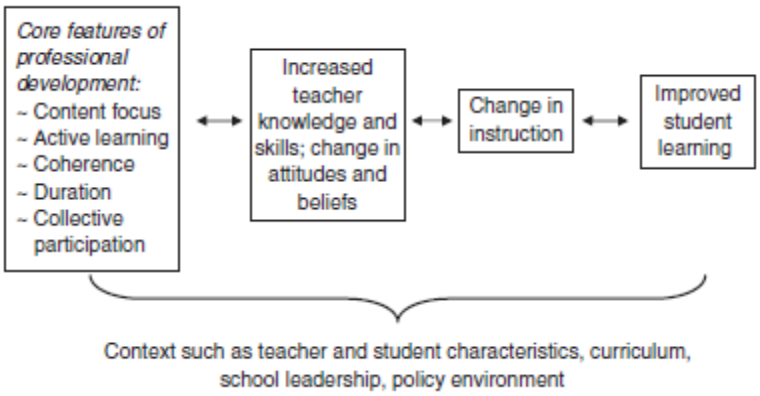


Figure 24. Measuring Change (Desimone, 2009, P. 184)

Participants were provided with three primary resource media. First, the module remained a constant resource throughout the study. The second supplemental set of resources consisted of websites and video links to CAST (the originators of UDL) and its definitions, guidelines, best practices, and examples of using UDL. The third resource consisted of additional websites and resources to address accessibility in distance

learning environments. Participants were provided with supplemental resource material on three different occasions throughout the study. The supplemental materials were intended for optional use; however, the purpose of faculty implementation of UDL as a result of receiving the supplemental support was to satisfy the second phase of Desimone's model: *increasing teacher knowledge and skills; change in attitudes and beliefs.* After analyzing the data, results indicated that two categories emerged. These were changes in course materials and change in teaching perspectives.

Theme: Change in Course Materials

Referring back to the flow of the study first described in Chapter 1, the UDL module was introduced as the treatment. It was then followed by the output. The final step was to measure initial change and to explore if initial change occurred amongst online instructors. In Chapter 3, initial and second style coding occurred in which themes developed. The theme, *Change in Course Materials*, was supported by the first three patterns of how participants chose and delivered content. The three patterns will be discussed here as sub-themes. These were: (1) the validity of content, (2) how the content was structured, and (3) the importance of clarity with regard to how information was being delivered to their students. The fourth, fifth, and sixth pattern supported a different theme, *Change in Teaching Perspectives.* This first began by instructors (4) modifying teaching strategies as the awareness of how their students learning increased. This led to innovation in (5) supporting non-traditional teaching methods as the instructors discovered how their students learned material differently. As the study progressed and changes began to emerge amongst instruction, it became apparent that delivery of content was not something that occurred half-heartedly. Instructors began to (6) share their ideas with colleagues at different levels ranging from daily collaborative activity to more of a casual exchange of information. Figure 25 illustrates how the themes and subthemes emerged.

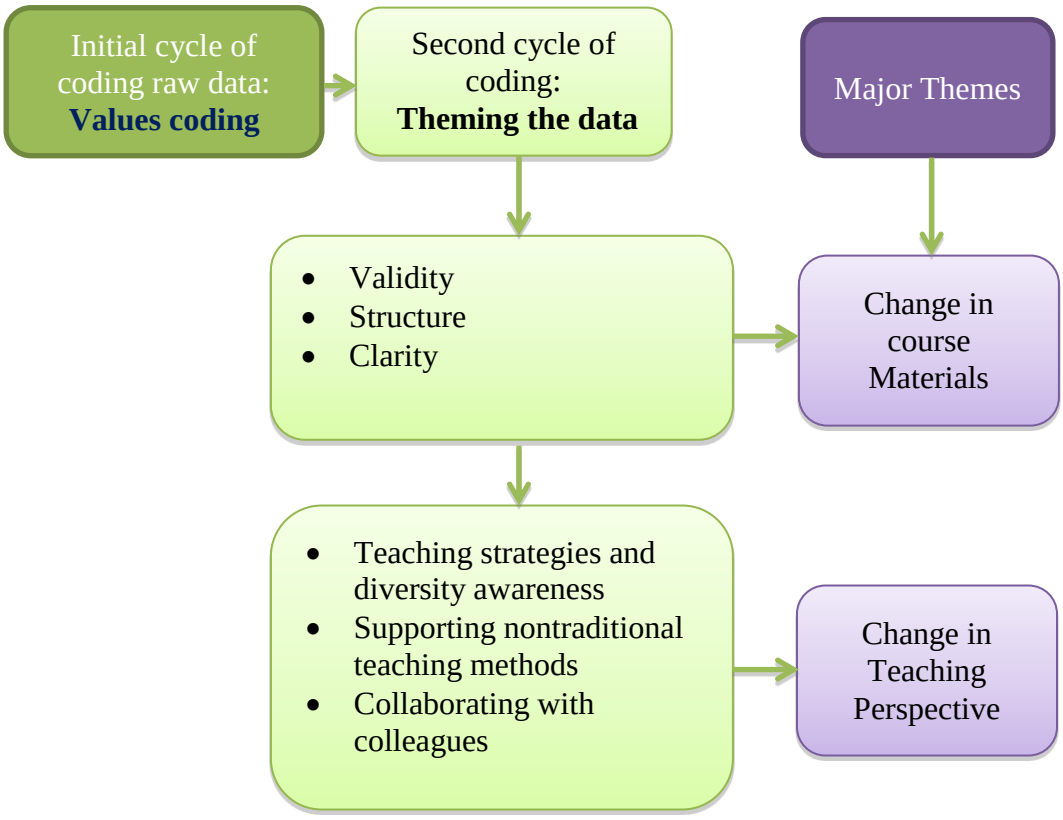


Figure 25. Themes and Subthemes

All four cases had very diverse teaching backgrounds; however, a commonality amongst them was to *validate* their teaching practices, to establish *structure* when teaching, and to provide *clarity* in content delivery.

Subtheme: Validity of content

Validity of content emerged as participants referred back to lessons they had previously taught. Knowles (1975) described this as adults beginning to accumulate a rich reservoir of experiences in which he/she accounts for and uses resources for further learning. In other words, participants referred back to previous experiences and applied that experience to their current teaching practices. Through initial interviews, course observations and artifacts/documentation, validity of content posed an important revelation. From the most seasoned online instructor of 12 years, to one that began teaching online less than 2 years ago, validation of content delivery repeatedly stood out during the interviews.

During initial interviews, whether or not awareness of using UDL was apparent, practices of how content was delivered were documented. At this point, L.E. was the most familiar with UDL principles and her initial experiences in teaching culturally diverse students transferred over to how she taught to her online students. L.E. had been teaching online for 7 years and stated she was able to put a "name" to approaches she had been using that helped to validate her actions. "My experience with teaching different people and cultures helped develop my strategies that have also helped with comprehension." Being aware of a person's learning strengths and cultural identity was something she had been doing for many years, even before teaching in an online environment.

D.E.'s experiences were similar to L.E's since both had been educators for many years and both taught in the K-12 environment. D.E. taught both face-to-face and online at this point and as he reflected back on the UDL module he stated that his teaching practices had to be modified to meet the needs of his online students and that teaching face-to-face was different than teaching online. D.E. mentioned that the concept of UDL provided reinforcement for what he was currently doing. He stated in an interview,

> I think that a lot of the ideas you were sharing, put a name, you know a theory behind what I was doing and continue to do. First impressions when you contacted me - of course I went and researched UDL and I realized many of the ideas you're supporting I've been doing for a very long time since doing Social Studies in middle school and high school.

Another participant, J.E., had been teaching online for less than two years. Most of his experience at this point had been in management in the business industry and becoming an adjunct instructor teaching in an online environment was a fairly new experience. His enthusiasm about teaching online showed as he reflected back on the UDL treatment module and began pulling out different applications that would possibly be considered UDL. In his online course, J.E. used supplemental material such as external websites and university developed PowerPoints. He knew his actions in providing additional materials as well as how the curriculum was offered to the students meant something, but was unfamiliar at this time of UDL's principles. His final response after our discussion was interesting. He ended his statement with, "That is what would be

related to UDL, correct?" Validation of how he delivered content was not as apparent at this time as to the actual materials used – which were primarily university issued. He expressed he felt limited at this point due to university restrictions on what he could use to deliver if it was not first approved by the university.

M.E. had been aware of UDL and had been implementing various applications of diverse teaching methods. In his 12 years of teaching it became apparent to him, over time, to provide multiple means of content delivery. When asked about the module after viewing it, he stated that he knew he was providing various formats of material for students and felt the module and initial resources validated his use of guided notes for lectures and offering his online material in different formats. He also stated that the module increased his awareness of using UDL in using more varied teaching methods than he had previously accounted for.

Subtheme: Structure of content

Structure of content delivery was initially accounted for when instructors commented about the structure of the UDL module (treatment) and concepts introduced to them at the beginning of this study. Knowles (1975) describes this as readiness to learn and how participants will use, or adopt, what is learned in his/her own locus of control. Participants made reference to how the content was structured and laid out which made it easier for them to navigate to find specific places of reference. L.E. stated, "I didn't have any difficulties navigating. I felt it was pretty well scaffold, or structured. The key words were clarified." Structure reflected how participants integrated the way their own courses were delivered. L.E. continued to comment the importance of structure and how vital it was to implement structure in her own course. She stated, "That's [structure] something that was important to me."

Structure of content by providing a class agenda at the beginning of each class has been a common teaching practice incorporated within L.E.'s lectures to show her students what to expect before a class meeting. She uses graphic organizers at the beginning of each class meeting so her students know what to expect. This is something she had done before when teaching K-12, but had only implemented this in her online class not too long ago. She expressed how her students appreciate the structure because it helps to

guide their instruction and leaves out the surprise factor, especially since student are the only ones in the room - alone with a computer. Figure 26 displays an example of a graphic organizer used during one of her synchronous class meetings.

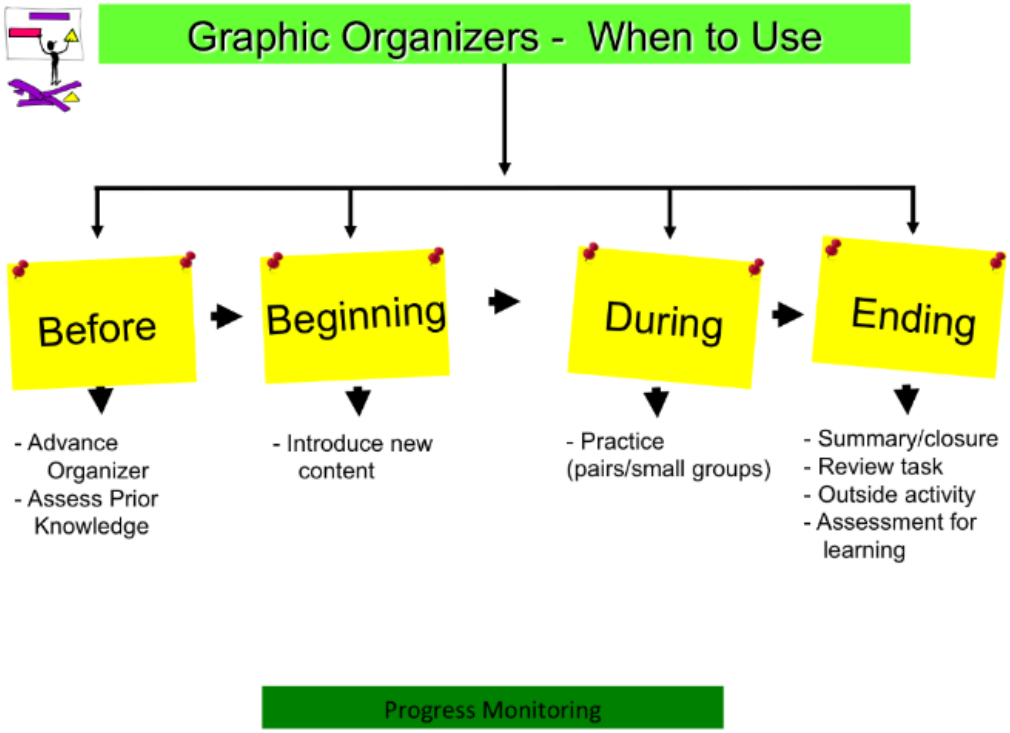


Figure 26. Example of Graphic Organizer (L.E.)

Structuring the module in such a way as to model basic applications of UDL was intended to *show* how principles could be applied rather than simply *tell* how they could be applied. For example, one consideration was navigation. The intended outcome was to limit the number of clicks it would take to reach a desired destination page. D.E. stated,

> Actually, I thought the site was good. There was no difficulty, it was easy to navigate, find, and manage information. The best part is that it's laid out very simply. If you got lost, you could go to Home.

M.E. also supported the navigational features stating, "The module was easy to navigate." Although a quick response by M.E., its significance in navigation was profound since he is a tenured-faculty member with a physical disability and his personal experience contributed at a more personal level, unique from the other participants. Navigating

through a site is something most people do without a second thought; however, having to continuously link through pages after pages would increase a person's chance of becoming lost within a site. Navigational benefits when linking to a desired location were found to be essential when structuring information for a course.

Subtheme: Clarity of content

Clarity of content delivery emerged when instructors explained how concepts became clearer as teaching occurred. Each of the participants interpreted the information from the UDL resources a bit differently. L.E. stated, "It helped not only conceptualize my own teaching but it helped me to explain it better." L.E. also commented that after reviewing the basics of how to apply UDL, clarity of teaching strategies, and how they were implemented, these concepts became better defined as she transferred that information to her own teaching methods. Knowles (1970) labeled this key element as a "need to know" where adult learners tend to learn when they have a need to know and an immediacy of implementing the information either for themselves or another individual. In this case, L.E. used what she needed know about clarity. This could be identified in her own teaching since she had already been implementing UDL.

J.E. indicated how his interpretation of applying UDL principles clarified his delivery of material to his students. In other words, his delivery of material was structured in a way that built upon a concept and he could explain by using multiple means of engagement. He used examples of real-world experiences and discovered how students could reflect on their own experiences and relate it to a new concept. Knowles (1970) identifies this as the experience where an adult begins to accumulate a rich reservoir of experiences in which he/she can account for and use as resources for further learning. J.E. found it interesting that he had been doing what came naturally to him and had been teaching this way for awhile. He could identify his practices as UDL-like and it became clearer to him what he wanted his students to learn and what the intended outcomes would be. He expressed how he knew he was doing something "right" -- something that only innately revealed itself when teaching a diverse audience.

D.E. established a collaborative approach with his students and encouraged them to provide feedback to support each other during discussions rather than revealing

answers to questions or problems that arose during his class meeting. He stated he was able to accomplish this by his students knowing what to expect based on clearer objectives and learner outcomes.

There was a consensus amongst the instructors that their teaching practices were "something they were doing correctly"; however, with the many trends and educational theories that had developed over the years, a name for their practices had not been thoroughly identified nor defined. They felt the information from the treatment module was the first indication from the study that their teaching practices could be supported by something tangible. A name that would be identified with their practices was, by consensus, UDL.

Theme: Change in Teaching Perspectives

As the study continued over the semester, materials were disseminated to each participant that included information on additional UDL applications and how to implement accessible materials, such as documents created with Word, PowerPoint, and Excel. Links to videos and websites were also provided. I was not sure how much of the supplemental materials were being utilized, or even looked at, until more course observations and interviews occurred.

Subtheme: Teaching strategies and diversity awareness

Participants were sensitive to the fact their students possessed diverse learning needs; however, acting on reaching those needs was not always apparent. D.E. commented on how his approach changed over time. His method from when he first began teaching online was to go straight into the next lesson without first reviewing previous material. His emphasized his intentions were not for his students to become lost in the material, but rather he had not considered reviewing previous material at this point. His delivery methods later changed commenting that by, "going slow, making sure all the students are on board, checking for the comprehension, and not assuming everyone understood what was expected or how to do it helped with retention and meeting the needs of diverse learners." He stated his lecture style supported a collaborative approach as well where he learned from his students as educators as well as them learning from

him.

L.E.'s experience to diversity reflected upon her past teaching experiences. She stated, "As far as incorporating, I try to incorporate assessment menus for students to have multiple modes for demonstrating proficiency in a topic." L.E. used assessment menus as a way for students to choose which method would best demonstrate what was learned. UDL's principle of multiple means of expression supports opportunity for students to show what they know and what they have learned. L.E. stated how she could provide information in course content that was routine, but not to the point that she was doing the same thing in every class yet the students still knew there would be a logical sequence to the delivery of content. "You know a few minutes of lecture, then an activity." L.E. knew her students expected a sequence and she met their needs in delivering her agenda at the beginning of each class session. She continued to state,

> They knew I was going to embed [learning] checks for understanding, draw out my lecture slides, and pause and talk to each other - those kinds of strategies. So whether or not it benefited one… you know the thing I like about UDL is that it benefits all students. And for me, it definitely improved my student evaluations.

Through perseverance in knowing what worked with her students on a general level, L.E. was able to identify key strategies based on being aware of how her students learned. She identified how her teaching was a process that developed over the years and meeting the needs of her students still required efforts in planning and developing since her students continue to learn differently each term.

J.E. used an asynchronous format to deliver his course. In contrast to the flexibility of L.E., J.E. felt his desires to reach a diverse audience existed; however, he expressed he felt limited somewhat due to the institution's established curriculum. "I'm kind of limited as to the type of information I use with a set curriculum provided by the university. J.E. commented,

> Most, if not all the students thanked me for the PowerPoint. They really appreciate the supplemental material. I would classify it as UDL. The way I use the PowerPoint is at the beginning of the semester when I'm setting up the course. The students, they perform their modules for the week. Everything is asynchronous, at their leisure, their convenience.

An example, shown in Figure 27, sets the tone for how J.E. sets up at the beginning of a class session.

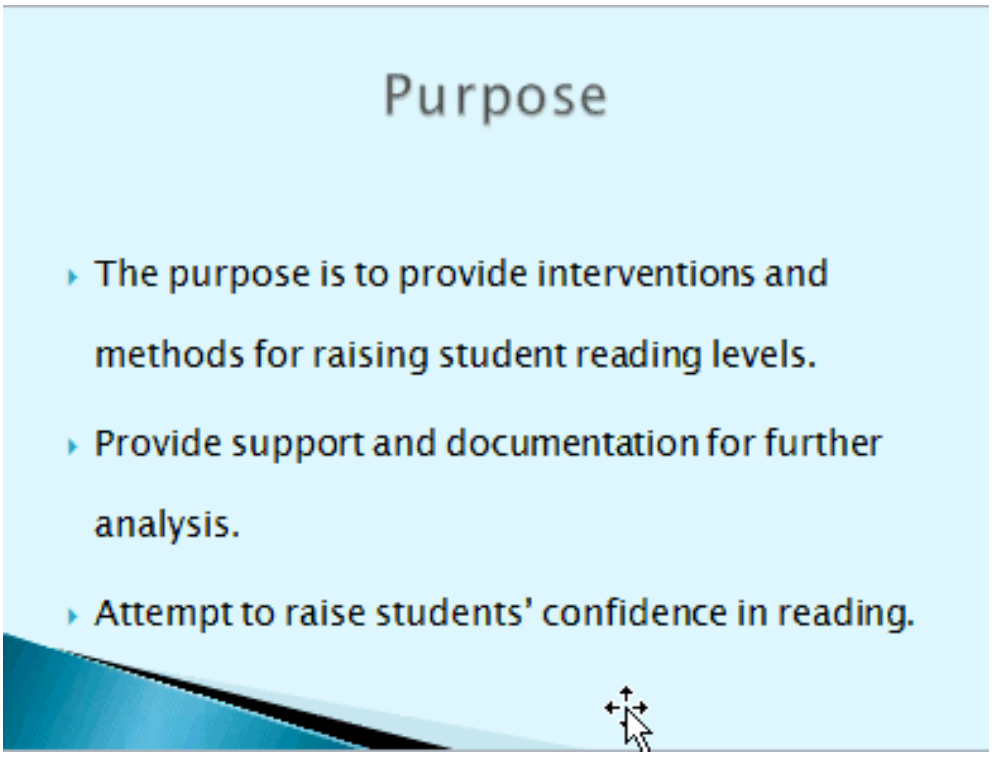


Figure 27. Example of a PPT slide directing students to the purpose of the topic (J.E.)

J.E. explained how he was asked to develop an online version of a course that was being taught face-to-face. He had more flexibility and took into consideration accessible material and UDL principles. Although he felt he was still new to accessibility and UDL, his enthusiasm for implementing them was evident. J.E. stated in a later interview the following,

> I was just developing another course where I was specifically taking into consideration the UDL and making sure that I brought in those types of tools into the learning environment so the students could not only read the material but they could see it, they could hear it, they could feel it.

J.E.'s perspective of having additional materials to supplement course content, supported UDL principles by providing multiple means of engagement. J.E. mentioned that through his years of teaching, he had used different methods of delivering material

with Power Points being the primary method; however, realized the need for multiple methods of delivery to reach a greater group of students. J.E. commented that his awareness of meeting diverse learners helped to develop clarity when creating his objectives. He also stated that he provided students with a purpose statement and expectations, which allowed for more opportunity for students to give feedback since objectives were clearer when introduced at the beginning of a lesson.

M.E.'s approach to using UDL applications led him to using "online chats, posting documents using different formats: Word, PowerPoint, videos, and [inviting] guest speakers." When asked about his applications of UDL and how his attentiveness to meeting the needs of his students in an online environment by offering unique "chat only" sessions, he emphasized his "chat only" sessions with his students reached those who could not use audio to speak, or hear, resulting in him using a visual form of communication. His intentions were to level the playing field by using only the chat feature where students were able to ask questions, review other students' comments and questions, and reread lesson information as the class progressed. He continued to state, "Yes, I believe my UDL approach is an asset to student learning." Early on in the study, he felt confident in his application and role of using UDL. At the next interview a few months after the first, M.E. reflected back on his teaching and made reference that although he was familiar with UDL and its principles, he admitted he had not been implementing as much as he would like to and stating, "Although teaching 12 years in an online environment, the awareness of applying more UDL techniques is still desired. Looking for ways to grow as a teacher is desired."

Subtheme: Supporting Non-traditional Teaching Methods

When teaching online, strategies sometime involved non-traditional teaching methods. The importance of altering teaching strategies, and to be open to non-traditional teaching methods, proved to be precedent even before volunteering to participate in this study. Applying UDL, especially for the first time, meant stepping out of traditional teaching methods and implementing methods that are still new to many. J.E. stated,

> So yeah, I can tell you for a fact that teaching online is different than teaching face-to-face…different skill sets. You're a Subject Matter Expert reaching out to the online student and communicating.

J.E. had experienced not only teaching students, but being the technology expert and sole support person to many of his students taking classes online, apart from teaching.

M.E. had a non-traditional strategy even in the online environment. He used chat in his synchronous courses. An example is shown in Figure 28. Initially, when observing M.E.'s synchronous meeting, I was not sure if using the chat-only feature would pose any communication barriers or difficulty amongst the students or the instructor. During several course observations, students were still engaged and used the chat to their advantage by being able to search previous answers to questions without having to interrupt the flow of class instruction. When asked why he used chats on most occasions when in a synchronous meeting, he stated, "I use chats because some students don't have audio so I use online chats. He stated it was due to leveling the opportunities for communication amongst his students. Some students did not have the technological capabilities of using a full microphone headset, while others did not have audio capabilities. Using the 'chat' feature in his synchronous meetings allowed for everyone to be involved in discussions. It also allowed for others to go back and review previous answers to questions they missed. Although he may not have been attuning his methods of synchronous meetings to that of UDL, his actions in knowing the best way to deliver his content during specific meeting times using only the chat feature afforded his students the best way to gain information at that particular meeting time. M.E. additionally stated that his research interest is to incorporate more speech into his synchronous courses with content delivery. M.E. has a physical disability and his personal interest involves research where technological devices can express speech. He would like to see caption technology established or technology that converts impaired speech to normal speech.

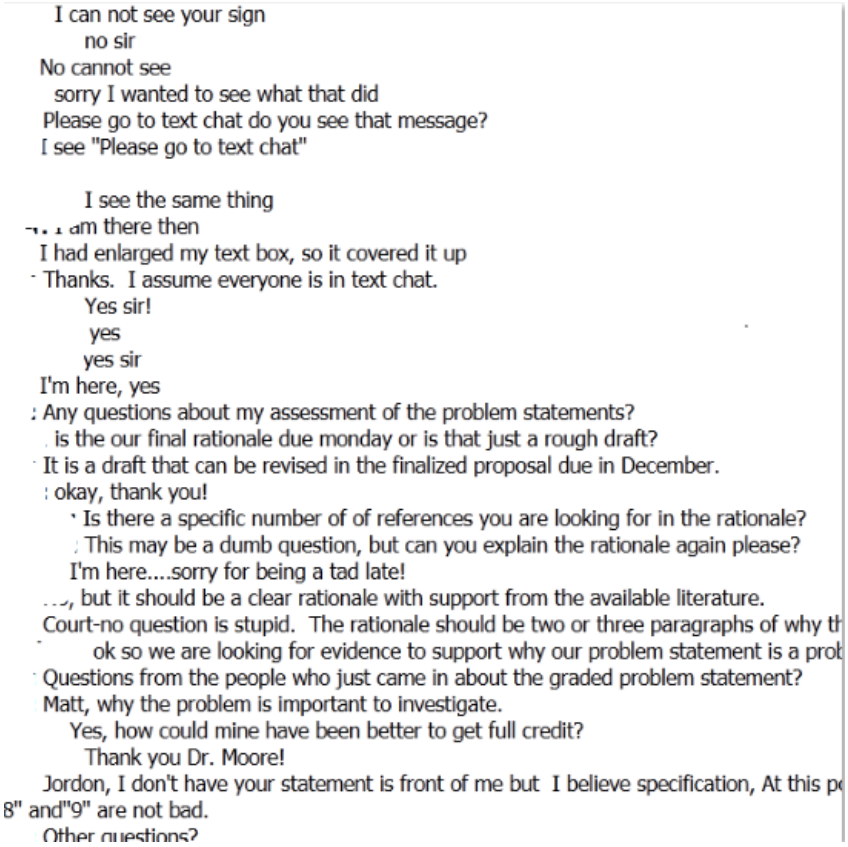


Figure 28. Example of a Chat Session

As discussions continued, and instructors thought about the progress in course design and development, they began to recognize how some online courses have been standardized. Both L. E. and D.E. identified how different online courses could be depending on the structure and who was being targeted. Different perspectives emerged from this discussion. L.E. stated,

> A course should be structured but not repetitive. There's a certain art and science in teaching that is very individualized and complex. It's not formulated. I noticed from semester to semester, student groups and certain group dynamics can change. So you know the same formula that works one semester may need to be adjusted or something may need to change for the fall semester.

Of the two recorded observations of L.E.'s course, it was very evident she made every attempt to know her students' needs and to view them as individual learns. Non-the-less her experiences were still challenging since the online environment held even more diversity than what she had experienced in the past. Her statement, "And in online, in

terms of content, I try to provide it in multiple formats for students and present it in different ways where students can look at it or engage with it according to their needs." L.E.'s perspective on designing her course allowed for flexibility to build on concepts and ideals she had been passionate about. She had the opportunity to engage students on a deeper level considering her design flexibilities and teaching experience.

D.E. stated that he was interested in creating different kinds of materials compared to what he was used to using in the past. When speaking about how his teaching practices changed through the years, he stated how important it was to create new materials to reach different learning needs. This has become a forefront of course design. He commented,

> How you experience different places, that's what I believe I've learned even more with the UDL and I realize the value in it. I've always been a big fan of kinesthetic - you know, touch it, feel it, smell it, and taste it. I also believe kids are more interested in things they know more about, including themselves. We're all humans trying to go through this self-exploratory process.

D.E. shared an interesting phenomenon during one of his class meetings when he felt his desire was to have his students utilize their own diverse strengths to learn and build upon. He had his students participate in a learning activity and instead of him drawing and writing on the whiteboard of the working space in the synchronous meeting, he decided taking a different approach. He stated the following in an interview toward the end of the study.

> Instead of writing a paragraph in response, I would have them draw a picture. Each one of them would get a piece of the chalkboard, you know on this blackboard [whiteboard]. They'd all get a color and they would start drawing. Someone was going to take a better idea than the other and they were free to go and build off of theirs.

At this point, his teaching shifted to a more learner-centered approach and his eagerness to expand on how he could further implement new teaching methods was surfacing.

Subtheme: Collaborating with Colleagues

Not only applying UDL, but sharing UDL with other colleagues, or merely

identifying different ways to approach teaching, emerged while discussing teaching strategies and methods used in each of their own course(s).

Both M.E. and L.E. expressed their desire to work with colleagues on further explorations of teaching strategies. L.E. stated, "I work with other professors, and in working with them, I recommend they use UDL in their courses. I credit the module for helping me with the language in explaining UDL to them more clearly." During one interview, M.E. expressed his interest in working with other universities, either as a faculty member, or as a research colleague. Regardless of online teaching experience, validating best practices and identifying implementation of accessible materials was of most concern. He stated,

> Although teaching 12 years in an online environment, the awareness of applying more UDL techniques is still desired. Looking for ways to grow as a teacher is desired. Most of UDL, I think, would fall under a teaching presence. Teaching establishes the learning environment. My awareness of UDL has been changed through these sessions. I am increasing in awareness and it is important as I continue to develop my online teaching for ECU and other universities. I always knew the value of interacting with the online learner. Now I am increasingly becoming aware of the importance of diversity of instructional methods and looking for ways to continue to grow as a teacher.

He further stated how he would be interested in how technological advances when integrated in an online environment potentially may improve the overall accessible experience, especially for those with a disability. M.E.'s technological interests in discovering new ways for speech-to-text to generate speech articulation is something he is very interested in pursuing and is open to research opportunities.

D.E. shared his passion in learning from others as well as sharing his experiences. He would like to assist faculty in creating teaching guides designed to center on the topic rather than the textbook. In essence, practicing new skills and interests he has learned for generating new course materials has afforded D.E. a broader working canvas to portray his thoughts and ideas. Additionally, he stated,

> I would like to learn more about a few of those-telecommunications products and more multimedia. And I am collaborating with a curriculum designer from our

> school and he's going to be helping me to develop…making more interactive technology so students get a more multisensory, interactive experience unified.

At a later interview, D.E. mentioned how he is applying what he is learning through this study with students in his own course where they too are educators. He shared one of the resource lists that were provided in this study and the reactions that were expressed through discussions.

> The students really thought about another perspective in their class, not just mine added. Then, that incredible knowledge behind the practice that a lot of times we know what we're doing is right…that's what you [the resources from the study] provided so the resources on accessibility and Blackboard accessibility, those were the two. And some other things and the modules we looked at with the students during the class. So that was very helpful.

He not only applied what he had acquired through the supplemental materials, but shared materials with students in his online course where most were educators themselves.

J.E. had been developing a course in the duration of the study and mentioned that when developing the course he had been in contact with several colleagues on his campus. One of his colleagues asked for his recommendation in using supplemental materials for a course. Keeping in mind the engagement aspect of UDL, he stated,

> I just finished developing an [online] strategic management course …I had to develop the course both for online and on-site students. I know that she [colleague] had asked for supplemental materials and I had recommended websites so that if she was teaching the classes live, she could go online. In addition to providing the PowerPoint presentations, she could go online, click the link, and walk through the problems of the examples and concepts for the students to grasp the material.

D.E. and J.E. currently share and contribute their online teaching experiences with others during newly established synchronous meetings with other colleagues at the university they work with. D.E. mentioned he would like to assist faculty in creating teaching guides designed to center on the topic rather than the textbook. He commented, "We're all humans trying to go through this self-exploratory process. So I think language, culture, speech patterns, word choices, clothing, music, the gamut of what we do when

our head is not in the books-incidental knowledge." In essence, practicing new skills and interests he has learned for generating new course materials has afforded D.E. a broader working canvas to portray his thoughts and ideas. D.E. has also recruited the assistance of an Instructional Designer to help in developing his new course.

During the course of the study, J.E. had been asked to develop an online version of a management course that had been previously taught on campus. One of his colleagues was teaching the on-campus section of the course. While developing the online course, his conversations with his colleague were directed around what to use as supplemental materials for the course. He stated he had initially recommended the use of PowerPoint slide sets to his colleague to aid with supplemental support. He then recommended external resources and websites to support the content for further student engagement. "[My colleague] could go online, click the link, and walk through the problems of the examples and concepts for the students to grasp the material." J.E. incorporated external resources within his own online course and mentioned he needed to go beyond the use of only PowerPoint slides and use other means to engage his students. His awareness of UDL influenced his developing strategies since his focus was centered more around the engagement of his students and how they understood the material.

Summary

Change in instruction was a slow process and evidence began to emerge during participants' exit interviews and through email correspondence. One participant shared the following, "I wasn't aware of the term [UDL] and apparently I had been using some of the design as far as my understanding, any visuals, or any type of information…" Indication of using UDL after supplemental support was indeed useful as indicated by the above participant's response. Furthermore, responses during participants' exit interviews and through course observations also showed evidence of change.

In this chapter, Desimone's model of change was used to determine if providing supplemental materials to participants impacted instructor practices with respect to student learning in how course content was delivered. Change in course material and change in teaching perspective were two themes that emerged. Delivery of content and changing the methods of delivery is, however, a slow process since the teaching

perspective would need to occur first before any action took place. Change did occur in the first four phases of the model, and further research would be required to reveal the last phase involving student learning. Additionally, measuring the extent of change would constitute further research not allotted within the time frame of this current study. Rich information on how instructors first demonstrate change can be validated by attitudes and acceptance followed by a change in perspective.

CHAPTER 8: DISCUSSION

Overview

Online courses have increasingly become the norm as universities and colleges attempt to reach wider audiences. As a result, an increase in teaching online has followed. How do instructors prepare for teaching in this kind of learning environment? Three research questions guided this study:

1. What elements of Universal Design for learning, accessibility, and practices do faculty members already employ?
2. How does the awareness of UDL impact, or affect, instructor practices with respect to student learning?
3. Does incorporating supplemental support through collaboration efforts and resources (e.g., asynchronous support and synchronous support through web-conferencing) affect faculty use of UDL implementation in their online course(s)?

The four case study participants received the same extent of exposure to UDL: first, with the treatment module, then with the supplemental materials sent during the study. As the interviews, emails, and correspondence continued, change in teaching perspectives and change in course materials became evident. This study captured not so much the quantity of change, but the process of change. Each case reflected the process of how adults learned new material as described by Knowles (1975) and the six elements that describes how adults learn-Andragogy.

Chapter 8 discusses the findings of this study through the research questions and additional findings. Next, the challenges and limitations of the study will be addressed, followed by implications of the study. Finally, suggestions for future research will be discussed.

Discussion of Findings

The initial three research questions will now be addressed. Participants were asked about UDL and accessibility practices that were possibly being implemented without labeling actions such as accessibility or UDL.

Research Question 1: UDL/Accessibility Practices Participants Currently Employ

At the time participants took the survey, they were not yet formally introduced to the definition of UDL; therefore, the questions were phrased to using actions, descriptions, and explanations more than using the direct terms "accessible" and "Universal Design for Learning" in case a participant could identify more with the action, description, or explanation rather than the terminology.

UDL and accessibility practices employed by the 41 participants. When comparing what was actually employed by the 41 participants who completed the survey during Phase I, the three highest UDL and/or accessibility practices were:

- Digital Syllabus 27%
- Electronic Accessible Printed Materials 81%
- Large Print 78%

The answer to why the above were used the most was not clear or made certain; however, the attitude of wanting to provide accessible materials was noticed. When delivering a course online one would assume materials would be electronic; however, not all electronic materials are accessible or printer friendly. The ability to enlarge printed material was high as well with 78%. One key feature on most computers is the ability to enlarge print. Therefore, it remains unclear as to the action of providing large print was actually done by the instructor or by the instructor being aware of accessibility features already embedded in a computer's hardware, and then informing the student of this.

Twenty-six percent of participants perceived implementing accessibility and/or UDL practices as being moderately difficult; therefore, it can be concluded as to why 23% actually implemented accessibility and/or UDL practices and rated it as also being moderately difficult. Similarly, 26% had a neutral reaction in which they had no obvious perception of what it would take to implement accessibility and/or UDL practices, while 23% rated the actual implementation as neutral as well. Both were very close ratings.

Comparing the lowest percentages of 2% perceiving implementation to be simple, and 7% rating the actual implementation as being simple indicated it does take more thought and effort into designing a course with accessibility and/or UDL practices. It is not something that can simply be done in hindsight or as an afterthought. It does take initial effort. Furthermore, participants rated the effectiveness of implementing accessibility and/or UDL practices at 53% indicating more than half of the participants have a desire to include accessible content within his or her course but may find it more difficult to do so.

UDL and accessibility practices employed by the four case studies. In order to isolate the four case studies with regard to their applications of accessibility and/or UDL practices from the rest of the 41 other respondents, I asked the 4 participants to answer the questionnaire a second time in order to gain deeper insight when doing a comparison amongst the cases. Table 18 shows the results of the four cases.

Table 18. A Comparison of Accessibility and /or UDL Practices

Questions	JE	ME	LE	DE
How do you make your syllabus accessible to all students enrolled in your class? For Example, do you provide a digital version, can it be converted to larger print, can it be read by a screen reader, do you provide graphics to supplement text, etc.?	Provide a digital version in both PDF and Word	It is Universally Designed.	The syllabus is available in a variety of formats. I also read it out loud to them in the first class, after playing a syllabus scavenger hunt game with them	Yes, all online classes and content for students to modify for specific needs
Have you ever implemented text-to-speech software in your online course?	No	No	Yes	Yes
Are your printed materials accessible, or can be converted to (check all that apply): Large Print, Braille, Audio-tape or books, Electronic Format, None of the above at this time.	**Large print and electronic format**	**Large print and electronic format**	**Large Print, Audio-tape or books, and electronic format**	**Large Print, Audio-tape or books, and electronic format**
Do you provide the fewest links possible to navigate through a class site?	Never	Always	Sometimes (and desires to improve this)	Sometimes
Does your delivery method when using any kind of audio output provide text captioning or transcription accessibility? Audio output includes videos, mp3, streaming video, recorded webinars, and any other audio output used.	Never	Always	Sometimes	Always
Do you use clear and simple language on Web Pages, jargon exclusively known by only a limited few leaving others 'lost'?	Never	Sometimes	Sometimes (want to improve on reducing links)	Always
19. Is information conveyed in color also available without color benefits? Example: "Choose the red box for yes	Sometimes	Always	Always	Always

and the green box for no." vs. "Choose the circle for yes and the box for no."				
Do you provide the option of having real-time captioning or sign language interpreter accessibility to students who may request it?	Never	Rarely	Always	Always
Please list any accommodation and/or practices implemented not mentioned above: If none have been used, simply state so in the box below.	NA	Materials presented in various forms.	Manipulatives and extra time for assignments or exams.	NA
How difficult would it be to implement accommodations and/or accessibility practices for individuals in your online courses?	**Neutral**	**Neutral**	**Simple**	**Simple**
How would you rate the implementation of these accommodations?	**Neutral**	**Neutral**	**Moderately Simple**	**Simple**
How would you rate the effectiveness of these accommodations?	**Neutral**	**Neutral**	**Neutral**	**Extremely Positive**
How would you rate your practices and accommodation of implementing Universal Design in courses taught online?	I sometimes implement UDL in my courses.	I always implement Universal Design in all my courses.	I always implement Universal Design in all my courses.	I always implement Universal Design in all my courses.

N=4

In comparison with the 41 total participants, the 4 case studies also answered electronic format and large print as the most used for accessibility (highlighted in dark gray and bolded above). When comparing the perception and actual implementation from the four case studies, the overall consensus was *neutral* and *simple,* as indicated in Table 18 above, bolded and highlighted in light blue. The effectiveness of implementing accessibility and/or UDL practices was also neutral with only D.E. indicating effectiveness as being extremely positive. To compare with the 41 participants from Phase I, about half perceived implementing accessibility and/or UDL practices as

moderately difficult, while the other half had a neutral perception. In contrast, when comparing how simple it would be to implement accessibility and/or UDL, the four case studies' perceptions rated it as simple, while only 2% of the 41 participants perceived implementing as simple. This leads to research question 2 and the findings of instructor practices and uses of accessibility and UDL.

Research Question 2: Instructor Practices and Uses of Accessibility and UDL

To explore the answers to the latter two research questions with regard to instructor practices and UDL implementation, the themes that arose during the interviews provided further insight on what instructors explored for themselves as well as how Knowles' theory of how adults utilize information in support of the six elements. An overview of the major themes will be discussed.

Validity, structure, and clarity of content. The major themes under *change in course materials* involved validity, structure, and clarity of content delivery. Each of the participants shared a consensus that the materials used during course delivery were on the pathway of providing accessibility and validated their uses. Additionally, the awareness of UDL affected instructor practices with respect to student learning.

Amongst the four cases L.E. and M.E. were the two with the longest experience teaching online. As a result, their change in course material was not as profound as J.E and D.E. who both had less time teaching online. L.E., for the most part, could describe her uses of materials, including graphic organizers, as something she had been doing for quite some time, but she had not labeled it as UDL. She could validate her uses for them as well as other materials used and could reflect back on her past experiences of teaching and could relate them to the concept of UDL to be something she had already been implementing. This aligns with Knowles' (1975) element of andragogy in using past experiences towards current practices. M.E. was also more familiar with using accessible techniques along with UDL and shared his awareness of reaching his students through text chats and guest speakers when conducting synchronous meetings. Overall perspective of his own presentation of content leaned towards his desire to implement more UDL principles and vary his methods in how he delivered his content.

In comparison, both J.E. and D.E. shared the same amount of enthusiasm when

discovering what UDL actually meant to them and how the materials they used, or wanted to use, could be labeled as UDL. Both of these two cases shared their plans in developing new courses that included an adamant intent on implementing UDL and accessibility features within those courses.

Teaching strategies and diversity awareness. All four cases demonstrated their sensitivity to diversity and reaching the needs of their students. Although L.E. had been exposed to diversity and cultural environments for many years, she expressed her concern for complacency of a one-size-fits-all attitude if instructors became overwhelmed with the demands of creating online courses. Her reactions to change and using methods of delivery were similar to M.E.s in the fact that their personal experiences with diversity and change were direct reflections of how they viewed themselves as learners and not just educators.

D.E. began incorporating with his own students the materials provided to him. Interestingly he used resources to not only use in his own course development, but also encouraged his students to use them as well. It's not certain exactly which exact resources were utilized, but on a general level, the exposure to providing accessible materials and UDL principles was evident.

Supporting non-traditional teaching methods. To state further how this research study generated data, I had the opportunity to observe synchronous course meetings with three of the four cases. Each one conducted their courses differently. D.E. mentioned that during his synchronous sessions with his students he now takes into account their learning and how he is using different learning applications to integrate new concepts. He has created a more learner-centered approach by having students learn from each other and identifying resources through his students. D.E. shared strategies from resources he received over the course of this study with his students. He has developed his own examples and non-examples of student expectations, created Candidate Success Teams for support, solicited volunteers to share submissions for peer review and integrate peer responses, and posted sample papers for students to review.

M.E.'s approaches were different in one aspect when compared with the other three cases. M.E. used both audio and chat in one meeting, while at another meeting, used the chat feature for his entire synchronous meeting. M.E. stated that for the future,

incorporating additional methods of delivering content was desired.

Collaborating with Colleagues. Of the four cases, D.E. and J.E. found support in each other. The convenience of working for the same university had its advantages and allowed opportunity for further collaboration discourse. During the course of the study they established online meetings designated for students to collaborate ideas on various discussion topics.

Compared with J.E. and D.E., L.E.'s experience in discussing planning and development of a course involved further application of UDL strategies. Since L.E. had already been utilizing UDL methods, she found herself recommending UDL to an increased number of colleagues she worked with on a regular basis. Since teaching future teachers, her opportunity to expose them to the benefits of UDL was incorporated during her lectures with them. Her current position has provided her opportunity to observe K-12 teachers where she has also found herself recommending UDL to other educators where diversity in culture and ability are encountered on a daily basis. Regardless of an online teaching experience, validating best practices and identifying implementation of accessible materials were of most concern.

Research Question 3: Supplemental Support Affect Faculty use of UDL

Participants were provided with supplemental resource material on three different occasions throughout the study. Referring back to the flow of the study that was first introduced in Chapter 2, *initial change* was the final step following the *treatment* and the *output.* To understand if initial change occurred, the method used to measure if initial change occurred used Desimone's (2009) model of measuring change. Figure 29 illustrates the process of change as mentioned in earlier.

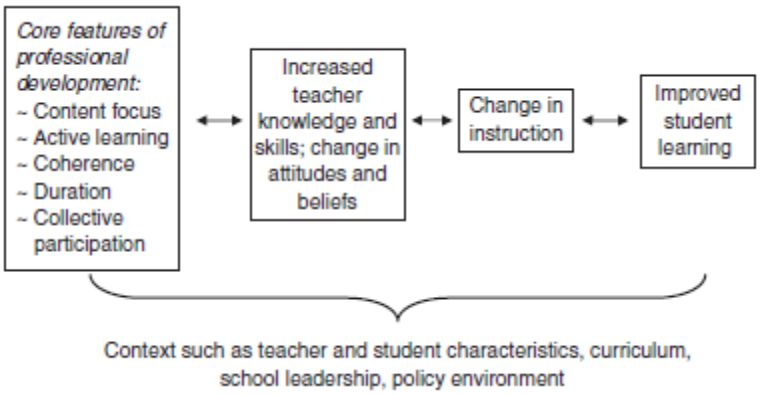


Figure 29. Measuring Change (Desimone, 2009, P. 184)

Referring to Figure 29, the four context boxes beginning with, *Core features of professional development*, appropriately describe how participants viewed and interacted with the UDL module. Opportunity to interact with the module remained a constant since the module was a consistent resource throughout the study. The second supplemental set of resources consisted of websites and video links to CAST (the originators of UDL and its definition), guidelines of UDL, best practices of UDL, and examples of using UDL. The third resource consisted of additional websites and resources to address accessibility in distance learning environments. The supplemental materials were intended for optional use; however, the purpose of faculty implementation of UDL as a result of receiving the supplemental support was to satisfy the second phase of *increasing teacher knowledge and skills; change in attitudes and beliefs.* After analyzing the data results indicated that two categories emerged:

Changes in course materials and **changes in teaching perspective,** constituted the third step, *change in instruction.* Change in instruction was a slow process and evidence began to emerge during participants' exit interviews and through email correspondence.

Indication of using UDL after supplemental support was indeed useful as indicated by the above participant's response. Furthermore, responses during participants' exit interviews and through their course observations also showed evidence of change. One participant shared the supplemental material with his students, whom

were educators themselves. He showed the UDL module to his students during several occasions, one being during a course observation. His influence on his students piqued their interest in an indirect, yet favorable, approach. Developers of self-paced, online courses should design their instruction in a manner that helps learners not only appreciate the value or importance of content or skills but also supports and scaffolds students' attempts to master them (Artino, 2007, p. 199). Course design should support the instructor implementing the skills to teach.

The last step in Desimone's model, *improved student learning,* could be presented in two ways. One would be to note the improved learning of the participants involved; however, the cumulative experiences and expertise each participant holds does not qualify me to distinguish them as having improved in their learning. Only increased knowledge of UDL and accessibility can be documented as having occurred. Therefore, improved students learning would stem from the results of the students directly in contact with each participant and evaluating and assessing their performance. Due to limited constraints of this study, time would not permit me to fulfill a comprehensive analysis on improved student learning. The topic; however, does create opportunity for future research. It should be pointed out that although change in course material and change in teaching perspective were the initial actions of change, actually applying UDL and accessibility on a continual and consistent basis remains to be seen and should be studied over the course of several years rather than several semesters.

Connections to Existing Research

Although UDL is a relatively new concept when integrated in distance learning, the preliminary methods of teaching are not so new. How adults learn is something that has been investigated for many years; however, the means and methods by which adults learn have changed with the increased use of technology, innovative teaching practices, and learning environments. Awareness, attitudes, diversity efforts, and change were the focus of how connecting to its existing research unfolded. Integrating the concept of UDL and connecting research will be addressed in this section. Previous literature and connections to existing research from Chapter 2 include the topics of (1) Professional Development and Change (Faculty Development and Change), (2) Distance Education,

(3) Diversity in Learning, (4) Definition and Theoretical Framework of UDL, and the (5) Theoretical Framework that supports this research study and adult learning.

Professional Development and Change: Faculty Development and Change

The University of Washington's DO – IT program has conducted research on professional development by asking four questions: (1) Who are the people involved, (2) what are the organization's abilities and resources, (3) what is the climate for change, and (4) what are the mandates/objectives of the organization? Their research has found that although change is inevitable, faculty may need to reform their understanding of traditional academic quality versus how to address their changing audience. DO-IT goes on to say that conflict will continue between diversity and quality of higher education if faculty attitudes do not change (Burgstahler, 2009). Additionally, Vrasidas and Zembylas, (2004) state how online environments are rapidly expanding as a venue for professional development.

During the course of my research, one case provided insight pertaining to its own changing environment. J.E. mentioned how the administration he worked for asked him to develop not only a face-to-face course, but to design an online version of the same course. The university, in this case, had seen a need to begin adding the option for online learning for courses that are currently held face-to-face. As he began building the course, J.E. stated that his recent awareness of UDL principles were being integrated into his new course; however, limitations established by pre-structured, university created courses posed some limitations in his development. It appears the need for additional learning environments is changing; however, the methods of how to deliver the content continues to be a slow process of implementation to conform to the higher the level of authority.

D.E. also mentioned how his awareness heightened and his commitment to student learning included delivering materials utilizing multiple means of engagement that is supported by UDL principles.

Distance Education: Students with Disabilities in Distance Education

There has been an increase of students having disabilities enrolling in online courses (Flores, 2010); however, increased awareness of having a student with a disability has been a slow process. Since approximately half of the instructors indicated

that they utilize UDL or accessible means students can utilize in their course, this means that the other half still does not consider students with disabilities in their course(s) when planning and designing content delivery. It may be due to university requirements, as previously mentioned, that constrain the use of alternative methods of content delivery, or simply instructors have not had the opportunity to create accessible material since they have not been exposed to a student who could benefit from alternative methods of content delivery. Even though providing accessible content is mandated by law, many instructors are not aware of the laws set in place to support accessibility. According to the demographic results of the initial survey in this study, instructor experience was fairly new comprising of 26% teaching between 0-5 years. In experience teaching *online*, the highest percentage was 26% having 5–7 years of experience. Part–time adjuncts were the highest population, at 35%, which reported teaching in institutions of higher education. Considering these results, it appears that among the respondents part-time adjuncts that are fairly new to teaching are ones that make up the majority of those teaching online. Assuming this is the case, being aware of laws, such as those stated in Section 508 and those by the World Wide Web Consortium (W3C) that have established guidelines mandating online accessibility with web – based courses and sites, may not be apparent. It may be the responsibility of the institution to make the initial push in educating new adjuncts in requiring accessible content in their courses. Universities, by federal law, do have to provide a disability statement within course syllabi; however, is this enough to meet the needs of the growing number of students who require alternative teaching techniques for optimum learning? Yes, there are services that institutions of higher learning have on campus to serve students with disabilities, but is this the only resource available? Is this enough to address the need for those taking online courses? Are institutions of higher learning only providing the very minimum of what's required by law and not establishing best practices for addressing a growing population of students? All these are questions yet to be answered.

Diversity in Learning

In Chapter 2, CAST (2010) was introduced as contributors to brain research involving the *what, how,* and *why* of how we learn. Their research involved how diverse

learning exists and how we, as educators, may be better prepared to address it. They analyzed how our unique set of experiences allows us to learn in different ways. Therefore, we choose to learn in ways we are successful in, as well as how we understand what goes on around us through our experiences from the past, reflecting the outcome of what we learn in comprehending our future. It is the way we choose to absorb new information (Thurber, 2003; Callahan, 1999). Diversity of learning made an impact on the participants and was validated during the analysis process when the theme, **Importance in Teaching Diversity and Learning Awareness**, developed as a result to coding the data. Considering both the research by CAST and the theme that developed through analyzing data for this study, it can be concluded that the importance to meet diversity needs is still present. Although the study of diversity is not new, the findings of this study show there may be better methods of addressing diverse learning needs as opposed to what has been done before.

Definition and Theoretical Framework of UDL

UDL was first implemented in face-to face classrooms where teachers began to recognize the benefits of creating courses that would benefit all learners at the onset of course design. A study by Pace and Schwartz (2008) attempted to address accessibility in an asynchronous online environment by providing a preview of class presentations, an outline of class notes, a review for examinations, and access to readings online. However, the primary focus of their study involved face-to-face classroom technology using clickers to increase overall class discussions. Most recent literature focuses more on face-to-face applications of UDL as opposed to online (Edyburn, 2010; McPherson, 2009; Rose, Harbour, Johnston, Daley, and Abarbanell, 2006). Through the course of my research, it was challenging to find studies using UDL in an online environment as previously mentioned in Chapter 7. The cases in this study taught online and, in the course of the study, finding innovative ways to present and improve accessible content delivery was still fairly a new concept.

As I searched for more online instruction and UDL, one study conducted by Donald Finn (2005) did emerge. Finn (2005) presented a UDL module to online instructors asking the effectiveness of an online faculty development UDL module.

Integration after viewing the module was conducted with 75 online instructors within a community college in Virginia. Results indicated that 93% would include materials to integrate UDL in their courses and 96% claimed they developed new ideas after viewing the module. In my research study, similar occurrences appeared. A UDL module was used as the treatment and during the course of the study, supplemental materials supplied to the participants on accessibility and UDL were used as guidelines to help in their implementation of providing accessible material. Participants were highly favorable of the supplemental resources provided in efforts to utilize the information to implement within their own course.

Implications of the Findings

This study sought to answer the awareness, aim, and efforts of best practices in applying UDL strategies by faculty teaching in an online learning environment or within a distance learning program. The expectation for faculty to teach in an online environment in institutions of higher learning at some point during their career is increasingly common; however, results from this empirical study indicate that many are teaching with little or no regard to what or how they may be teaching nor the diversity of learning needs they may be facing.

In an effort to gain more insight on how instructors delivered their content in an online environment, one major implication from the study was how participants' concerns and interests in student learning began to guide how they taught and how they could implement accessible materials by applying UDL principles and strategies. This study helped to identify the need for further professional development trainings that emphasize the importance of providing accessible materials at the onset of course design and not to think of accommodating an individual as an afterthought of design. Research Question 1 sought to answer the question of UDL applications instructors currently employ in a distance learning environment. In Chapter 2, studies indicated that instructor awareness of UDL was limited which inadvertently affected how instructors reacted to accessible materials (Tobias, 2003). Additionally, efforts by the DO-IT Program through the University of Washington have recognized the need for professional development contributing to change in how courses are delivered in an online environment

(Burgstahler, 2009). Nevertheless, conflict will continue between diversity and quality in higher education until learners are aligned with resources that meet their needs. Finding out which UDL or accessible applications instructors currently employ allows us to somewhat explain their attitudes towards change.

Limitations of the Research

This study held significant findings with regard to a positive shift towards change in approaching how teaching occurred in an online setting and the importance of having accessible content available at the onset of the course. All research studies have their limitations with no exception in this one. Limitations included challenges in evaluating the participants' uses of new skills, participant recruitment and collaboration, course observation criteria, and limited time to conduct the study.

Participants' Uses of New Skills

Due to the different levels of anticipated knowledge and uses of UDL, challenges were inevitable, and undoubtedly occurred, when evaluating participants' use of new skills. According to Guskey (2000) there are four challenges in evaluating participants' use of a new skill. The first challenge was to identify appropriate and accurate indication of use. To overcome this challenge, I identified the UDL application used by the instructor taken from the examples implemented from the treatment module.

The second challenge was specifying frequency, adequacy, and regularity of use. How many times or how much UDL was applied according to the set guidelines and principles of UDL remained unknown. The qualitative section of the study provided in-depth analysis to assist in overcoming this challenge.

The third challenge was determining if adequate time had been used to notice if relevant utilization occurred. The researcher intended on overcoming this challenge by providing exit interviews after a period of one semester. Exit interviews were conducted four months after the initial interviews to determine application of UDL. Furthermore, the researcher provided supplemental support through email during the interim time of the online meetings. Resources sent to instructors, supporting UDL, provided information on creating materials, documents, videos, and other resources available for the widest

learning audience possible.

The fourth, and final, challenge to evaluating participants' use of a new skill was providing flexibility for adaptation. The initial use of UDL may not have been recognized by the instructor, or the instructor's perception of UDL. Comprehending UDL concepts and guidelines by viewing the module, utilizing some of the resources sent by the researcher, and discussing UDL applications during the one-on-one interviews, allowed for better comprehension of its use.

Participant Recruitment and Collaboration

Although the survey was gaining initial active participation, the recruitment strategy of obtaining more participants to continue on to Phase II of the study was very challenging. A small sample size of 41 participants completed the survey and was provided access to the UDL treatment even though their continued participation for Phase II was not yet secured. I risked the fact that any feedback from the 41 participants would not be available if they did not document it in the initial survey where potential loss of valuable data could occur.

In Phase II, rich data from participants emerged through qualitative methods during collection and analysis of data; however, due to the qualitative method change from focus group sessions to case study opportunities to get the participants together to discuss and collaborate *amongst themselves* in providing feedback about accessibility and UDL was not available. Case studies were also limited in discourse due to time and schedule conflicts. Collaboration efforts toward having richer discourse amongst the four participants did not occur.

Course Observation Criteria

There were two limitations relative to course observations. The first one was that I only had the opportunity to observe three of the four cases. Due to institution restrictions of one of the participants, I was unable to obtain access to the course and was also unable to obtain recordings after the fact. However, an adequate amount of teaching and student materials was provided for analysis from the participant. In addition, restrictions and university policy imposed by three of the four institutions prevented me from distributing a student survey, even if disseminated by the instructor. Only one of the participants was

able to disseminate the survey. As a result, data collected was included within the artifacts and documentation as opposed to a greater contribution of specific student data. Discourse amongst students and the instructor was available for three of the four cases. Overall, all four cases provided rich artifact and documentation material for comparison.

The second limitation relative to course observations was the timing when using CAST's (2013) UDL checklist for course design and delivery. Only after the course observation phase was completed was the UDL checklist made known to me as the researcher. Had I been aware of the UDL checklist prior to conducting course observations, a predetermined list of what to specifically observe during the course observations with regard to using UDL would have increased observational insight and allowed for an inclusive validation list as opposed to one that was generated from multiple sources. I should mention that although a pre-set UDL course list was not used during initial course observations, I was able to utilize it after the fact using course recordings and field notes taken while doing the observations. Documenting and analyzing the data by aligning information from the UDL checklist validated actions taken by participants during course observations.

Limited Time to Conduct the Study

The duration of this study was approximately 4 months, or one semester. Interviews, course observations, and other qualitative methods of collecting data overlapped throughout the 4 months. As a result, communication with participants was sometimes challenging since scheduling time with participants on a one-on-one basis posed scheduling conflicts and time constraints. Increased communication with the participants over a two or three semester time frame would have provided even more rich data on the effects online teaching utilizing UDL and accessibility had with instructors and their students.

Recommendations for Future Research

Through this study the data revealed insightful information that may be beneficial to educators teaching in online environments. Methods of gathering data could utilize focus groups along with one-on-one interviews, as well as other methodological methods

to include richer discourse. It is uncertain if different perspectives of using UDL would have generated if participants had the opportunity to actually share experiences amongst each other as opposed to only contributing information only to me as the researcher; different outcomes are yet to be seen.

Recommendations for Further Research Studies

Future researchers could conduct this same study, or similar study, using qualitative methods incorporating focus group sessions of online instructors in efforts to gain further insight on participant discourse and discussion of UDL implementation. Additionally, conducting the study for a longer period of time would provide instructors increased exposure to supplemental materials and allow more opportunities to utilize them. Information generated about their uses of UDL and accessibility could be measured for more than one semester and ultimately include learner outcomes.

Over the two-year duration since this research study began, Universal Design for Learning has increased in recognition and in implementation practices. Additionally, several institutions of higher learning have adopted methods of delivery utilizing resources within their course management systems. (An example has been hosting webinars on UDL and accessibility.) Massive Open Online Courses (MOOCs) have also been created to provide professional development training to anyone interested in learning more about how UDL and accessibility can be applied in an online environment. Strategic considerations for future research constitute cause for online development and design and the direction in which professionals design course work. The term *professional* is used liberally in the previous sentence as to not restrict UDL implementation in the education arena but to include those whose passion is to extend information to others in a way that may benefit the widest audience possible.

Recommendations for Future Practice of Accessibility and UDL

Realistically, erecting a course that may have been pushed upon faculty by administration too often sets the tone for designing a course in which faculty are learning and designing as a simultaneous effort; this can often be stressful and strenuous. Support from department chairs as well as other administration would be key to providing faculty the support needed when developing not only courses, but entire programs in support of

accessible online content. Since results of this study indicated that attitudes of instructors have shifted towards a more positive outlook based on the effectiveness of accessible content, actual implementation still lags behind. Since technology has afforded new and innovative methods of learning and teaching, the means by which individuals access information has become increasingly more accessible as well. The challenge is to educate those that may benefit from such methods. Universities and other institutions of higher learning have the authority to implement training in areas of accessibility. Persistence from those vested in wanting change would more than likely be the innovators to initiate and receive such training. Not knowing how to implement accessibility in an online course is not an excuse if instructors are faced with delivering courses online. Being vulnerable to lawsuits threatens universities as a whole and I'm certain becoming involved in one is highly unfavorable. Increased training to anyone teaching online by institutions of higher learning is encouraged and consideration is recommended sooner than later.

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APPENDIX A: FACULTY CONSENT FORM

AGREEMENT TO PARTICIPATE IN ACCESSIBILITY IN DISTANCE EDUCATION: IMPLEMENTATION OF A UNIVERSAL DESIGN FOR LEARNING MODULE FOR PROFESSIONAL DEVELOPMENT TRAINING

INSTRUCTOR CONSENT FORM

Tracie Ortiz
Primary Investigator

I am conducting a research study for my dissertation in the College of Education's Ph.D. program. The purpose of this mixed methods study, using surveys and focus groups, is to determine the awareness, practices, and accommodations of UDL by faculty teaching distance education courses when implemented in a distance learning environment, in a postsecondary online course, and at various 2-year and 4-year institutions within the US.

Participation in the project will be a two part process:

1) An initial survey will be disseminated to gather information on the demographics, teaching experience, and general background information of the participants' awareness, practices, and accommodations of Universal Design for Learning (UDL).

2) Participants will be asked if they would like to further be involved in the study. Of those consenting to further participate, they will be contacted to participate in three to four online focus group discussions. Evaluation of instructor experience and practices in using UDL will occur through interviews, discussions, and feedback conducted during the online focus group sessions.

Consenting to participate in this study is on a personal level and does not represent the respective institutions in which participants are employed. No personal identifying information will be included within the research results. All participant names and institutions will be anonymous.

Questions in the survey should take between 15-20 minutes to complete.

The investigator believes there is no risk to the participants participating in this research. A monetary incentive of $50 in the form of a gift card will be given to each person for participating in the focus group study. Upon completion of the study, it is my intention to share this experience in determining the evaluation results of online instructors implementing UDL in their online courses to assist in the accessibility of online courses in distance education programs for *all* learners.

Data will be confidential and the UH Committee on Human Studies have the authority to review research data.

Participation is completely voluntary. By checking the 'yes' box below, you are consenting for audio taping of our meetings for collection of data purposes only.

I am very grateful and thank you very much for your participation.

If you have any questions, please contact the researcher, Tracie Ortiz, at 858-208-9445 or tracier@hawaii.edu

If you have any questions regarding your rights as a research participant, please contact the UH Committee on Human Studies at 808-956-5007, or uhirb@hawaii.edu

- ☐ Yes, I consent to participating in this study and allow audio recordings of our meetings.
- ☐ No, I do not consent to participating in this study and do not allow for audio recordings of our meetings.

Signature_____

APPENDIX B: IRB APPROVAL

UNIVERSITY OF HAWAI'I
Committee on Human Studies

November 3, 2011

TO: Tracie Ortiz
Principal Investigator
Educational Technology

FROM: Nancy R. King
Director

Re: CHS #19561- "Accessibility in Distance Education: Implementation of a Universal Design for Learning Module"

This letter is your record of CHS approval of this study as exempt.

On November 3, 2011, the University of Hawai'i (UH) Committee on Human Studies (CHS) approved this study as exempt from federal regulations pertaining to the protection of human research participants. The authority for the exemption applicable to your study is documented in the Code of Federal Regulations at 45 CRF 46 (2).

Exempt studies are subject to the ethical principles articulated in The Belmont Report, found at http://www.hawaii.edu/irb/html/manual/appendices/A/belmont.html

Exempt studies do not require regular continuing review by the Committee on Human Studies. However, if you propose to modify your study, you must receive approval from CHS prior to implementing any changes. You can submit your proposed changes via email at uhirb@hawaii.edu. (The subject line should read: Exempt Study Modification.) CHS may review the exempt status at that time and request an application for approval as non-exempt research.

In order to protect the confidentiality of research participants, we encourage you to destroy private information which can be linked to the identities of individuals as soon as it is reasonable to do so. Signed consent forms, as applicable to your study, should be maintained for at least the duration of your project.

This approval does not expire. However, please notify CHS when your study is complete. Upon notification, we will close our files pertaining to your study.

If you have any questions relating to the protection of human research participants, please contact CHS at 956-5007 or uhirb@hawaii.edu. We wish you success in carrying out your research project.

1960 East-West Road, Biomedical Building, Room B-104, Honolulu, HI 96822-2303
Telephone: (808) 956-5007, Facsimile: (808) 956-8683, Website: www.hawaii.edu/irb, E-mail: uhirb@hawaii.edu
An Equal Opportunity/Affirmative Action Institution

APPENDIX C: INITIAL SURVEY

Assessing Instructor Awareness, Aim, and Best Practices of Universal Design for Learning

Please complete the following survey. The approximate completion time is 20 minutes. It is part of a dissertation study to determine the implementation of Universal Design for Learning (UDL) with respect to awareness, aim, and efforts of best practices of UDL strategies by higher education faculty teaching distance education courses. Your participation is appreciated and priceless!

2. Gender

- Male
- Female

3. Age

- 18-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51-55
- 56-60

- 61+

4. Please identify your role at the University you are currently employed.

- Tenure Faculty
- Non-tenured Faculty
- Part-time Instructor/Adjunct
- Teacher Assistant
- Graduate Assistant
- Staff

5. Please identify the department in which you teach.

- Business
- Criminal Justice
- Curriculum Studies
- Educational Administration
- Educational Foundations
- Educational/Instructional Technology
- Health Sciences
- Special Education
- Sociology

- Other: [ ]

6. How many years have you been teaching in higher education?

- 0-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-30
- 31+

7. How many years have you been teaching online or distance education courses?

- Less than 2 years
- 2-4
- 5-7
- 8-10
- 11-13
- 14-16
- More than 16 years
- I do not teach an online course nor have taught an online course.

So, You Teach Online? Your Input is Appreciated!

Please answer two quick questions about distance education courses.

8. What on-line or distance education courses have you taught? (Please be as specific as possible.) *

9. What online or distance education courses are you currently teaching? *

The next four questions will ask about your experience with people with disabilities.

10. Please describe any personal experiences that you have encountered with disabilities (personal, family, friends, and/or social experiences).

11. Please describe any professional experiences that you have encountered with disabilities.

12. Have these (personal and/or professional) experiences affected your professional practice? If so, how?

13. Do you encourage students to use services through the University's student's disabilities office? *

- Yes
- No

Accessibility and Accommodations

The next 13 questions will ask specific applications pertaining to accessibility of course materials.

13. How do you make your syllabus accessible to all students enrolled in your class? For Example, do you provide a digital version, can it be converted to larger print, can it be

read by a screen reader, do you provide graphics to supplement text, etc.

14. Have you ever implemented text-to-speech software in your online course?

- ○ Yes
- ○ No

15. Are your printed materials accessible, or can be converted to (check all that apply):

- ☐ Large Print
- ☐ Braille
- ☐ Audio-tape or books
- ☐ Electronic Format
- ☐ None of the above at this time

16. Do you provide the fewest links possible to navigate through a class site?

- ○ Always
- ○ Sometimes

- Rarely
- Never

17. Does your delivery method when using any kind of audio output provide text captioning or transcription accessibility? Audio output includes videos, mp3, streaming video, recorded webinars, and any other audio output used.

- Always
- Sometimes
- Rarely
- Never

18. Do you use clear and simple language on WebPages? Jargon exclusively known by only a limited few leaving others 'lost'.

- Always
- Sometimes
- Rarely
- Never

19. Is information conveyed in color also available without color benefits? Example: "Choose the red box for yes and the green box for no." vs "Choose the circle for yes and the box for no."

- Always

- Sometimes
- Rarely
- Never

20. Do you provide the option of having real-time captioning or sign language interpreter accessibility to students who may request it?

- Always
- Sometimes
- Rarely
- Never

21. Please list any accommodation and/or practices implemented not mentioned above: If none have been used, simply state so in the box below.

22. How difficult would it be to implement accommodations and/or accessibility practices for individuals in your online courses.

- Extremely difficult
- Moderately difficult

- Neutral
- Moderately Simple
- Simple

23. How would you rate the implementation of these accommodations?

- Extremely difficult
- Moderately difficult
- Neutral
- Moderately Simple
- Simple

24. How would you rate the effectiveness of these accommodations?

- Extremely Positive
- Positive
- Neutral
- Negative
- Extremely Negative

25. How would you rate your practices and accommodation of implementing Universal Design in courses taught online?

- I always implement Universal Design in all my courses
- I sometimes implement Universal Design in my courses
- I occasionally implement Universal Design in my courses
- I rarely implement Universal Design in my courses
- I have never implemented Universal Design in my courses

26. What degree/s do you hold?

27. What was your area of specialization?

28. What grade level/s have you taught in the past?

29. How did you decide to become a teacher?

30. How did your professional preparation influence your current teaching? Please explain.

APPENDIX D: ONE – ON – ONE INITIAL INTERVIEW QUESTIONS

One-one-One Interview Questions

Discussions in the synchronous web-conferencing will allow for the researcher to determine if new knowledge and skills are being utilized after implementing one application of UDL. Additionally, artifacts of faculty or student work will be encouraged to share. Examples could be written reflections or examination of portfolios or journals. The following questions would be used to gain information on the use of UDL and evaluate reactions and outcomes.

1. Was the module easy to navigate?
2. Were you able to gain the basic concept of UDL based on feedback provided within the module?
3. Is UDL something you would be able to implement within your own online course? How?
4. Would you be able to use at least one application of UDL in your online course?
5. How did you implement UDL in your course?
6. What type of student did you notice, if any, benefited from your implementation of UDL?
7. Would you use UDL again in your course?
8. Would you recommend UDL be used in other online courses?
9. Would you consider disseminating a pre-made survey to your students (IRB approved through UH@Manoa) asking their experience with Universal Design for Learning?
10. Would you be willing to allow me to observe your course one to two times during September or October?

APPENDIX E: UDL CHECKLIST FOR COURSE OBSERVATIONS

UDL Guidelines – Educator Worksheet v. 2	
I. Provide Multiple Means of Representation:	Your notes
Provide options for perception	
1.1 Offer ways of customizing the display of information	
1.2 Offer alternatives for auditory information	
1.3 Offer alternatives for visual information	
Provide options for language, mathematical expressions, and symbols	
2.1 Clarify vocabulary and symbols	
2.2 Clarify syntax and structure	
2.3 Support decoding of text, mathematical notation, and symbols	
2.4 Promote understanding across language	

2.5 Illustrate through multiple media	
Provide options for comprehension	
3.1 Activate or supply background knowledge	
3.2 Highlight patterns, critical features, big ideas, and relationships	
3.3 Guide information processing, visualization, and manipulation	
3.4 Maximize transfer and generalization	
II. Provide Multiple Means for Action and Expression:	Your notes
Provide options for physical action	
4.1 Vary the methods for response and navigation	
4.2 Optimize access to tools and assistive technologies	
Provide options for expression and communication	
5.1 Use multiple media for communication	
5.2 Use multiple tools for construction and composition	
5.3 Build fluencies with graduated levels of support for practice and performance	
Provide options for executive functions	
6.1 Guide appropriate goal setting	
6.2 Support planning and strategy development	
6.3 Facilitate managing information and resources	
6.4 Enhance capacity for monitoring progress	

III. Provide Multiple Means for Engagement:	Your notes
Provide options for recruiting interest	
7.1 Optimize individual choice and autonomy	
7.2 Optimize relevance, value, and authenticity	
7.3 Minimize threats and distractions	
Provide options for sustaining effort and persistence	
8.1 Heighten salience of goals and objectives	
8.2 Vary demands and resources to optimize challenge	
8.3 Foster collaboration and community	
8.4 Increase mastery-oriented feedback	
Provide options for self-regulation	
9.1 Promote expectations and beliefs that optimize motivation	
9.2 Facilitate personal coping skills and strategies	
9.3 Develop self-assessment and reflection	

APPENDIX F: EXIT INTERVIEW

Experiences and Feedback

1. What is your overall interpretation of UDL?
2. Did the supplemental material through email as well as access to the module help, or used during the interim time of the study?
3. Would you consider any awareness practices changed during the past four months? Why?
4. Reflection comments:

Thank you so much!
Contact information…