

A TRANSCENDENTAL PHENOMENOLOGICAL STUDY OF FACULTY USE OF
UNIVERSAL DESIGN FOR LEARNING THAT INCLUDES MULTIPLE MEANS OF
EXPRESSION WHILE TEACHING ONLINE GENERAL EDUCATION COURSES AT A
TECHNICAL COLLEGE

by

Monique Stephaun Baucham

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University

2020

A TRANSCENDENTAL PHENOMENOLOGICAL STUDY OF FACULTY USE OF
UNIVERSAL DESIGN FOR LEARNING THAT INCLUDES MULTIPLE MEANS OF
EXPRESSION WHILE TEACHING ONLINE GENERAL EDUCATION COURSES AT A
TECHNICAL COLLEGE

by Monique Stephaun Baucham

A Dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

Liberty University, Lynchburg, VA

2020

TO BE APPROVED BY:

Rollen Fowler, Ph.D., Committee Chair

Amy McLemore, Ed.D., Committee Member

Tara Scott, Ed.D., Committee Member

ABSTRACT

Little is known about the perceived benefits of Universal Design for Learning (UDL) to help college students with learning disabilities. The purpose of this transcendental phenomenological study was to study general education faculty members' perceptions on student achievement when faculty employ multiple means of expression, the third principle of UDL, which is to vary the means of assessment at a technical college in southeastern Georgia. The transcendental phenomenological studies human experiences. The theoretical framework used to guide this study includes two adult learning theories: Knowles's (1998) andragogy and Mezirow's (1996) self-directed and transformational learning. Vygotsky's zone of proximal development was also applied. The research questions were designed to give insight into the faculty's experiences with UDL, assessing multiple means of expression, barriers to the implementation of multiple means of expression, and their perceptions of the impact on student performance. The participants included 14 general education faculty at a technical college in Southeast Georgia. Interviews, surveys, and course evaluations of faculty courses were used to collect data. Textual data were transcribed and inputted into In Vivo for thematic analysis. Six themes emerged highlighting the lack of training and knowledge regarding the use of multiple means of expression.

Keywords: universal design, universal design for learning, universal design for instruction, universal design for education, universal design for assessment, student, inclusive classrooms, multiple means of expression, assessment, postsecondary education

Table of Contents

Abstract	iii
List of Tables	viii
List of Abbreviations	ix
CHAPTER ONE: INTRODUCTION.....	1
Overview.....	1
Background.....	2
Historical.....	2
Social.....	6
Theoretical	7
Situation to Self.....	11
Problem Statement	13
Purpose Statement.....	14
Significance of the Study	15
Research Questions.....	16
Definitions.....	17
Summary.....	18
CHAPTER TWO: REVIEW OF THE LITERATURE	20
Overview.....	20
Theoretical Framework.....	20
Andragogy.....	21
Transformational Learning Theory.....	23
Self-Directed Learning Theory	24
Related Literature.....	24
Overview of UDL Framework.....	24

Contribution of CAST in UDL	26
Universal Design Approaches.....	32
UDL in Higher Education (Student Perspectives)	33
UDL in Higher Education (Faculty Perspectives)	37
Training on UDL.....	44
Students with Disabilities in Postsecondary Settings	46
Technology in Universal Design for Learning	48
Distance Education	50
Validation of Benefits.....	52
Universal Design of Assessments.....	55
Summary.....	56
CHAPTER THREE: METHODS	59
Overview.....	59
Design	59
Research Questions.....	61
Setting	61
Participants.....	63
Procedures.....	63
The Researcher’s Role	64
Data Collection	65
Interviews.....	66
Survey	68
Online Course Evaluation.....	70
Data Analysis	71
Trustworthiness.....	72

Credibility	72
Dependability	72
Transferability	73
Confirmability	73
Ethical Considerations	74
Summary	74
CHAPTER FOUR: FINDINGS	75
Overview	75
Participants	76
Participant Demographic Information	77
Results	80
Interview Responses	80
Survey Results	80
Theme Development	84
Research Question Responses	87
Member Checking	91
Summary	92
CHAPTER FIVE: CONCLUSION	93
Overview	93
Findings	93
Discussion	94
Theoretical Literature	95
Empirical Literature	99
Implications	100
Theoretical Implications	102

Empirical Implications.....	103
Practical Implications.....	104
Delimitations and Limitations.....	105
Recommendations for Future Research.....	105
Summary.....	106
References.....	107
APPENDICES	127
Appendix A: Permission to Conduct Research.....	127
Appendix B: Questions for Recruitment and Purposeful Sampling.....	128
Appendix C: Interview Questions.....	129
Appendix D: Survey Questions	130
Appendix E: Informed Consent Form.....	131
Appendix F: Reflective Journal	134
Appendix G: Course Evaluation Measurement Sheet	135
Appendix H: Participant Interview Transcriptions.....	136

List of Tables

Table 1. Student Population by Gender	62
Table 2. Student Population by Race	62
Table 3. Faculty Population by Gender, Employment Status, and Race (N =103)	62
Table 4. Participant Sample by Employment Status, Subject, Number of Years Teaching Online, Gender, and Race (N=14)	79
Table 5. Survey Results	81
Table 6. Participant Online Courses Means of Expression.....	83
Table 7. Participant Statements/Emerging Themes	85

List of Abbreviations

American Disabilities Act (ADA)

Center for Applied Special Technology (CAST)

English as a Second Language (ESL)

Learning Disability (LD)

National Longitudinal Transition Study (NLTS)

Universal Design for Learning (UDL)

Universal Design (UD)

Universal Design for Instruction (UDI)

Universal Design for Education (UDE)

Universal Design for Assessment (UDA)

CHAPTER ONE: INTRODUCTION

Overview

The principles of Universal Design for Learning (UDL) emphasize equitable and flexible teaching based on simple and intuitive instructional practices, as well as presenting material in a variety of formats to create access for all learners (Orr & Hamming, 2009). The intent of UDL is built around the concept of accessibility incorporated into education design in order to optimize learning for all students (Combs, Elliott, & Whipple, 2010). In terms of accessibility, UDL is considered a viable tool—not only for individuals with documented disabilities, but also for those that are using mobile devices (Tobin, 2014). The desired outcome is that all students—regardless of ethnicity, disability, or socioeconomic status--can access instructional materials and demonstrate the knowledge, skill, or attitude that they have learned (Roberts, Park, Brown, & Cook, 2011).

Block, Loewen, and Kroeger (2009) noted that there is limited basic and applied research supporting UDL's efficacy and use with diverse populations, including students with learning disabilities. Even so, UDL is featured in federal legislation for postsecondary education (e.g., the Higher Education Opportunity Act of 2008); yet, a recent review of UDL research indicated that many barriers to learning for individuals with disabilities remain (Couzens et al., 2015). For example, those students with visual disabilities need to receive materials in an alternative format, those who are hearing-impaired need materials transcribed, those who are physically challenged need classrooms in accessible locations, and those with learning disabilities may need various accommodations (Block et al., 2009; Burgstahler, 2009; Burgstahler & Moore, 2009). Not only do students with disabilities have these barriers to learning, there are extra steps and burdens created when requesting and making necessary accommodations. If a classroom or curriculum

were to be developed with UDL in mind, however, then some of the needed accommodations would be readily present. In this chapter, I will discuss the background of UDL, along with the situation to self, problem, and purpose statements, research questions, and the design of the current study.

Background

Historical

There are two broad kinds of solutions for addressing the problems of individual students, including those with intellectual disabilities. One solution is to think of the students having the problems (e.g., students have disabilities that interfere with their ability to access the content of the course, to express knowledge, or to engage optimally in it). This view fosters solutions that address weaknesses in individuals. The other solution is to consider the issues as problems within the learning environment, an environmental view. For example, the typical overreliance on printed text for presenting content and evaluating students raises barriers to achievement for some students, while privileging others (Brikerhoff, Shaw, & McGuire, 1992; Burgstahler, 2009; DeVore, Stuart, & Riall, 2008). The environmental view fosters solutions that address the potential limitations of the learning environment including limitations of representation, engagement, and assessment, rather than the limitations of the students. The advantage of such delivery solutions is that they are likely to be useful for many students.

The results of a study using 15 years of data from the National Longitudinal Transition Study (NLTS) indicated that the rate of postsecondary participation by youth with disabilities has more than doubled, increasing from 15% in 1987 to 32% in 2003 (Izzo, Murray, & Novak, 2008). Despite their increasing enrollment, however students with disabilities continue to underperform in comparison to students without disabilities in terms of college participation and

retention rates. The education gap between students with and without disabilities is partly due to some postsecondary faculty members' lacking the knowledge and skills to teach students with disabilities. Many administrators, faculty members, and graduate teaching assistants have reported that they do not know how to accommodate students with disabilities (Izzo et al., 2008). UDL is an attempt to provide educators with the tools to enhance students' access to information, engagement, and means of expression.

Until recent decades, higher education in the United States had been primarily available to a professional class that was White, able-bodied, heterosexual, Christian, and male (Pliner & Johnson, 2004). Over time, higher education has come to include persons of color, women, and people with disabilities (Pliner & Johnson, 2004). The Smith-Hughes Vocational Education Act (1917) promoted vocational education in public schools. The Soldier's Rehabilitation Act of 1918, amended in 1919, was the first act to organize and offer vocational education programs for veterans with disabilities. The Smith-Fess Act (1920) was the first to offer programs and services for civilians who suffered from disabilities following industrial injuries. Although more underrepresented groups, such as individuals with disabilities, were increasingly attending institutions of higher education, access to and equity for that education was not comparable to that of the majority.

In 1973, the Rehabilitation Act mandated a free and an appropriate education to children with disabilities from 3 to 21 years of age. Finally, the Americans with Disabilities Act (ADA) was passed in 1990, extending the Rehabilitation Act of 1973 to prohibit discrimination in key areas including education. According to the Centers for Disease Control and Prevention (2015), one out of every five adults has some type of disability. While the Americans with Disabilities Act primarily refers to students with severe physical and mental disabilities, disabilities may

include issues related to hearing, vision, language, mobility, learning disorders, or mental illness (National Center for Education Statistics, n.d.). The regulations for Public Law (P.L.) 101-476, the Individuals with Disabilities Education Act (IDEA), define a learning disability as a disorder in one or more of the basic psychological processes which manifest itself in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculations (Mackenzie, 1997). As stated previously, approximately 11% of college students have an intellectual disability. One such organization that is helping to address this issue is the Center for Applied Special Technology (CAST).

CAST is the creator of the UDL framework. It is a nonprofit research and development team with the primary focus of creating greater access to educational material for all students (Center for Universal Design, 1997). According to CAST, the three principles of UDL are: (a) multiple means of representation, which is designed to give learners various ways to acquire information and knowledge; (b) multiple means of engagement, which helps to become acquainted with learners' interests, offers relevant challenges, and increases motivation; and (c) multiple means of expression, which provide learners with alternative ways to demonstrate what they know, do, and think (Center for Applied Special Technology, 2014; Orr & Hamming, 2009). Research and applications of UDL have indicated that designing curricula that are intended to provide greater access to learners with disabilities may also benefit other learners (Bruce, 2015). In the current study, I explored the faculty perceived benefit on student performance when faculty provide learners with multiple ways to demonstrate their understanding of the course content.

In the literature, there are several terminologies for universal design in education as it applies to instruction and learning, such as Universal Design for Learning (UDL), Universal

Design for Instruction (UDI), Universal Instructional Design (UID) Universal Design in Education (UDE; CAST, n.d.). UDL is an approach to planning and developing curricula that promotes access, participation, and progress for all learners (Huang, 2017). UDI is an approach to teaching that consists of proactive design and the use of inclusive instructional strategies that benefit a broad range of learners, including students with disabilities (Grier-Reed & Williams-Wengerd, 2018; McGuire & Scott, 2006). Its principles are based on the original universal design principles developed at North Carolina State University (Center for Universal Design, 1997; Mace, 1985). UID focuses on two key objectives: (a) enhancing student learning through the application of the seven principles of UID and (b) conducting research studies that assess the impact that UID has on student learning (McGuire & Scott, 2006). UDE also is based on the seven principles of universal design and is applied toward education at all levels (Bowe, 2000; McGuire & Scott, 2006).

The most commonly used terms are UDL and UDI; regardless, all of the previously cited terminologies are based on the same fundamental goal of including the most learners possible, regardless of ability. For the purposes of this study, the term UDL represents all universal design terminologies and applications to curriculum design as applied to the classroom (Altay, 2014). Another critical concept in this study is the Universal Design for Accessibility (UDA), an evaluation designed to clearly articulate the decisions students need to make regarding the desired skill and knowledge (Burgstahler & Cory, 2008). These approaches are designed to create greater levels of access for students with and without intellectual disabilities.

The primary premise of applying universal design principles to instructional settings is to provide students with multiple and flexible ways to access content and demonstrate obtained knowledge (DeVore et al., 2008; Firchow, 2014). Burgstahler and Cory (2008) stated that each

principle has its merits; however, the impact of universal design principles on student performance has not been clearly determined. In the current study, I focused on the theory and the implementation; however, the determination of the impact on student learning outcomes has not been clearly articulated in the existing research, even though the intrinsic value appears to be present in theory (Burgstahler & Cory, 2008). Implementation is a step in the right direction to aid many students in need; however, the validation of positive affect on student outcomes is needed.

Social

The implementation of the principles of UDL demonstrates an appreciation for a diverse student body in the educational setting (Hitt, 2018). The diversity of the postsecondary education student body has expanded over the last two decades, creating the need for colleges and universities to vary the presentation of information and examination to supplement traditional teaching methods (García-Campos, Canabal, & Alba-Pastor, 2018; Roberts et al., 2011). This diverse population includes over 35% minority students, over 11% of students with disabilities, 45% part-time students, and almost 40% students over the age of 25 (Roberts et al., 2011). Additionally, scholars have anticipated an enrollment increase of 25% of Black students and a 42% increase of Hispanic students by 2021 (Chandler, Zaloudek, & Carlson, 2017). Each population may present a unique learning opportunity because students have varying learning styles. In addition, this population consists of students from varied ethnic and cultural backgrounds, students whose first language is not English, students who are older than the traditional college-age student, and students with an array of learning, attention, psychological, and physical disabilities (McGuire & Scott, 2006; Roberts et al., 2011). The diversity in student populations is ever-changing.

Theoretical

Recognizing that UDL in the context of education has the potential to improve practice in classrooms while providing opportunities for all students to succeed, the Higher Education Opportunity Act (HEOA)—first passed in 1965 and reauthorized in 2008—was the first legislation to establish a statutory definition of UDL. UDL is a framework by which greater access is afforded to all students, regardless of learning style or disability (Al-Azawei, Serenelli, & Lundqvist, 2016). UDL is a scientifically valid framework for guiding educational practice that provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the way students are engaged; moreover, UDL reduces barriers to instruction; provides appropriate accommodations, supports, and challenges; and maintains high achievement expectations for all students (Higher Education Opportunity Act, 2016, Section 1111(b) (2)).

The HEOA reauthorization also added new and revised provisions for minority groups, English language learners, and students with disabilities. HEOA emphasizes reducing barriers by building appropriate supports and challenges into instruction. It also emphasizes the importance of teacher preparation programs incorporating UDL principles into instruction and curriculum development (Takemae, Dobbins, & Kurtts, 2018). Some higher education institutions may not incorporate HEOA components (Brown, Welsh, Hill, & Cipko, 2008), but even adding teacher professional learning communities to support the implementation of UDL can be beneficial (Owen, 2014). Greater support for teachers throughout the process results in wider acceptance.

There are also compliance issues, such as with students with print disabilities (i.e., students with disabilities who experience barriers to accessing instructional material in a nonspecialized format are receiving properly formatted materials; Embry & McGuire, 2011;

Higher Education Opportunity Act, 2008). These practices do not meet the expectations set by the HEOA and, in fact, sometimes create new barriers (Rao, Wood, & Bryant, 2014). For example, a substantial barrier for students is not getting accessible books and course materials quickly enough to meet the deadline of a particular course assignment. These barriers to learning and others have been created by educators, administrators, and staff unfamiliar with laws, policies, and best education practices, such as UDL (Rao et al., 2014). The idea or theory of UDL has been previously discussed in the research literature, but its implementation has only been discussed in reference to computer-based testing (Dolan, Hall, Banerjee, Chun, & Strangman, 2005).

Students are expected to disclose their documented disability with the instructor and the Office of Disability Services. Some faculty have expressed the idea that “the lack of fit between the traditional instructional process and the student is perceived as a deficit on the part of the student” (Shaw, 2011, p. 22). This type of attitude from faculty can be a barrier to effective UDL implementation. The very premise of UDL can be hindered and the benefits for students with and without documented disabilities, faculty, and staff can be jeopardized when it is introduced or implemented with bias (Shaw, 2011). Although the enrollment of students with disabilities continues to rise, students with disabilities continue to exhibit lower college participation and retention rates than students without disabilities (Izzo et al., 2008). The current emphasis on the assessment of students’ knowledge and skills acquired in school environments is strong at all levels of education.

Multiple means of expression allow students to demonstrate knowledge gained through various means that directly link to student outcome (Abell, Jung, & Taylor, 2011). If the acquired knowledge is not validated, educators cannot determine whether the intended student

learning outcomes have been achieved. Multiple means of expression allow students to demonstrate the knowledge, skills, and attitudes acquired in various formats. The previously discussed acts all mandate that assessments serve a broad range of students, yet some faculty members have limited knowledge and experience in designing varied assessment tools (Burgstahler & Cory, 2008). There is a need for more training programs that provide assessment development skills and research on the effects of applying universal design elements in higher education settings (Burgstahler & Cory, 2008). The results of the research will aid researchers and practitioners in documenting the impact on student outcomes.

Educational practitioners must develop and validate universal design principles, guidelines, and checklists across contexts and constituencies. Evidence-based research would provide faculty with the foundation upon which to design and select curricula and assessments that meet the needs of diverse learners without compromising the high standards and outcomes of higher education (Izzo et al., 2008). The results of the current study suggest that faculty and administrators are attuned to the increasing diversity of college students and the need for greater flexibility in instructional design while maintaining high standards to effectively teach these students and prepare them to enter the 21st-century workforce (Bowe, 2000; Brikerhoff et al., 1992; Courey, Tappe, Siker, & LePage, 2012).

Faculty who receive on-demand, multimodal professional development in UDL practices and climate assessment have reported that they are better able to meet the needs of students with disabilities in their classrooms (Izzo et al., 2008). They support the application of UDL as a paradigm for meeting the instructional needs of students with diverse learning needs. While universal design cannot replace faculty members' responsibility to ensure that qualified students

with disabilities have access to necessary accommodations, it has the potential to produce better learning outcomes for all students (Izzo et al., 2008).

There are seven postsecondary regional accreditors, all of whom require postsecondary institutions to demonstrate assessment of student learning outcomes. One of the essential elements of accreditation is assessing the effectiveness of an institution. Institutional effectiveness is seen as the systematic, explicit, and documented process of measuring performance against all aspects of an institution's mission. College constituents expect the college to produce results and document improvements in student learning, support services, and operational outcomes. The Southern Association of Colleges and Schools Commission on Colleges expects all member institutions to do the following:

Engage in ongoing, integrated, and institution-wide research-based planning and evaluation processes that (a) incorporate a systematic review of institutional mission, goals, and outcomes; (b) result in continuing improvement in institutional quality; and (b) demonstrate the institution is effectively accomplishing its mission. (Core Requirement 2.5, Institutional Effectiveness, p. 16); and,

Identify expected outcomes, assesses the extent to which it achieves these outcomes, and provide evidence of improvement based on analysis of the results. (Comprehensive Standard 3.3.1, Institutional Effectiveness, p. 27)

All postsecondary regional accreditors have similar requirements. Assessment is essential to the continued effective evaluation of academic programs. Multiple means of expression allow different students to demonstrate the knowledge and skills obtained as a result of instruction. In limiting the ways in which knowledge is expressed, however, schools can restrict the documented success of some students and some academic programs. It is important to provide

students with and without learning disability options for how they take in information (usually referred to as *representation*), practice new content (*engagement*), and show what they know (*expression*) by using varying methods which may include technologically enhanced assessments (King-Sears, 2015). This has become a common method for assessing student work.

In postsecondary settings, the role of the state government in delineating elements of the curriculum is generally far less prescriptive than in the K–12 system, which has created an atmosphere of flexibility for postsecondary faculty. Curricula and courses differ tremendously among liberal arts, research, vocational, and technical colleges and universities. Although certain disciplines (e.g., education, accounting, occupational therapy) are guided in their curricular offerings by professional standards and certification requirements, many more embody curricular flexibility. Faculty can often choose their own course textbook, and they may decide to use a different text or revised edition every year. For students with disabilities, flexibility in curricular requirements at the postsecondary level speaks to the importance of carefully choosing a college or program that matches their learning strengths, weaknesses, and interests. Faculty flexibility in choice of curricular materials, however, can represent a challenge for students who rely on an audiotope or electronic version of a text, because the timely ordering of materials is essential and a decision to change a textbook shortly before the start of a semester can create a barrier.

Situation to Self

The ontological assumptions are that some students with learning disabilities enroll in collegiate and university settings and that these students need some form of accommodation. I further assumed that multiple means of expression would assist in accomplishing that end. I have served as an assessment officer in postsecondary education for the past 14 years. As an assessment officer in postsecondary education, I have considered the multiple ways instructors

assess students and the equitable practices employed in evaluation. I have an appreciation for varied means of assessment to optimize student learning outcomes. It is critical that instructors design assessments to ensure that all students, regardless of disability or disadvantage, have an opportunity to progress and the evaluation of institutional effectiveness.

Formative and summative assessments are essential to the continuous learning process. Assessments must be an integral part of the instructional process to determine the starting place of instruction and to determine if adequate process is being made (Shaw, 2011). Providing multiple means of expression enables students to demonstrate their understanding of the material with minimal individual accommodations (Shaw, 2011). Scholars conduct qualitative research when a problem or issue needs to be explored, and when existing theories do not adequately capture the complexity of the problem under examination. In theory, with UDL, there are benefits and an increase in access; however, the actual impact on student learning outcomes has yet to be determined.

Regarding axiological assumptions of the study, the results of this particular qualitative study are imperative to students taking online general education courses that are taught at technical colleges by improving their learning experience. By doing this, the study results will be of great value to the society. Through the current study, it was possible to identify the perception of faculty members particularly when it comes to student learning outcomes because the faculty will be able to put into practice the tenet of multiple means of expression. Moreover, the findings enable faculty to identify the barriers to implementation of multiple means of expression. In order to capture the rhetorical philosophical assumptions in this particular study, I ensured that the presentation is appealing so that readers are persuaded to read and practice it. I formatted the study in the most appropriate structure that scientific structure reports are supposed to have.

Positivism and post positivism were attained; the entire study was formulated on the basis of scientific research methods. Because positivism and post positivism requires sociological studies to incorporate data collection strategies that match up to quantitative methods due to their reliability and validity, I employed the use of surveys in the study, as they are known to have good reliability and representativeness. Regarding constructivism, participatory and pragmatism, I ensured that the data gathered and processes undertaken were valid and reliable.

Problem Statement

The problem under investigation concerned the limited information about postsecondary faculty's experience in using UDL in their online courses, as well as their perceptions about the effectiveness of UDL for improving outcomes for students with learning disabilities (Black, Weinberg, & Brodwin, 2015; Roberts et al., 2011; Shaw, 2011). The student population in colleges and universities in the United States is becoming increasingly diverse in terms of ethnicity, age, social class, country of origin, and disability status (Higher Education Opportunity Act, 2008). As Shaw (2011) stated, "Meeting the educational needs of a diverse population requires a new way of thinking about instructional access for students" (p. 23). Students have previously offered favorable opinions that support the need for universal design for learning (Black et al., 2015); however, objective supporting evidence from faculty concerning the utility and need for UDL is still needed.

There is thorough discussion in peer-reviewed sources on the implementation of UDL; however, the literature is limited in its discussion of the impact on student learning outcomes. More research is needed to understand faculty's perception of the impact of UDL on student performance, especially as it relates to their use of multiple means of expression or assessment for achieving positive outcomes for students with documented learning disabilities. There has

been previous research on UDL implementation, faculty training, and faculty and student barriers (e.g., Al-Azawei et al., 2016; Burgstahler, 2009); however, research on faculty's experience with and use of UDL in postsecondary educational settings and its subsequent impact on student outcomes is needed (Black et al., 2015; Roberts et al., 2011). The aforementioned researchers have not specifically examined online faculty's experiences and perceptions related to the benefits of UDL and multiple means of expression while teaching students with learning disabilities in online general education courses. Enrollment in online courses has increased by 34% since 1997; online course enrollment increased by 21% from 2008 to 2009 alone (Hollingshead, 2018). More students are choosing this alternate method of instructional delivery, and the need for universally designed principles has also increased in tandem.

In the Ivy Access Initiative Study in 2011, several different courses were represented. These courses included biology, education, physics, and geology courses. The benefits to the students included providing varied ways to demonstrate knowledge and creating more student engagement; however, the actual impact on student performance was not captured in the scope of the study (Shaw, 2011). Moving beyond the perceived benefits to documented benefits is the scope of this study.

Purpose Statement

The purpose of this transcendental phenomenological study was to describe faculty experiences with the use of UDL, including multiple means of expression, while teaching online general education courses at a technical college. The phenomenon under investigation was faculty's use of multiple means of expression and the perceived impact on student learning outcomes in online general education courses. The theory guiding this study was the Universal Design for Learning Principle (Center for Universal Design, 1997) as it relates to the use of the multiple

means of expression and online instruction in general education courses (Miller & Lang, 2016). It is important to understand the experiences of these faculty members, how these realities ultimately affect student achievement, and whether they believe their experiences with UDL affects student achievement in online courses. Evidence of multiple realities includes using the actual words of different individuals and presenting the different perspectives. I reported on the participants' varied perspectives and noted emerging themes.

Significance of the Study

I aimed to make this study empirically significant in narrowing the literature gap as it relates to the faculty employment of multiple means of express, the third principle of Universal Design for Learning, and student learning achievement. The practical significance of the study was to provide an expanded research base that will assist in identifying relevant intervention strategies, the training necessary for current faculty (Orr & Hamming, 2009), training required in teacher education programs (Courey et al., 2012), and the importance of consistent evaluation of the quality and usefulness of the assessment instruments utilized in postsecondary classrooms. The intent was to have a broader impact on student learning achievement and the technical college setting in which the study was conducted. The theoretical implications of the study are far-reaching, in that the results provide insight into the faculty use of UDL in the technical college setting and enhance the framework on the use of UDL to advance the cause of social justice education and meeting the needs of a diverse student population (Bruce, 2015; Liasidou, 2014; Rogers-Shaw, Carr-Chellman, & Choi, 2018). Given the importance of access to achieving social justice and equal access (Hanesworth, Bracken, & Elkington, 2018), UDL is a promising approach to meeting the needs of learners in a more consistent and effective way.

Through this study, I addressed the immediate need to bridge the gap between students successfully completing courses and degrees and the current level of student performance. I sought multiple and varied thoughts on the subject matter presented in order to determine the actualized benefit of UDL implementation. Through a constructivist approach, I aimed to garner participants' views to find meaning in the phenomenon (Creswell, 2009). The survey and research questions were broad and open-ended in order to allow participants the opportunity to explore the varied complexities of UDL.

Research Questions

I developed three research questions to learn more about the faculty lived experiences in online general education classes that use the third principle of UDL, multiple means of expression. These questions were targeted toward learning more about the barriers and the successes of faculty. The questions were broad in nature so as not to limit the information sharing.

RQ1: What are the online faculties' lived experiences with multiple means of expression and the performance impact on students with documented learning disabilities?

Creating greater levels of access is necessary for a diverse population of students. Faculty do attempt to make accommodations upon request (Izzo et al., 2008); however, faculty who receive on-demand, multimodal professional development in UDL practices and climate assessment have reported that they are better able to meet the needs of students with disabilities in their classrooms (Izzo et al., 2008).

RQ2: How do online faculty integrate the use of multiple means of expression into their pedagogy to meet the needs of all students including those with learning disabilities?

Multiple means of expression are varied means of assessment. The UDL framework builds assessments based upon stated goals, but with consideration of the learners' need for variability (Orr & Hamming, 2009). Mislavy, Almond, and Lukas (2003) stated that the role of planning for variability in assessment is seen in improving accessibility for test takers with disabilities. The inclusion of multiple means of expression in the course design appeals to a wide array of students.

RQ3: Which contributions can UDL impose upon instructional practices used by online faculty to eliminate the barriers to successful implementation of multiple means of expression?

Evidence-based research must be conducted and disseminated so that faculty have the empirical foundation upon which to design and select curricula and assessments that meet the needs of diverse learners without compromising the high standards and outcomes of higher education (Izzo et al., 2008). Through the use of UDL framework, these faculty will be in a position of varying the means of expression. Some faculty members have limited knowledge and experience in designing varied assessment tools (Burgstahler & Cory, 2008). As a result, the implementation of UDL framework might prove to be an effective tool in providing direction to such instructors and postsecondary educational institutions. There is a need for more training programs that provide assessment development skills and research on the effects of applying universal design elements in higher education settings which can be attained through the implementation of the UDL framework (Burgstahler & Cory, 2008). Overcoming the lack of knowledge is essential to effective design of the varied assessments.

Definitions

The following are definitions used in this study:

Accommodation: This term describes reasonable adjustments in employment, and public facilities. The statutory term refers to making existing facilities readily accessible to and usable by individuals with disabilities and job restructuring (Americans with Disabilities Act, 1990).

Cognitive disability: This term is used with respect to an individual having greater difficulty with one or more types of mental task than the average person. This has a basis in the individual's biology or physiology (Ohio Coalition for the Education of Children with Disabilities, n.d.).

Distance Education: This includes formal educational courses facilitated where there is physical distance between the instructor and the student (U.S. Department of Education, n.d.a).

Learning disability: This is a disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculations (U.S. Department of Education, n.d.b).

Psychiatric disability: This term is used with respect to an emotional or mental illness that substantially limits one or more major life activities of the individual, including—but not limited to—schizophrenia, anxiety, or mood disorder (U.S. Equal Employment Opportunity Commission, n.d.).

Summary

The primary goal of UDL is to create greater levels of access for all postsecondary students. The principles of UDL increase the ways in which material is represented, increase the level of engagement, and increase the methods of assessment in order to provide equitable and flexible access. Institutions that are seeking to address the diversity of its student population to include those with learning disabilities incorporate UDL and other practices to reduce the

number of accommodations that need to be made by including progressive course designs. Not only do students with disabilities have barriers to learning, extra steps and burdens exist when requesting and making necessary accommodations that are primarily placed upon the student. UDL is a curricular design that promotes access, participation, and progress. Although there are legislative mandates and postsecondary regional accreditation requiring the demonstrated assessment of students' knowledge, there is still limited standardization. UDL creates greater levels of access; however, evidence is scant validating the actual benefits of UDL.

In the next chapter, I will discuss the background and creation of the UDL framework, both student and faculty perspectives on the UDL, and technological support for UDL. I will also explore three theoretical frameworks: andragogy, transformational learning, and self-directed learning theories. By reviewing the body of existing literature, I develop an overview of UDL, its uses, and its perceived benefits—or lack thereof—in secondary and postsecondary education.

CHAPTER TWO: REVIEW OF THE LITERATURE

Overview

Chapter Two encompasses the review of literature relating to the subject matter, Universal Design for Learning. In this section, I explore the theoretical framework that I used to guide the entire study. Three theories were employed in shaping the theoretical framework: andragogy, transformational learning, and self-directed learning theories. The first section of the review includes an in-depth exploration of these theories and their principles in relation to UDL and adult online teaching in technical colleges. In this section, I also provide an overview of the UDL framework, drawing literature from previous works by other researchers. Apart from an overview, an in-depth presentation of UDL literature is provided touching on various issues such as distance education, learners with disabilities, and the impact of technology on the UDL framework.

In a study that reviewed 12 peer-reviewed papers from different databases and journals that focused on the UDL framework, seven themes emerged. Among those themes were the type of results (Al-Azawei, Parslow, & Lundqvist, 2017). The results varied on the use of UDL. Instructor beliefs on its benefits and student results were diverse. The aim of this study was to review the faculty perceived benefits on the use of multiple means of expression to validate the benefits of the use of UDL.

Theoretical Framework

In conducting this study, I drew upon diverse approaches to implementing multiple means of expression or varied assessments. I employed the use of three theoretical frameworks in the course of exploring adult learning theories and how they can be integrated into universal design for learning. Through these theoretical frameworks, I aimed to illustrate the effectiveness

of UDL (Hollingshead, 2018), particularly multiple means of expression in the course of teaching online general education courses that are taught at technical colleges. The three adult learning theories that I employed in this study's theoretical framework were andragogy, transformational learning, and self-directed learning theories. The reason for choosing these three theories is because there is no particular theory that can be solely applied to all adults. It is for this reason that UDL emphasizes using multiple means of expression in adult instruction. Adult learning theories have been formed based on the past literature, in which researchers have established models, sets of expectations, principles, theories, and descriptions that form the knowledge base of studying adult learning (Hollingshead, 2018). An understanding of these theories and adult knowledge base among adult learners would allow postsecondary institutions to be more responsive to the needs of its adult students (Quaglia, 2015), thereby creating greater levels of access for all students.

Andragogy

Andragogy is an adult learning theory popularized by Malcom Knowles (1990). In this particular theory, Knowles explores the art and the science of helping adults enhance their learning process. This theory was formulated to contrast pedagogy, which explains the art and science of teaching children (Knowles, 1990). Knowles developed assumptions regarding the features of adult learning that vary from the characteristics of children learning. These five characteristics are self-concept, adult learner experience, readiness to learn, orientation to learning, and finally motivation to learn. Knowles asserted that as individuals mature, their self-concept transforms from one that is dependent personality into a self-directed person. Regarding adult learner experience, as individuals mature, they gather a growing reservoir of experience that forms their background for learning. Thirdly, the theorist explains readiness to learn among

adults in regard to their maturity claiming that when people mature, readiness to learn is inclined in the developmental tasks of the social roles. When people mature, their time notion changes from one of postponed orientation of knowledge to one of immediacy of orientation; therefore, their learning orientation transforms from one that is subject-centered to one that is centered on their problem. Lastly, motivation among adults is internal. Knowles formulated four principles of andragogy, one of which asserts that it is imperative for adults to be incorporated in planning and evaluation of how they are taught. Experience is a key construct of learning activities among adult learners. The third principle states that adults are usually interested in learning disciplines that are of immediate relevance and influence on their job or even personal life. Finally, adult learning is not content-oriented, but rather problem-centered.

Another theory that supports andragogy is the Vygotsky's theory of the zone of proximal development. This theory is based on the premise that giving students the appropriate assistance will help motivate the student to achieve the task. It is that gap between what a student can do with help and what they can do without help (Chaiklin, 2003). It is balance between student success with proper assistance and those that cannot achieve just because of the lack of assistance.

As more institutions become more aware of the benefits of adult learning theories, the implementation is become more widespread. One such organization is the London Fire Brigade (LFB; Chinnasamy, 2013), which sought to train firefighters through mentoring. In doing so, LFB implemented the program by using adult learning theories. Their primary goal was to have each trainee take ownership for his or her learning through self-direction and relevant experience, thus creating a motivation to learn.

Transformational Learning Theory

Transformational learning theory is an adult learning theory that uses disorienting dilemmas to challenge how learners think. This theory encourages students to employ critical thinking and questioning to assess whether their perceptions and beliefs are correct regarding the world. The theory was first introduced by Jack Mezirow in the late 1900s (Mezirow, 1978). Mezirow used the theory to explain how adults changed the way they interpreted their world. This particular theory is considered uniquely adult that is grounded in human communication where “learning is understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience in order to guide future action” (Mezirow, 1996, p. 162). The transformative process is formed and circumscribed by a frame of reference. Frames of reference are meaning structures inclusive of assumptions and expectations that frame an individual’s tacit points of view and influence their thinking, beliefs, and actions. It is the revision of a frame of reference in concert with reflection on experience that is addressed by the theory of perspective transformation—a paradigmatic shift. The transformative process explains how adults revise their meaning structures (Calleja, 2014).

Meaning structures act as culturally defined frames of reference that are inclusive of meaning schemes and meaning perspectives. Meaning schemes, the smaller components, are indicative of specific beliefs, values, and feelings that reflect interpretation of experience. They are the tangible signs of the habits and expectations that influence and shape a particular behavior or view, such as how an adult may act when they are around a homeless person or think of a Republican or Democrat. Although changes in meaning schemes are a regular and frequent occurrence, Mezirow (1996) argued that meaning perspectives are often acquired uncritically in childhood through acculturation and socialization, most often during significant learning

experiences with parents, teachers, and other mentors; these perspectives most often reflect one's dominant culture.

Self-Directed Learning Theory

According to Karimi (2016), nearly 70% of the adult learning process is self-directed. The theory of self-directed learning (SDL) was initially formulated from Knowles's (1990) concept of andragogy. In his theory of andragogy, Knowles proposed that learners should be increasing self-directed in the course of their maturity. The theory entails the process whereby individuals take the ingenuity without aid from their peers or their instructors while they are executing and assessing their experiences. It can thus be regarded as an informal procedure that typically occurs outside the classroom.

In their study, Merriam, Caffarella, and Baumgartner (2007) described SDL's goals in three perspectives. The first goal of the theory is enhancing the ability of students to be self-determined in their learning process. The second goal is supporting transformational learning and lastly, the theory is focused on promoting emancipatory learning and social action as an important section of SDL. The role of teachers in this theory is encouraging their learners entirely in their learning process and aiding them in identifying their growth and development in learning strategies. Also, teachers are tasked with providing their students with alternatives for attaining successful learning outcomes.

Related Literature

Overview of UDL Framework

Universal Design for Learning is a practical application framework emphasizes the development of material in various formats, encourage additional methods of engagement, and assessments that accommodate different learners (Smith & Lowrey, 2017b). The primary goal of

UDL is to create learning environments for all students reducing the need for individual accommodations. The Individuals With Disabilities Educational Act of 1997 and 2004 furthered these mandates at a K–12 level, and the Americans With Disabilities Act (1990) and Sections 504 (1973) and 508 (1998) of the Rehabilitation Act mandated equitable access to curriculum at a post-secondary level (Rao, Edelen-Smith, & Wailehua, 2015).

The UDL principles emphasize equitable and flexible teaching based on simple and intuitive instructional practices, paying careful attention to ensure that material is presented in a variety of formats to create access for all learners (Cook & Rao, 2018). UDL replaces the medical or deficit model of disability with a more inclusive paradigm in which persons with disabilities are a part of the continuum of learners with various strengths and weaknesses (Orr & Hamming, 2009). As such, it is more often that the instructor—rather than the student—needs a paradigm shift.

Much like the application of universal design in architecture or product development, a universally designed teaching and learning environment is inherently more inclusive and likely to meet the needs of a more diverse audience (Orr & Hamming, 2009). The purpose of this chapter is to explore the implementation of UDL in higher education settings, attitudes of higher education faculty and students regarding UDL, training on UDL in educational settings, the evolving educational requirements in creating greater levels of access for all postsecondary students, and the proposed benefits of UDL.

Universal design began in architecture in the 1980s and early 1990s with the design of physical environments to be accessible by all people without the need for adaptation or specialized design wherever possible (Center for Universal Design, 1997). When applied to higher education, universal design represents a cohesive approach to promoting inclusion

(Lawrie et al., 2017), one that considers—on an ongoing basis—how curriculum, instruction, and assessment can be designed to meet the learning needs of the greatest number of students, without compromising academic rigor.

The UDL framework is designed based on three guiding principles: multiple means of representation, engagement, and expression. Within these three principles, there are nine guidelines and 31 finer-grained checkpoints to assist in designing courses (Scanlon et al., 2018). A study was conducted reviewing the UDL checkpoints in a representative sample of activities in chemistry courses. The reviewed showed that only four out of the 31 checkpoints were utilized. These were primarily focused on the principles of representation. Still showing very little change in the area of expression. There is still more room for improving for utilizing the UDL principles and more specifically in the area of expression (Scanlon et al., 2018). For the purposes of this study, expression refers to assessment.

Contribution of CAST in UDL

One of the early innovators in applying the idea of universal design to education was the Center for Applied Special Technology (CAST). Although initially focused on K-12 education, CAST has broadened its scope to include the application of UDL principles to postsecondary education. As an approach to curriculum development, UDL ensures that students with a wide range of abilities can access and succeed in the general curriculum. In short, people do not have one general learning aptitude, but many learning abilities; thus, a disability or challenge in one area may be compensated for by extraordinary abilities in another. In order to meet the needs of all learners, educational, emotional, and technological barriers must be minimized, and flexible teaching strategies must be incorporated into curricula (Block et al., 2009; Mustaquim, 2017). Incorporating UDL into the curriculum can reduce the need for individual accommodation.

According to CAST, the framework of UDL follows three basic principles: multiple means of representation and presentation, multiple means of strategic engagement, and multiple means of expression (Sopko, 2008). Multiple means of representation refer to multi-modal teaching, relying on a mixture of mediums (e.g., lecture, video, group discussions) to relay concepts. Multiple means of strategic engagement refers to maximizing student learning through motivation and relevancy so students have opportunities to interact with and learn the content. Lastly, multiple means of expression allow students to demonstrate their learning through varied assessment methods throughout the course. These three UDL principles provide students with a variety of options for learning and different methods of assessments to express what they know. The UDL framework challenges educators to rethink the nature of their curriculum, and empowers them with the flexibility to serve a diverse population of learners.

The intent of a universal design approach is to provide access to the curriculum for all students, including the large numbers of postsecondary students with disabilities who choose not to disclose their disabilities to their institutions—nearly 60% based on the National Longitudinal Transition Study (NTLS) data (Wagner, Newman, Cameto, Garza, & Levine, 2005). Consider the current process through which students with disabilities gain educational access in higher education. Students with disabilities who disclose their disabilities in order to obtain needed accommodations are often required to register with their institution's office of disability services. Field, Sarver, and Shaw (2003) cited several problems with this traditional model of providing educational access. First, students are required to disclose their disabilities to faculty members every semester and request 'special' treatment in the form of reasonable accommodations. Interviews with students with disabilities reveal that this process can be humiliating and stigmatizing. Second, when faculty members are required to make accommodations for

particular students, they often must retrofit or modify existing instructional and curriculum materials—a time-consuming and difficult task, in some cases. Third, adhering to a formalized process for requesting accommodations places disability services personnel in the role of mediator between students and faculty members, promoting student dependence on disability services staff and discouraging students from directly discussing their educational needs with faculty members. Incorporating instructional strategies makes learning accessible to a broad range of learners.

Post-secondary demographics are becoming increasingly diverse and the need for meeting the needs of this population is prevalent. There is insufficient research to indicate how educators navigate their roles within the classroom and embed inclusion, universal designs for learning, and technology to address the needs of all learners (Kraglund-Gauthier, Young, & Kell, 2014). There are many barriers to learning for individuals with disabilities. Students who are visually impaired need materials in alternate formats and those that are deaf also need materials to be presented in an alternate format, those with learning disabilities may need various accommodations (Block et al., 2009; Burgstahler, 2009). Students with learning disabilities also need accommodations and may face stigmas by disclosing their disabilities (Denhart, 2008). The literature discussed faculty's knowledge of UDL and working with students with disabilities as well as students' perspectives on UDL, and cases of actual implementation of UDL (Embry, Parker, McGuire, & Scott, 2005; Izzo et al., 2008). UDL is a tool that can enhance the postsecondary educational environment for all students.

Originally, students with disabilities were accommodated after the fact. The course curriculum was already designed or created, and then students were accommodated afterwards rather than having the curriculum designed with all students in mind. Had the curriculum been

designed for all students, the student with a disability would have equal access to the information and coursework similar to students without disabilities at the onset of the course (Griful-Freixenet, Struyven, Verstichele, & Andries, 2017). Block et al. (2009) made the point that the UDL model in higher education involves a change in the way one views disability. A move from the medical model to the social justice model, rather than viewing disability as a problem would view disability as an aspect of one's diversity (Pino & Mortari, 2014; Thornton & Downs, 2010). UDL promotes the social responsibility of all persons in creating an environment that is usable by the highest number of people possible—whether it is a physical, informational, curricular, or social environment (Moore, Smith, Hollingshead, & Wojcik, 2018). The focus moves away from accessible and minimum code requirements to usability (Block et al., 2009). Usability aides in the retention of students with and without intellectual disabilities.

Accommodations are akin to meeting the minimum code requirements, whereas UDL is equated with usability. The accountability of schools, teachers, and administrators depends upon accurate and effective assessment procedures and practices; however, the process of accurately assessing all students, including those with diverse and varying strengths and needs, is complex and likely insufficient (Burgstahler & Cory, 2008). The UDL framework builds assessments based upon stated goals, but with consideration of the learners' need for variability. Mislevy et al. (2003) stated that the role of planning for variability in assessment is seen in improving accessibility for test takers with disabilities. This represents an initial step in evaluating online professional development training in UDL, but additional research is needed. Using objective and standardized assessments, future scholars should assess the impact of specific UDL strategies on student learning while controlling for learner variables such as innate ability, functional limitations of a disability, and motivation. Adding comparison classrooms on the same

essential content taught through traditional higher education approaches would allow researchers to evaluate the merits of specific universal design practices. Conducting an anonymous survey and reviewing course documents with faculty and students participating in both traditional and universally designed classes would provide opportunities to triangulate the data to determine the educational effects and social validity of specific UDL practices (Izzo et al., 2008). The call for research on the efficacy of universal design in higher education has been sounded (Burgstahler, 2009; McGuire & Scott, 2006).

In a study conducted by Janet Levey, the researcher reviewed literature published between 2003 and 2013 focusing on the use of instruction of nursing education. Levey (2018) found that the greatest barrier to the use of UDL was still lack of knowledge. Nursing education students also have diverse learning needs (Harris, 2018). Of the 45 articles reviewed, UDL was not regarded as a well-known inclusive solution for meeting the needs of a diverse student body in nursing education. Individual accommodations were made for students that were marginalized by learning disabilities. In yet another study the principles of UDL and UDI were used. This time the viewpoints of the students with and without learning disabilities were evaluated. Students were asked what they perceived as barriers to learning. Both student populations rated UDL and UDI as useful in improving their learning. The students offered several different perspectives that supported the principles of universal design in higher education (Black et al., 2015). Most felt that the UDL design was beneficial for all students.

The number of students with disabilities pursuing postsecondary education is increasing. Fifteen years of data from the National Longitudinal Transition Study have indicated that the rate of postsecondary participation by youth with disabilities has more than doubled, rising from 15% in 1987 to 32% in 2003 (Wagner et al., 2005). The National Center for Education Statistics

reported that the proportion of students who enter postsecondary education who have a disability continues to increase. The statistics start with identifying the fact that 7.2% had disabilities in postsecondary education from 1989 to 1990 (Horn, Berktold, & Bobbitt, 1999). This percentage of students with disabilities remained consistent until 2003-2004 when it increased to 11.3%. These statistics indicate that approximately 10% of the postsecondary education student body has some form of disability.

Students with disabilities are often accommodated after the fact with the course designed for the largest population of students leaving over 10% of the student population to be accommodated. If the curriculum and assessments had been part of the initial course design, the student with a disability would have equal access to the information and coursework similar to students without disabilities. Block et al. (2009) noted that a change is required in the way higher education looks at and accommodated disabilities. As noted previously, there must be a shift from the medical model and viewing disabilities as a separate accommodation to one that is more encompassing with the original design taking into consideration greater levels of access for all students.

Making accommodations is simply meeting the minimum requirements; however, UDL is an approach that promotes equity and social responsibility for all students (Kennedy et al., 2018). As previously stated, a move from the medical model to a social model with regard to the way we view disabilities is required even in health-related courses. However, the change must be for more than just the educators. It should include administrators and disability services personnel. Many campus offices that provide resources to students with disabilities are named Disability Support Services which carries both a stigma and/or the need for some form of medical support (Thornton & Downs, 2010). Making students reluctant to disclose.

Despite increasing enrollments, students with disabilities continue to underperform in comparison to students without disabilities in terms of college participation and retention rates (Wagner et al., 2005). According to the National Longitudinal Transition Study-2 (NLTS2), nearly 30% of exiting high school students with disabilities enrolled in college, compared to 40% of the general population. Further, 1 year after high school graduation, only 10% of students with disabilities were still enrolled at 2-year colleges, and only 5% were enrolled in 4-year colleges (Wagner et al., 2005). Although disability services are available, they lack the sufficiency to matriculate students with disabilities through to graduation. This places a greater emphasis on the need for course augmentation that creates greater levels of access for all students.

The educational achievement gap between students with and without disabilities is partly due to faculty members failing to design inclusive courses and postsecondary institutions failing to mandate inclusive designs. Despite the mandates of the ADA and Section 504 to teach and accommodate equal educational access to students with disabilities, many administrators and faculty state that they do not know how to accommodate most students with disabilities (Bourke, Strehorn, & Silver, 2000; Dona & Edmister, 2001; Hinds & Mather, 2007). Improving the skills of faculty to effectively teach students with diverse learning needs could improve postsecondary retention rates and student learning outcome achievement. UDL is one of those principles that allows faculty to create more inclusive classrooms.

Universal Design Approaches

Not only are there physical barriers to learning, but for some disabilities, such as learning or psychiatric, students face additional barriers. Students may be misunderstood by faculty or be reluctant to request accommodations for fear of the stigma related to their disabilities (Denhart, 2008). The postsecondary accommodation process for students with disabilities typically follows

a medical model through which the student becomes the focus of interventions determined by a disability resource professional (Burgstahler, 2009). This individual may or may not be trained on the use of educational classroom intervention strategies.

In the medical model, modifications are made to accommodate the disability, rather than the student's actual needs. An accommodation that may work for one student may not work for another, even if the students have a similar disability (Seok, DaCosta, & Hodges, 2018). This model requires constant administrative oversight on the part of the disability resource staff, places additional responsibilities on students with disabilities beyond what their nondisabled classmates' experience, and often puts disability service providers at odds with faculty. However, if a classroom or curriculum were developed with UDL in mind, some of the need for accommodations would be alleviated (Embry et al., 2005). The idea behind UDL is access for all individuals.

Many general education teachers in public schools have inclusive classrooms. The diverse population of students in the classrooms includes students with behavior disorders. While the behavior disorders can be viewed as challenges, teachers may not feel up to the challenge and revert to getting through the process, rather than options such as UDL, because of a lack of knowledge. The educational process can be enhanced, however, when UDL is used as a foundational approach (Johnson-Harris & Mundschenk, 2014). This foundational approach can be used in a standard course design and enable all instructors to use courses with elements of UDL.

UDL in Higher Education (Student Perspectives)

Researchers have shown that students' use of a UDL-enhanced website alone as an intervention strategy did not improve grades, (Bongey, Cizadlo, & Kalnbach, 2010), raising the

possibility that there may be an optimal blend of tools and approaches. Multiple factors played into this outcome. Students in this study noted that that certain aspects of the UDL implementation had counterproductive responses including less interaction with the lecture content and reduced attendance (Bongey et al., 2010). The research suggests that there is value in implementing UDL principles because student performance will increase with the optimal blend of representation, engagement, and expression, thereby creating an environment for greater student learning outcome achievement. However, this assertion was not validated by the Bongey et al. (2010) study. The study did not observe a difference in student performance.

In another study, conducted by Madriaga, Hanson, Kay, and Walker (2010), 668 students were randomly selected out of the total population of 2,004 full-time undergraduate students and mailed a questionnaire. After 4 weeks, 484 students had completed and returned the questionnaire; 68.5% of the respondents were female and 21.5% male. There were 172 disabled student respondents and 312 nondisabled students. Of the respondents, 88.5% (429 students) of the overall group and 88.4% of the disabled group were White British, with small numbers of Asian/Asian British, Black/Black British, Chinese, and mixed-race students in each group (Madriaga et al., 2010). The study showed that disabled and nondisabled students had challenges when transitioning to the university setting, including acquiring the fundamental habits for success in the collegiate setting. Nondisabled students were more challenged by oral presentations and group work. Disabled students were challenged by taking notes, hearing lectures, and gaining physical access to buildings.

In yet another study to determine student perceptions of UDL, the sampling included 867 students in grades 5–12 across three schools and 15 teachers (Abell et al., 2011). Of the student participants, 10% were upper-elementary students (fifth and sixth grades), approximately 81.4%

were middle school students (seventh, eighth, and ninth grades), and 8.6% were high school students (10th, 11th, and 12th grades). The participants provided their perceptions of their teachers and classroom environments. Approximately 61% of the students described the classroom environment of a male teacher and approximately 39% described that of a female teacher. All the teachers were experienced teachers with over 5 years of teaching experience, and two thirds of the teachers had taught for more than 10 years. There were three important findings from the study. First, high school students had higher scores than upper-elementary or middle school students for personalization, but there were no significant differences between upper-elementary and middle school students for personalization. Second, high school students had the highest participation scores, whereas middle school students had the lowest participation scores. Third, students reported higher personalization scores for female teachers than for male teachers (Abell et al., 2011). Overall, the personalization and design elements were thought to be beneficial.

There are also compliance issues, such as whether students with print disabilities (i.e., students with disabilities who experience barriers to accessing instructional material in a nonspecialized format) are receiving properly formatted materials Embry & McGuire, 2011; Higher Education Opportunity Act, 2008). These practices do not meet the expectations set by the HEOA and, in fact, sometimes create new barriers (Rao et al., 2014). For example, a substantial barrier for students is not getting accessible books and course materials quickly enough to meet the deadline of a particular course assignment. These barriers to learning and others have been created by educators, administrators, and staff unfamiliar with laws, policies, and best education practices, such as UDL (Rao et al., 2014). The idea or theory of UDL is discussed in the research literature, but its implementation has only been discussed in reference

to computer-based testing (Dolan et al., 2005). Reviewing computer-based testing can be limiting.

Universal design in the setting of education is a framework of instruction that aims to be inclusive of different learning preferences and learners and helps to reduce barriers for students with disabilities. Students are expected to disclose their disability to the instructor. Some faculty have expressed the idea that “the lack of fit between the traditional instructional process and the student is perceived as a deficit on the part of the student” (Shaw, 2011, p. 22). This type of attitude from faculty can serve as a barrier to effective UDL implementation. The very premise of UDL can be hindered and the benefits for students with and without documented disabilities, faculty, and staff can be jeopardized when it is introduced or implemented with bias (Shaw, 2011). Although the enrollment of students with disabilities continues to rise, students with disabilities continue to lag behind students without disabilities in terms of college participation and retention rates (Izzo et al., 2008). The current emphasis on the assessment of students’ knowledge and skills acquired in school environments is strong at all levels of education. Accountability has become a ruling factor in education, driving the emphasis on assessment.

As previous scholars have shown, standardizing content for all learners is not optimal for all students. Al-Azawei et al. (2017) conducted a mixed design study with 92 undergraduates at the University of Iraq in order to learn more about the integration of UDL and a Technology Acceptance Method (Al-Azawei et al., 2017). The evidence showed that UDL was a good approach to helping learners accept e-learning and overcome curricular limitations. The scope of the study highlighted some of the benefits of UDL, as it varied the representation of the information presented.

Kumar and Wideman (2014) conducted a case study on a technologically enhanced traditional health science class where the principles of UDL were utilized. Students were offered varied forms of representation, engagement, and expression. The students responded well to the course design and thought that including UDL offered more flexibility, reduced stress for the students, and increased student performance (Kumar & Wideman, 2014). Increasing student performance is one of the most beneficial aspects of the design.

UDL in Higher Education (Faculty Perspectives)

Perceptions about UDL play an important factor in creating greater levels of access for student success. The way faculty view these greater levels of access can increase student opportunities or prohibit the implementation of necessary accommodations (Lowrey, Hollingshead, Howery, & Bishop, 2017). In one study, Embry et al. (2005) evaluated the understanding that some disability service providers have of UDL. The participants were in both the public and private education higher education sectors. The 16 participants ultimately felt that UDL could help to increase recruitment and retention; however, the weaknesses noted included faculty resistance, lack of training, and limited technology. The participants also noted that there was a lack of support from administration; therefore, costs of implementation and training would be problematic.

One instructor sought to incorporate Universal Design principles in three online courses. The instructor worked from the premise that universally design courses would be beneficial to students with and without learning disabilities and minimize the need for accommodations (Rao et al., 2015). The Universal Instruction Design principles were integrated throughout the five phases of design, analysis, design, development, implementation, and evaluation. The authors

determined that students appreciated the organization of the course and the heightened teacher interaction.

Most faculty feel there is merit in implementing UDL and similar strategies to increase access for all students and there are some who have acted on this belief and operationalized their efforts (Dallas & Sprong, 2015; Edyburn, 2010; McGuire & Scott, 2006). Edyburn (2010) conducted extensive research and summarized his findings in a list of 10 propositions for UDL, providing explanations for how each could be implemented. Some of Edyburn's propositions include that UDL in education is fundamentally different from the original context of universally designed architecture, UDL values diversity, UDL does not occur naturally, and the value of UDL must be measured.

The UDL framework varies from the original context of architecture. Edyburn (2010) asserted that (a) there must be a paradigm shift in UDL that places emphasis on instructional design rather than architecture; and (b) UDL helps educators understand the value of technology and how it can enhance all UDL principles to create a balance between learning objectives, individual learner characteristics, performance support strategies, and outcomes. Edyburn also noted that valuing diversity assists in understanding individual learner characteristics and motivators. Edyburn expressed concern that the desired results of UDL will not be achieved unless diversity of the student body begins to inform course design.

The question of design, as Edyburn (2010) cited, is a problem for some instructors because it is challenging for them to teach daily and become effective instructional designers, some grapple with the idea that the role of instructor and designer are distinct from one another. Edyburn is not alone in his opinion as differing schools of thought have been introduced. Some researchers suggest that instructors feel more comfortable with meeting the needs of students

with disabilities because they received training on how to implement UDL (e.g., Izzo et al., 2008; McGuire & Scott, 2006). In the study of Izzo et al. (2008), the researchers focused on identifying the faculty-perceived training needs for students with learning disabilities, whereas the second study focused on faculty perceptions of a multi-modal professional development tool that illustrated how faculty could use UDL in their courses.

The first study involved surveying 271 faculty and focus groups with 92 additional faculty. The survey respondents noted UDL training as the greatest training need (Izzo et al., 2008) and because of the need identified in the first study, a training module entitled Faculty and Administrator Modules in Higher Education (FAME) was developed. The first one focused on UDL. Of the 98 faculty members that reviewed this module, 92% found it favorable, noting that they felt much more equipped to meet the needs of the nontraditional students and specifically students with disabilities. One noted limitation of the study was that its focus was on the need for professional development and implementation of UDL, rather than actual practices and evidence-based assessments. One consistently limiting theme that was noted by Izzo et al. (2008), Orr and Hamming (2009), and McGuire and Scott (2006) is that there is a need for evidence-based research that addresses student performance so faculty have the empirical foundation upon which to design and select curricula and assessments that meet the needs of a wide range of diverse learners without compromising the high standards and outcomes of higher education (Izzo et al., 2008). The high percentage of faculty that saw UDL as favorable continues to tout the possible benefits of UDL.

Another project was launched by Smith and Buchannan (2012) at Western Illinois University. The goal of this pilot project was to investigate the practical application of universal design principles and the benefits of faculty collaboration with the Disability Resources Office.

Although the study was limited in scope because it included only one faculty member and one representative from the Disabilities Resources Office, the findings showed that collaborative efforts can yield a sustainable course design and that the courses were usable for students with varying learning needs and preferences. Despite diverse course formats and student populations, the practical application of UDL proved to be flexible and usable beyond the theoretical framework (Smith & Buchannan, 2012). While limited in scope, the study showed the application of UDL is more than just theory.

As a follow-up to this pilot project, Smith and Buchannan (2012) discussed developing a faculty partners program. In this collaborative program, faculty will be trained on universal design principles and their individual courses evaluated and redesigned with universal design techniques. The goal of the program is for faculty members who have received formal training on UDL to become design experts and share their best practices with colleagues (Smith & Buchannan, 2012). The implementation of the program will demonstrate the benefit of UDL from both a faculty and student perspective as information is continuously shared and methods are improved upon.

In another study conducted by Lombardi, Murray, and Gerdes (2011) at the University of Oregon, the authors surveyed faculty using the inclusive teaching strategies inventory (ITSI). The inventory contained questions representing six constructs of universal design which are: (a) multiple means of presentation, (b) inclusive lecture strategies, (c) accommodations, (d) campus resources, (e) inclusive assessment, and (f) accessible course materials. Lombardi et al. found that faculty members who had received prior disability-related training or had prior experience working with students with disabilities were more likely to have positive attitudes about UDL. This indicates that faculty without prior experience working with students with disabilities may

be a hindrance to the effective implementation of UDL, and may not see the need for creating learning environments that have greater levels of access.

The Ivy Access Initiative was another study that clearly articulated the benefits of universal design to faculty (Institute on Community Integration, n.d.). The Ivy Access Initiative included participants from Brown, Columbia, Dartmouth, Harvard, and Stanford. They joined together to form a universal design consortium. The purpose of the initiative was to create a model for implementing UID (Institute on Community Integration, n.d.). The Ivy Access Initiative website also discusses accessible web design and adaptive technology. Faculty from various disciplines—including biology, law, math, composition, and psychology—participated in the project. Each concluded that faculty who are committed to inclusive practices implement universal design principles in various and creative ways.

Faculty's attitudes toward individuals with disabilities are complex. While some propose that accommodations should provide equal access and therefore sustainable performance, others have had challenges with expecting the same level of performance (Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007; Staats & Laster, 2018). According to Brikerhoff et al. (1992), there are four issues that affect service delivery to students with learning disabilities in higher education settings. One of those issues is determining how to foster the independence of college students with learning disabilities. In a study conducted of students with learning disabilities in colleges offering associate degrees, Mamiseishvili and Koch (2012) noted that approximately 25% of the students did not go beyond their first year, and that approximately 51% left without return by the end of their second year. Mamiseishvili and Koch suggested that while attrition cannot be directly traced to lack of access to educational material and poor

attitudes toward students with learning disabilities, the implementation of UDL principles may be related to student success and overall improvements in retention levels.

In the study that Courey et al. (2012) conducted at Valdosta State University, UDL was implemented in a lesson plan in a general education setting. Courey et al. determined that the lesson plans can be written to provide increased curriculum access for both struggling students and their more advanced peers. In this manner, all students in the class could benefit from the variety of instructional and assessment options used by the teachers. The authors determined that the lesson plans can be written to provide increased curriculum access for both struggling students and their more advanced peers. General education instructors could also benefit from training on the UDL principles (Vitelli, 2015). General education is typically infused into all academic programs, and by infusing UDL principles into general education courses, all students in the class could benefit from the variety of instructional and assessment options used by the teachers.

The richness of a lesson plan with multiple options for representation, action, expression, and engagement will appeal to students with less English proficiency, students with cultural differences, or gifted students who can engage with more challenging material (Courey et al., 2012). Colleges that have English as a second language (ESL) programs report that approximately 2 to 5% of their graduates were once enrolled in the ESL program (Courey et al., 2012). This is another population of students with varied cultural experiences and learning styles, making it necessary both to present the information in different formats and to offer varied forms of assessment to validate the learning experience.

Block et al. (2009) sought to examine faculty teaching methods and determine if they are already incorporating UDL principles and simultaneously evaluate faculty attitudes towards

students with disabilities. The findings of the study revealed that there are still barriers to learning for students with disabilities. These include faculty attitudes, lack of faculty training in appropriate accommodations and inclusive classroom design. There are many barriers to learning for individuals with disabilities. For example, those with visual disabilities need materials in alternative formats, those who are deaf need materials transcribed, those who use wheelchairs need a classroom in an accessible location, and those with learning disabilities may need various accommodations (Block et al., 2009; Burgstahler, 2009; Burgstahler & Moore, 2009). Not only are there physical barriers to learning, but for some disabilities, such as learning or psychiatric, there are additional barriers that students face. Students may be misunderstood by faculty or be reluctant to request accommodations for fear of the stigma related to their disabilities (Denhart, 2008). Not only do students with disabilities have these barriers to learning, but they experience other issues as well.

Yet another study on the use of UDL for rural students was conducted at Think College Vermont at the University of Vermont. The premise of the study was to focus on students with intellectual disabilities in rural communities (Ryan, 2014). There were 12 students enrolled in the program, six males and six females, ages ranging from 19 to 30 years old. All of the students live in rural Vermont communities. The goal was to create an inclusive environment for these students. A faculty expert in UDL was also hired to be a consultant during the project, UDL being a critical component of the project. The student, faculty member, and the academic support personnel would meet to determine the optimal accommodation and plan for the student. Based on the results of the study, students' achievement increased and students felt more equipped to succeed.

There is a direct correlation between faculty beliefs and knowledge of UDI. When faculty are knowledgeable of UDI, their confidence increases. Even more interesting, there is a correlation between faculty rank and the belief in course augmentation. The results of Hartsoe and Barclay's (2017) investigation indicated that those that ranked as Professor showed a strong belief in course modifications in correlation to those that ranked as Assistant Professor. Although there is relevant evidence that there is a need for varied methods of representation, engagement, and expression, faculty use of UDL continues to vary. The evidence from a study conducted at a community college suggested that the use of UDL varies based on age and ethnicity (Gawronski, Kuk, & Lombardi, 2016), while at another, it varied based on rank. The more instructors are exposed to UDL, the more they utilize it.

Training on UDL

Instructors need some basic knowledge on the principles of UDL. UDL is a design principle used to create greater levels of access to material and assessment for all students. Most faculty design their courses based on the content that is needed to be taught. Almost 90% of the students in the postsecondary settings do not need accommodations, do not need accommodations (Roberts et al., 2011); however, there is still a significant portion of the postsecondary population that do. Training is needed to ensure that this population of students receives all that is needed. When a student with a disability enrolls, the disability resource office typically assists by informing the faculty member of the strategies necessary to accommodate that student.

There may be any number of recommended accommodations for the student. Studies also support the idea that teacher education programs do not consistently teach UDL principles, which affects teachers' awareness and implementation (Courey et al., 2012). Participants in a

teacher education program enrolled in one of two sections of the course, *Introduction to Mild/Moderate Disability*. UDL training was included in the design of this course. Each student was required to write a lesson plan before the UDL training, one immediately following the training and one at the end of the semester. For the first two lesson plans, participants were given scenarios; however, for the last lesson plan, they were asked to create their own scenario. All of the participants expressed the importance of UDL principles; however, practice did not consistently align with expressed belief. Possibly because teacher-centered instruction is emphasized in more than 80% of the textbooks used in schools, the participants observed traditional teaching and assessment techniques during their own education and subsequently needed more time and experience with UDL to change behaviors (Courey et al., 2012; Park, Roberts, & Delise, 2017). This led to the conclusion that more interaction with UDL leads to more utilization of UDL.

Each aspect of UDL is important to future educators. There are many specific terms used in UDL implementation. *Representation* refers to designing instructional materials that make content accessible to the greatest number of diverse learners. *Action* and *expression* can be defined as alternative communication methods for students to communicate or demonstrate their learning. *Engagement* involves stimulating students' interest and motivation to learn through creative, hands-on, and meaningful instruction. A large lecture class with over 600 students sought to improve its communication with students by infusing PowerPoint slides, lecture notes, clickers, and MindTap into the traditional lecture class (Dean, Lee-Post, & Hapke, 2017). At the conclusion of the class the impact on perceived learning was determined, and suggestions were provided for instructors to meet the needs of a diverse student population. It is also important for

those that train others (Scott, Thomas, Puglia, Temple, & D'Aguilar, 2017). The implications of teaching others are far-reaching.

In yet another study of the College Supporting Transition, Access, and Retention (College STAR) project at a public university in southeastern United States, researchers worked to develop increase faculty knowledge to better meet the needs of diverse student populations (Hutson & Downs, 2015). The aim of this program was to establish a faculty learning community that focused on implementing UDL. This helped faculty to feel more confident and supported to implement UDL and the changes that were required.

A study was conducted at the University of North Carolina at Greensboro to help build confidence and self-efficacy (He, 2014) while teaching online courses in K-12 courses. All 50 states require K-12 students to have an online experience, and UDL is a beneficial part of the course design. Another study conducted in 2017 surveyed accredited colleges and universities to determine faculty preparation to implement UDL. One of the outcomes of the study urged postsecondary institutions to insure that general education and special education instructors were prepared effectively implement UDL (Scott et al., 2017). Although the UDL framework has been in existence for decades, researchers are still having to tout the benefits of its use.

Students with Disabilities in Postsecondary Settings

One of out of 11 postsecondary undergraduate students reported having a disability (Roberts et al., 2011). The fastest growing subgroup of this population is students with learning disabilities. Some faculty are becoming more comfortable with making accommodations, and others are starting to employ universal design principles to ensure access for all students (Orr & Hamming, 2009). UDL accomplishes two significant things: (a) it reduces the need to disclose one's disability, and (b) it provides a framework from which all faculty members can work for

course design, course interaction, and testing. Once faculty understand the framework, they are more likely to use it in course designs.

Students with learning disabilities are also the largest subgroup of students with disabilities (Roberts et al., 2011). According to Roberts et al. (2011), “Through the action research, the participants found for UDI strategies improved learning and accessibility for both struggling and non-struggling students” (p. 12). The diversity of the postsecondary education student body, including students with disabilities, has expanded over the last 2 decades, creating the need for colleges and universities to examine and augment traditional methods of teaching and assessment (Roberts et al., 2011). Diversity is demanding change in the approach to appealing and engaging students.

Rao and Tanners (2011) conducted a study at the University of Hawaii to determine the views of students that were exposed to UDL-designed courses. A 25-question survey was administered through an online survey system prior to the end of the course. Students could access the questionnaire through a URL posted in the learning management system by the instructor and complete it anonymously. Additional data were collected through interviews with specific students conducted after final course grades were submitted. Six students completed the survey, and four of the six were interviewed. The results showed that “the format of the course provided ways to support students with high incidence disabilities such as learning disabilities that could also be helpful for a student with a low incidence disability, such as visual impairment” (Rao & Tanners, 2011, p. 226). This served as a proactive step toward creating greater levels of access and demonstrating knowledge through multiple means of expression.

A study conducted at a Midwestern public university of 1,621 faculty assessed faculty attitudes toward inclusive teaching strategies (Dallas, Upton, & Sprong, 2014). When faculty see

the relevance of such strategies, students experience benefits. The findings of the study showed that there were significant differences in faculty attitudes based on teaching experience, academic discipline, and prior training on disability related topics. The researchers concluded that UDI could also impact student retention and graduation rates. It also proved to be beneficial for students that were studying abroad (Lillie, 2017). The online course supplement to the study abroad experience was designed using UDL principles proved to be beneficial for the students.

Technology in Universal Design for Learning

Technology is an important tool in incorporating UDL principles in classrooms and online (Kennedy, Thomas, Meyer, Alves, & Lloyd, 2014). The lack of technology can be a significant barrier to creating greater levels of access for all postsecondary classrooms for a more inclusive environment (Dolan et al., 2005; McGuire & Scott, 2006). Campbell (2004) discussed using various forms of assistive technology with a focus on students' learning styles. Students could demonstrate learning that was most in alignment with his or her learning style (Davis, 2014). This author suggested that students with visual and auditory learning styles would be able to read material using the traditional modes; however, students with learning disabilities may be able to use forms of assistive technology including readers and electronic textbooks (Varonis, 2015). However, students with sensory or learning disabilities may be able to use assistive technologies. Technology aides in the effective implementation of UDL (Strawser, Frisby, & Kaufmann, 2017). Assistive technology and varied forms of texts helps to present information in varied formats and offer more forms of engagement (Grande & Whalen, 2017), with Lecture Capture being one of the most widely used assistive technologies that aides in appeal to a varied student population (Watt et al., 2014). Varied forms of representation can assist students in understanding the material presented. Even social media can be incorporated in the use of UDL.

In a synchronous online writing class, social media was used as a best practice in support of UDL (Vie, 2018). The class offered alternative assignments and the use of accessible social media technologies.

Another use of UDL that was determined to be beneficial is in the library. A group of librarians designed a biology tutorial for an assignment and to appeal to various learning styles. Part of the tutorial design included UDL principles. The designers honed-in on using multiples means of representation to address the need to appeal to varied learning styles technique for those principles that can be applied to any library tutorial (Webb & Hoover, 2015). Thus, promoting information literacy.

It is important to note that just because a class is online does not mean that it is accessible for students with disabilities (Thomson, Fichten, Havel, Budd, & Asuncion, 2015). Campbell (2004) also discussed specific formats for presenting material, for example, material being presented in one-column formats. Students with learning disabilities can become confused when reading multiple columns of material. Speech-to-text software is another form of assistive technology which can be used to assist in completing writing assignments. Other forms of assistive technology, such as visual maps, help students become more organized to facilitate the completion of assignments and increase retention (Hope, 2016). Retention leads to enhanced student achievement.

Students could use these organizational methods to separate notes and drafts of papers and combine them all to get a final draft of the paper. These various forms of technology could benefit all students, especially those with disabilities and reduce the number of students that must disclose their disabilities. It would also be useful for those that do not desire to disclose because of the perceived stigma associated with it.

In support of the use of UDL, Izzo and Bauer (2015) indicated that using both the appropriate hardware and software applications benefits students with disabilities that are majoring in science, technology, engineering, and mathematics (STEM) majors. The authors of the article touted that when digital technologies are developed without incorporating accessible design features, persons with disabilities cannot access required information. Even students on the autism spectrum benefit from assistive technology (Burgstahler & Russo-Gleicher, 2015). Students with autism can use virtual environments to help increase social skills (Vasquez et al., 2015). When the UDL design principles are included, students with disabilities have better access to gain the skills and knowledge required to complete their postsecondary credentials (Izzo & Bauer, 2015). Again, this method provides students with and without disabilities with greater access to the content.

Distance Education

Distance education is a rapidly growing mode of instructional delivery because of its scheduling flexibility, instructional delivery mode, and more diverse student population. Between 2008 and 2009, there was a 21% growth in enrollment in online courses, which far exceeded the 2% growth in the overall number of students in higher education. More students are choosing the option of convenience and flexibility. Students with disabilities are increasingly opting to participate in online courses (Coy, Marino, & Serianni, 2014). “With more students choosing distance education options, enrollments in online courses will increasingly reflect the diversity of postsecondary populations inclusive of students with disabilities” (Rao & Tanners, 2011, p. 211). It is incumbent upon the institutions, therefore, to prepare online courses that appeal to a variety of student types (Smith & Basham, 2014). Diversity of student population is becoming an increasingly popular topic on most college campuses.

Online courses offer a convenience for nontraditional students that brick-and-mortar courses do not offer. Proactively addressing the need for greater levels of access for all students creates a welcoming environment for all students and reduces the need for students to disclose disabilities (Dell, Dell, & Blackwell, 2015). Despite its positive aspects, online learning can pose numerous challenges for instructors and students. Course success is often determined by the students' digital literacy, which is demonstrated by their ability to navigate through an online course, to complete the steps to complete research online, and to possess various levels of experience with software, which is not always consistent in nontraditional students (Rao & Tanners, 2011). Self-motivation is critical to student achievement in the online environment.

Engagement can also be a success factor in online courses (Wolff, Wood-Kustanowitz, & Ashkenazi, 2014). This highlights the need for the second principle of UDL, multiple means of engagement. When students are motivated and the material is personally relevant to them, they are more likely to engage consistently (Croxtton, 2014; Orr & Hamming, 2009). In a review of the literature, 38 different resources were evaluated by the authors, and specific themes emerged further supporting the fact that a growing number of college students have learning disabilities, identify the most effective methods of intervention to raise the expectation that this population of students will graduate, and to communicate the desire of faculty for additional training to college administrators. The presence of highly developed self-regulation skills aside, quality course design is vital for the academic success of all students (Tobin, 2014). Communication among online course participants, including the instructor, is often noted as a challenge in digitally driven instructional environments (Rao & Tanners, 2011). The use of multiple means of expression helps to bridge the communication gap.

Although there is legislation that mandates universal access, there are indications that many of the technologies used in a learning context are not universally designed, thus making the environment for universal access unsustainable. One way to bridge this gap is to ensure that all technology-based educational tools and resources are designed to be usable by all people to the greatest extent possible, without the need for adaptation or specialized design (Habib et al., 2012), a specialized design that some instructors may not have the skill to carry out effectively.

Further, as distance learning becomes wider spread, relevant technologies become a critical part of this evolution. Open and distance learning (ODL) has become a meditation for learning (Nyoni, 2014). It was determined that the majority of facilitators of distance learning skills lack the readiness for the effective facilitation. “Some facilitators did not fully understand what undergirds ODL andragogy, principles and practices” (Nyoni, 2014, p. 32). The need for UDL principles continues.

Validation of Benefits

Two of Edyburn’s (2010) propositions include evidence-based validation of the benefits of universal design. This author asserted that it is necessary to measure the primary and secondary impacts of universal design. He further stated that this evaluation must be based on enhanced student performance. For instructional designers to be effective, they must know and be able to describe the intended user of the course. When the course is initiated the appropriate research methodologies must measure the impact of the intervention on the primary audience as well as the rest of the students in an inclusive classroom. During data analysis, researchers should focus on discerning whether the course successfully produced the desired gains (Edyburn, 2010). Data analysis should examine whether there were additional effects within the inclusive classroom. Further development of research analyses of the primary and secondary effects of

UDL is essential for fostering a new generation of data-based discussions about UDL efficacy (Edyburn, 2010).

Edyburn (2014) stated that if UDL does nothing more than provide students with alternatives, it will fail significantly as a new paradigm for enhancing student performance in educational environments. UDL outcome measurement needs to focus on the benefits that result from access and sustained engagement (Edyburn, 2014). This exhibits a sustained engagement in learning tasks of increasing difficulty and complexity leads to high levels of learning and performance, thereby resulting in a greater need to understand how to measure the contributions of UDL to sustained engagement (Edyburn, 2010). This further validates the need to determine the impact of UDL on student learning outcome achievement.

Another study focused on student perceived benefits. While the students' perceptions added value in the use of a UDL-enhanced website, the overall intervention did not lead to improve grades, leading to the possibility that there may be an optimal blend of tools and approaches (Timmerman, Strickland, Johnson, & Payne, 2011). Of the 116 students, 50 (43%) completed the anonymous survey, and all of the respondents stated that they used the supplemental website. Overall, students expressed a high degree of satisfaction with the online supplemental website.

In fall 2008, there were a total of 6,542 user sessions in comparison to 7,251 in spring 2009. The average length of the session increased from five minutes and 29 seconds to eight minutes. More than 45% of the respondents believed that the presentation methods promoted an understanding of the material and design. Two students, who self-identified as students with disabilities, made specific comments regarding the helpfulness of the website and wished all of

their professors would do this (Timmerman et al., 2011). Students' perspectives on this topic are an important part of the evaluation.

Despite the intervention, there was no difference in the grades over a 3-year timeframe, 2006/2007, 2007/2008, and 2008/2009 (Timmerman et al., 2011). The results of an ANOVA confirmed that there were no significant differences among the 3 years, even though student satisfaction was strong and there was increased usage and time spent on the website. It may be possible, however, that certain aspects of the UDL implementation had counterproductive responses, including less interaction with the lecture content and reduced attendance (Timmerman et al., 2011).

Timmerman et al. (2011) showed that 45–50 papers out of 100 were selected based on the following criteria: (a) paper and graphs were complete, on topic, and without plagiarism; (b) paper was authored by a biology major currently enrolled in the biology program; (c) no more than five papers were selected from any one lab section; and (d) within each laboratory section at least one paper was selected from a student who earned an A. The reliability of the rubric using the cumulative (total) score for each paper was high ($g = 0.85$) for each of the three classes.

Timmerman et al. stated:

The findings suggest that use of the rubric provides major benefits in higher education: (a) to increase substance and consistency of grading within a course, particularly those staffed by multiple instructors or graduate teaching assistants; (b) to assess student achievement of scientific reasoning and writing skills; and (c) when used in multiple courses, to highlight gaps in alignment among course assignments and provide a common metric for assessing to what extent the curriculum is achieving programmatic goals. Use of a rubric adds objectivity to the evaluation. (p. 509)

The fact that the rubric returned high reliability values for each set of papers from three different courses suggests that the criteria tested are assessable across subfields of biology. The rubric for science writing was demonstrated to be a reliable metric in the hands of graduate student teaching assistants, as it effectively assessed student performance over a variety of biology courses. Application of the rubric to multiple course assignments also highlighted gaps and misalignments between assignment expectations, desired student performance, and curriculum goals.

Sokal and Katz (2017) explored the experiences of kindergarten to grade 12 Canadian teachers who took part in a 5-day professional development session where they learned how to implement the UDL Three-Block Model. This model is designed to meet the needs of diverse students (Katz & Sokal, 2016). The teachers that took part in the training were more open to inclusive practices and implemented said practices with a goal of increasing student learning outcomes.

Universal Design of Assessments

Universally designed assessments are intended to be both accessible and valid for the widest possible range of students (Izzo et al., 2008; Thurlow & Kopriva, 2015). To develop a universally designed assessment, the test development process must incorporate aspects of universal design. Using universally designed assessments has the obvious benefit of enabling all students to take the same test, thus simplifying the interpretation of results, and creating an opportunity for consistency in student performance (Izzo et al., 2008). Creating a level of consistency in assessment helps to establish a relevant baseline of performance by which to compare future performance.

Universal design principles for the development of assessments include identification of the assessment's purpose, alignment of the design with the purpose, and the use of the assessment for the identified purpose. Further test items should be designed to be usable with varying accommodations. Increasingly, computers are being used to conduct assessments to increase access for all students (Christensen, Shyyan, & Johnstone, 2014). Computerized assessments have both advantages and disadvantages (Begnum & Foss-Pedersen, 2018; Spooner et al., 2007). Most students prefer computerized assessment, and it is relatively easy to provide many accommodations, such as large print and consistent audio presentations of an item, on a computer. The assessment documentation was reviewed at a community college to determine whether the assessment accommodations were appropriate for students with learning disabilities. While the need for accommodations was present, it was determined that the accommodations for assessment were not based on the students' history, diagnosis, or specific area of disability (Weis, Dean, & Osborne, 2016). This further supports the need for multiple means of assessment that can accommodate various students without the need for specially designed assessments.

Summary

The primary premise of applying universal design principles to instructional settings is to provide students with multiple and flexible ways to access content and demonstrate obtained knowledge (DeVore et al., 2008). Online courses offer a convenience for nontraditional students that brick-and-mortar courses do not offer. Proactively addressing the need for greater levels of access for all students creates a welcoming environment for all students and reduces the need for students to disclose disabilities.

No adult learning theory covers everything for an individual learner. For example, andragogy focuses more on the instructor's role as a facilitator rather than individual learning,

cognitive rather than affective domain and self-awareness rather than less self-awareness. Both humanism and constructivism are predominantly in the affective domain rather than the cognitive domain, as opposed to cognitivism. It is incumbent upon instructors, therefore, to vary the forms of assessment, means of expression, in order to allow a diverse student population to demonstrate the knowledge or skill acquired through an assessment mechanism that closely aligns with their learning style.

General education in both the secondary and post-secondary environments should be accessible to all students regardless of learning style. Universal design for learning offers a transformative method to vary the way in which information is presented, to make information relevant to increase student engagement, and to vary the methods of assessment. This is a universally important topic, with the need being demonstrated by the increase of students with disabilities into post-secondary education.

The research discussed details the implementation of UDL analyzing both the student and faculty perspectives prior to implementation, during implementation, and post implementation (Knarlag & Olaussen, 2016; Roberts et al., 2011). In addition, the intent of universally designed assessments is to be accessible for all students and allow all students to demonstrate the skills, knowledge, or attitude acquired. However, the empirical foundation for UDL is limited.

The review of the literature further illustrates that more study needs to be conducted on the practical implications on the use of UDL in postsecondary education and on its impact on student achievement (Roberts et al., 2011). The primary recommendation for future research is to operationalize the UDL principles and investigate its impact on the outcomes of postsecondary education students with and without disabilities (Izzo et al., 2008). The literature supports the importance and necessity of the UDL principles. With the average number of students in any

collegiate setting with documented disabilities, totaling approximately 11% of the student population, the need for universal access is evident (Izzo et al., 2008). Nontraditional students have similar needs. Institutions of higher education should think more broadly about the diversity of the student population to ensure that no students are excluded from the educational experience. For more than 10 years, researchers have discussed the perceived benefits of Universal Design for Learning as an inclusive framework for curriculum (Shogren & Wehmeyer, 2014). UDL should promote inclusion and curricula that meets the needs of all learners including those with intellectual disabilities. Now is the time move past the promise and test the hypothesis in actual practice (Smith & Lowrey, 2017a). In actual practice, the actual versus the perceived benefits can be determined.

In the next chapter, I will discuss the data collection and analysis methods that I used to examine faculty's perspectives on the use of multiple means of expression, the third UDL principle, and its impact on student achievement. The participants included faculty facilitating general education through distance education at a 2-year technical college in southeast Georgia. In the next chapter, I will also discuss my role as the researcher and the selected methods for validating the trustworthiness of the study.

CHAPTER THREE: METHODS

Overview

The purpose of this qualitative phenomenological study was to identify faculty members' perceptions on student learning outcome achievement when using multiple means of expression, the third principle of UDL which is to vary the means of assessment. By its very nature, qualitative research is inductive and exploratory (Creswell, 2009). Moustakas's (1994) transcendental psychological phenomenology theory focuses less on the interpretations of and more on a description of the experiences of the participants. Qualitative researchers seek to explore a phenomenon and create new theories where none exist.

The phenomenological design was intended to promote discovery of the occurrence through an inductive inquiry insider. The approach to this design is based on a premise that the participant's experiences are truthful and candid (Creswell, 2009). This type of inquiry encourages listening to the participants' voices as they express their perceptions of employing multiple means of expression as part of the UDL principles and those principles' subsequent impact on student performance. The emergent themes from the shared experience elicited an engaging dialogue that ultimately results in an enhanced learning experience for faculty. Qualitative research does not simply offer theories; it validates and demonstrates the working of such theories through emergent themes identified in the data (Creswell, 2009). The data collection method, data analysis, description of the setting, participants, and ethical considerations are discussed in this chapter.

Design

I selected the qualitative transcendental phenomenological design to guide this study. Phenomenological refers to the common meaning for several individuals lived experiences of a

concept of a phenomenon (Moustakas, 1994). Qualitative research is used to promote greater levels of understanding. Its primary purpose is to understand the lived experiences of participants. *Epoche* is the first step of the phenomenological reduction process. This is an approach taken at the beginning of the study so that he/she can set aside his/her views of the phenomenon and focus on those views reported by the participants (Moustakas, 1994). The purpose of this study was to identify the lived experience of faculty when they employ multiple means of expression, designed to enhance student learning. The phenomenological design was deemed the optimal approach for this study because the focus is on understanding the emergent themes from the lived experiences. Transcendental phenomenological studies focus on the lived experiences and encourage the researcher to bracket out his or her ideas regarding the subject (Creswell, 2009; Moustakas, 1994). Additional training should be required of faculty and administration to design the courses inclusive of UDL principles. Further, faculty need to understand how to develop varied means of assessment.

The qualitative research approach enabled me to explore and understand the individual's perspective on the specific phenomenon. The data for this study were collected in the participants' setting, and data analysis took the research from broad and varied information to generally identified themes that I interpreted for meaning. Moustakas (1994) focused on one of the Husserl's concepts, *epoche* (bracketing), in which investigators set aside their experiences as much as possible, to take a fresh perspective toward the phenomenon under examination. Hence, transcendental means everything is perceived freshly, as if for the first time (Moustakas, 1994). I kept a reflexive journal to record my thoughts from the beginning of the study (Appendix E). For this study, surveys consisted of open-ended questions. In addition, course observations were used

to validate that all participants have used at least two different means of expression. All data were gathered and analyzed to identify common themes.

Research Questions

The following research questions were developed to learn more about the faculty lived experiences in online general education classes that use UDL principles. These questions are targeted toward learning more about the barriers and the successes. The questions are broad in nature so as not to limit the information sharing.

RQ1: What are the online faculties' lived experiences with multiple means of expression and the performance impact on students with documented learning disabilities?

RQ2: How do online faculty integrate the use of multiple means of expression into their pedagogy to meet the needs of all students including those with learning disabilities?

RQ3: Which contributions can UDL impose upon instructional practices used by online faculty to eliminate the barriers to the successful implementation of multiple means of expression?

Setting

Southeast Community College is a pseudonym for a 2-year college that is authorized and accredited to offer technical certificates of credit, diplomas, and associate degrees. The rationale for selecting this location involved several factors, including the facilitation of online courses, the willing engagement of the faculty, and the college's current redesign initiative, which is inclusive of their online courses inclusive of the application of UDL principles. Similar to most 2-year colleges, SCC has the important goal of ensuring that all students reach a competency level in general education curriculum. Creating greater levels of access for all students would help colleges achieve this goal and even more importantly demonstrate the skills, knowledge,

and attitudes that they have obtained. The college has an enrollment of over 5,200 students, and is located in southeast Georgia. The demographics of the student and faculty population can be seen in Tables 1, 2, and 3 below.

Table 1

Student Population by Gender

Gender	Number	Percentage
Male	1,900	36.20%
Females	3,343	63.80%

Table 2

Student Population by Race

Race	Number	Percentage
Black	2,460	46.90%
White	2,066	39.40%
Hispanic	324	6.20%
Multiracial	136	2.60%
Asian	73	1.40%
American Indian	24	0.50%
Non-Resident Alien	4	0.10%
Other or Undisclosed	156	3.30%

Table 3

Faculty Population by Gender, Employment Status, and Race (N = 103)

Race	Frequency	Percentage
Asian	5	4.85%
Black or African American	41	39.81%
Hispanic	1	0.97%
White	56	54.37%
Male	33	32.04%
Female	70	67.96%
Full-time	34	33.01%
Part-time	69	66.99%

Participants

I employed purposeful sampling in this study. The specific criteria for faculty were having taught English, math, and science general education courses for at least 3 years in the technical college setting. All faculty members were required to hold at least a master's degree in the discipline in which they teach. The faculty participants reflected the general demographics of the overall faculty. All eligible faculty were encouraged to participate; however, purposeful sampling was employed to ensure there is representation from the math, science, and English disciplines. Finally, the faculty members did not need to have prior training or exposure to UDL principles because training was provided. The sampling size for faculty was 15 faculty members of varying gender, ethnicity, and age out of 30 general education faculty members, allowing for some participant attrition and minimizing redundancy in the data (Creswell, 2009).

Procedures

The initial steps included submitting a completed LU/IRB application attaching the written approval of the research site to conduct the research. The approval granted me permission to recruit the identified prospective participants and collect the data. Recruitment of participants occurred via email, with the instructions to contact me if they were interested in volunteering, at which point I screened them to ensure that they qualified as a participant in my study. Online faculty participants were required to sign the Informed Consent Form (Appendix E) prior to beginning any of the research activities related to data collection. No monetary remuneration was offered.

The pool of possible participants was asked the questions found in Appendix B. The survey questions were vetted by two postsecondary representatives that are familiar with Universal Design for Learning. Both representatives have their doctorate degrees in education.

One is a Dean of Online Faculty, and the other is a Vice President for Student Affairs that gives oversight to the Office of Disability Services.

Participants were surveyed about the varied methods of expression, including formative and summative assessments they have used in their online courses. For example, if instructors typically use multiple-choice questions, they were asked to use essay questions for one formative assessment. The ideal time of implementation was prior to the summative assessment at the end of the term to determine whether the one additional alternative means of assessment would increase the results on the summative assessment and the overall course performance. The survey results were transcribed, and emerging themes were identified.

The Researcher's Role

I am an institutional effectiveness officer at a college in southeastern Georgia and employed by the study's setting; however, I have no direct involvement in the employment of faculty, faculty supervision, or course design. I have a personal bias regarding the importance of assessment and the necessity of varied means of assessment. My passion for this subject matter fueled my desire for this study. I engaged in reflexivity before the study begins in order to ensure that my biases would not impact the study. As I did not have a direct supervisory relationship with the participants and had no role in the course or curriculum design, I maintained an objective stance throughout the data collection and data analysis efforts. To mitigate undue pressure, my position was not used during the recruitment process. Further, no official college letterhead was used, and all correspondence was sent from my Liberty University student email account. Moreover, the survey was confidential in nature. The survey link was distributed via email 2 to 3 weeks after the interview.

My previous experiences increased my appreciation for the principles and practices of UDL. My experience as an instructor were also helpful in relating to the experiences of the faculty participants. My experiences as both an assessment officer and an instructor helped me to keep the study balanced and objective.

Data Collection

To ensure the content and value of the questions, two representatives from postsecondary institutions who are familiar with Universal Design for Learning vetted the questions. I approached each person requesting assistance with the review process. Each person has taught courses in postsecondary education, completed doctorate degrees, and are well versed in the topic. Both have terminal degrees in their respective fields. One is a Vice President of Student Affairs who provides oversight to students being tested for science, math, and English competency levels and testing for learning styles. She has over 20 years of experience in postsecondary education. The second person who vetted the questions is a Dean of Online Faculty. As another 20-year veteran, she is vested in the course designs, student engagement, and student course completion. Both reviewed the questions that I used during purposeful sampling, as well as the survey questions. I received feedback to change any yes/no questions, provide explanation when stating multiple means of expression, add a question regarding technologically prowess, and that this study is timely. The first set of questions that I used for purposeful sampling after participants express an interest in participating in the study and are listed below and in Appendix B.

1. Are you a faculty member at Southeastern Technical College?
2. Do you teach English, science, or math classes online?
3. Do you have a master's degree in the discipline you teach?

4. Have you taught these online courses at least 3 years?

Interviews

Once the 14 faculty participants were recruited through purposeful sampling and a rapport was established, the face-to-face interviews commenced. Pseudonyms were created for each participant to insure confidentiality. The interviews were approximately 1 hour in length. The participants were asked to volunteer demographic information; however, they had the ability to refuse. Obviously, some demographic information was readily available during the interviews. I facilitated the interview in the campus conference room or a place that is convenient to the participant. The responses helped me to answer RQ1, whereas, data for RQ2 and RQ3 were collected if the instructors reported having any experience with using multiple means of expression. Presented below are the interview questions along with an explanation of how they are grounded in the topic literature (the questions can also be found in Appendix C).

What design principles of UDL have you incorporated into your online course?

The way faculty view these greater levels of access can increase student opportunities or prohibit the implementation of necessary accommodations (Lowrey et al., 2017). One university instructor worked from the premise that universally design courses would be beneficial to students with and without learning disabilities and minimize the need for accommodations (Rao et al., 2015). This instructor utilized Universal Instructional Design principles in three online courses, working from the notion that this would increase student achievement in the courses.

Each semester, what percentage of your students have documented disabilities that require accommodations?

The rationale for this question was to investigate whether the assertion of Roberts et al. (2011) that one out of 11 postsecondary undergraduate students reported having a disability is consistent across different institutional settings.

What varied means of expression and assessment do you use in your course?

I asked this question to investigate whether instructors are providing unrestricted ways to demonstrate their knowledge and skills. Multiple means of expression allow students to demonstrate knowledge gained through various means that directly link to student outcome (Abell et al., 2011). The question provided me with data on whether instructors at the research site are providing UDL accommodations to enable students with disabilities to demonstrate their knowledge/understanding of the course content through a variety of modes/methods of expression.

Based on the different types of assessments used, do these varied means of expression, meet the instructional needs of students with disabilities? If so, why? If not, why?

Universally designed assessments are intended to be both accessible and valid for the widest possible range of students (Izzo et al., 2008; Thurlow & Kopriva, 2015). To develop a universally designed assessment, the test development process must incorporate aspects of universal design.

How did the use of the principles of Universal Design for Learning enhance student learning outcome achievement?

Rao et al. (2015) demonstrated that students with and without disabilities like UDL accommodations because it enhances the course's flexibility and organization; in addition, Rao et al. suggested that because of students' reactions, UDL technology is a "value added" approach to improving student achievement. The interview question seeks to understand whether online

instructors at the research site, based on their experience in using UDL, support the notion that UDL enhances outcomes/achievement.

What barriers did you experience in implementing the UDL principles in your online course?

Instructors have often reported struggling with administrative barriers and perceiving that college administration lacks the understanding of necessary to make appropriate accommodations. Some of the practices utilized do not meet the expectations set by the HEOA and, in fact, sometimes create new barriers for instructors (Rao et al., 2014; Varonis, 2015). For example, one substantial barrier for students is not getting access to books and course materials quickly enough to meet the deadline of a particular course assignment. These barriers to learning and others have been created by educators, administrators, and staff unfamiliar with laws, policies, and best education practices, such as UDL (Rao et al., 2014).

Survey

Once the 14 faculty participants were selected through purposeful sampling and the interview complete, the surveys were distributed. The survey responses remained confidential. I distributed the survey electronically using SurveyMonkey after turning off SurveyMonkey's ability to track ISP addresses, because ISP addresses are regarded as personally identifiable information. The survey questions are listed below and are found in Appendix D. The data collected through the survey were used to directly support responses to all three research questions to expound upon instructor experiences and actual barriers to implementation. The surveys were sent 2 to 3 weeks after the initial face-to-face interview.

Since the interview, what strategies have you employed in your class to vary the means of expression?

It is important to provide students with and without learning disability options for how they take in information (usually referred to as representation), practice new content (engagement), and show what they know (expression) by using varying methods which may include technologically enhanced assessments (King-Sears, 2015).

What benefits, if any, have you noted from use of all of the UDL principles including varying the multiple means of expression?

The benefits to the students included providing varied ways to demonstrate knowledge and creating more student engagement; however, the actual impact on student performance was not captured in the scope of the study (Shaw, 2011).

How has it affected overall student performance?

The problem being investigated concerned the limited information about postsecondary faculty's experience in using UDL in their online courses and what their perceptions are about the effectiveness of UDL for improving outcomes for students with learning disabilities (Black et al., 2015; Roberts et al., 2011; Shaw, 2011).

How has the multiple means of expression affected the performance of students with documented learning disabilities?

The problem being investigated concerned the limited information about postsecondary faculty's experience in using UDL in their online courses and what their perceptions are about the effectiveness of UDL for improving outcomes for students with learning disabilities (Black et al., 2015; Roberts et al., 2011; Shaw, 2011).

What do you see as the value of employing multiple means of expression in your online course?

Al-Azawei et al. (2016) reviewed 12 peer-reviewed papers from different databases and journals that focused on the UDL framework. From the review, seven themes emerged, one of

which was the *type of results*; the results varied by use of UDL. In addition, Al-Azawei et al. found considerable variation not only in instructor beliefs about the benefits of UDL, but also in student outcomes or results based on what UDL was used. The aim of the current study was to investigate online faculty's perceptions about the benefits and use of multiple means of expression to validate the benefits of the use of UDL.

What UDL design principles will you use in the future?

Universal Design for Learning is a practical application framework that emphasizes the development of material in various formats, encourages additional methods of engagement, and varied assessment methods that accommodate different learners (Smith & Lowrey, 2017a). The question was designed to assess what postsecondary online faculty instructors anticipate doing/using to assist them in their online work and when/if they have a student(s) with a learning disability in their course.

Online Course Evaluation

I reviewed the online courses to document the various types of means of expression utilized in the course and review the one different means of assessment that was utilized. This intent was expressed in the recruitment email. Once approval was garnered from the authorized administrator at the college, the Director of Distance Learning created a login username and password that granted me access to the courses for seven days. I only had access to the courses taught by those that granted consent. The review included the number and the type of varied methods of assessment used in a single course, and the frequency of use. The additional information was used to assist in determining any perceived or actual benefits on the use of multiple means of expression, thus helping me to answer RQ2 and RQ3. The protocol for evaluating online courses was as follows:

1. One online course per online faculty participant was reviewed.
2. I received access to the online courses by the Director of Distance Education.
3. For each course, the following was recorded:
 - a. The specific subject taught.
 - b. The number of different assessment methods used during one semester.
 - c. How frequently each method is used during one semester.

Data Analysis

Qualitative analysis is often structured based on choices and decision by the researcher based on the gathered data. Moustakas (1994) proposed a data analysis procedure that is effective for phenomenological studies thus being good for this particular research. The first procedure, according to Moustakas's phenomenological analysis procedure, is preparing the collected data for the analysis procedure. After preparation of data, what follows is reducing the data in a phenomenological manner. The third procedure encompasses engaging in imaginative variation which is followed by identifying the essence of the experience. Specifically, Moustakas proposed eight steps of data analysis, which can be categorized into three parts: phenomenological reduction, imagination variation, and essence. Within phenomenological reduction, there are five phases: horizontalizing or rather, listing of all-important expressions from the data, lessening of experiences to the invariant elements, and thematic clustering to develop fundamental themes. The fourth step is comparing multiple sources of data to validate the invariant elements. The last step in this section is developing personal textural descriptions of the individual and collective sample used. The second part, imagination variation, has two steps: the creation of distinct structural descriptions and the development of complex structural

descriptions. The last part has only a single step, which is synthesizing texture and structure into an expression.

The analysis software that I employed in analyzing data in this particular research was In Vivo. The software aided in automating the analytical process, identifying themes, and coding, which is “the process involving aggregating the text or visual data into small categories of information, seeking evidence for the code from different databases being used in a study, and then assigning a label to the code” (Creswell, 2009, p. 184). I employed memoing as part of the process to maintain consistency and accuracy when capturing each concept.

Trustworthiness

The following steps were taken to increase the trustworthiness of the findings: member checks, which are specific participants identified to validate the credibility of the study’s findings, and data triangulation, a method used to validate data by using multiple sources, methods, investigators and theories (Creswell, 2009). Trustworthiness addresses credibility, dependability, transferability, and confirmability.

Credibility

Credibility refers to the extent to which the findings accurately describe reality. Credibility depends on the richness of the information gathered and on the analytical abilities of the researcher. In addition, Lincoln and Guba (1985) described credibility as internal consistency, where the core issue is ensuring rigor in the research process and during the communication of results.

Dependability

Dependability is similar to reliability in quantitative studies. It deals with consistency, which is addressed through the provision of rich detail about the context and setting of the study.

As a mechanism of attaining dependability, a thick description, which is a full description of the participants' experiences and the meaning, was included. Thick description refers to the detailed account of field experiences in which I make explicit the patterns of cultural and social relationships and places them in context (Creswell, 2009). By comparison, a thin description is an account of facts without discovery of the meaning. In the context of this study, the experiences of the faculty and the students were placed in the appropriate relationship, which helped me to place them in context.

Transferability

Transferability is another aspect of qualitative research that should be considered; it refers to the possibility that what was found in one context is applicable to another context. Within the research, I solicited peers for reviews. Ideally, the reviews were conducted by institutional effectiveness officers with 10 or more years of professional experience. Other subject matter experts in the field reviewed the transcripts and the emerging themes identified through the study. The peers reviewed the findings to determine their consistency with findings in the field and to identify whether a finding in a particular context is pertinent to another setting.

Confirmability

Just like dependability, conformability too is similar to reliability in quantitative studies as it majors on consistency of data in a study. According to Creswell (2009), conformability entails the objectivity in terms of potential for congruence between two or more independent individuals regarding the accuracy of data, its meaning and more importantly relevance. In the course of attaining conformability, data triangulation was employed. The data triangulation consisted of a review of the data from the surveys and course observations. Each of these data collection efforts were analyzed independently, and the emerging themes were compared to

corroborate the evidence (Creswell, 2009). I asked the participants to verify the accuracy of the survey transcripts, which increased the credibility of the study.

A second technique to ensure confirmability was to use member checks to confirm the accuracy of the transcription. Selected participants were asked to review the themes and provide me with feedback on the validity of the themes identified. This supported the data's validity and the reliability of the data collection methods.

Ethical Considerations

The ethical considerations in this study include confidentiality, security of data, and freedom from undue influence. Pseudonyms were used for the site and all participants to ensure confidentiality. All electronic information was stored in password-protected files. Paper copies will remain in secured locked file cabinets for 1 year after the completion of the study, after which time they will be shredded. All participants were free from undue influence in regard to their participation in the study. Additionally, I had no direct supervisory influence over the participants, which minimized any undue pressure to participate.

Summary

Fourteen general education instructors at a 2-year technical college in Southeast Georgia participated in this study, with the goal of evaluating the efficacy of the third principle of Universal Design for Learning, multiple means of expression. I collected qualitative data through interview, surveys, and course observations. The data were triangulated and evaluated to identify emergent themes to determine the impact on student learning outcome achievement.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this transcendental phenomenological study was to describe faculty's experiences with the use of UDL, including multiple means of expression, while teaching online general education courses at a technical college in southeastern Georgia. The phenomenon under investigation was faculty's use of multiple means of expression and the perceived impact on student learning outcomes in online general education courses. The theories guiding this study were transformational learning theory (Mezirow, 1978) and Knowles's (1990) theory of andragogy. The resulting framework is Universal Design for Learning Principle (Center for Universal Design, 1997) as it relates to the use of the multiple means of expression and online instruction in general education courses (Miller & Lang, 2016). I aimed to determine whether instructors use multiple means of expression, how this may address the needs of students with learning disabilities, and whether instructors experience any barriers when implementing multiple means of expression.

This study was grounded in three research questions. These research questions were developed to learn more about the faculty lived experiences in online general education classes that use the third principle of UDL, multiple means of expression. These questions were targeted toward learning more about the barriers and the successes of faculty. The questions were broad in nature so as not to limit the information sharing. Research Question 1 asked: What are the online faculties' lived experiences with multiple means of expression and the performance impact on students with documented learning disabilities? Research Question 2 asked: How do online faculty integrate the use of multiple means of expression into their pedagogy to meet the needs of all students including those with learning disabilities? Research Question 3 asked:

Which contributions can UDL impose upon instructional practices used by online faculty to eliminate the barriers to successful implementation of multiple means of expression?

In the remainder of the chapter, I will use the expressions of the participants to explain their experiences using multiple means of expressions. Using the transcendental phenomenological design allowed me to set aside my opinions and biases. In this chapter, I will present the findings from the one-on-one interviews, survey results, and course reviews. Further, I identified themes that emerged when reviewing the findings as well as information that helps answer the research questions posed to frame this investigations (Creswell, 2009). Faculty that have master's degrees in their general education discipline, have taught online for at least 3 years, and are currently teaching at the study site were invited to participate.

Participants

Purposeful sampling was employed, and 14 individuals volunteered to participate. The specific eligibility inclusion criteria for faculty are instructors who have taught English, math, and science general education courses for at least three years in the technical college setting. All participants must hold at least a master's degree in the discipline in which they teach. The faculty participants reflected the general demographics of the overall faculty. All eligible faculty were encouraged to participate; however, purposeful sampling was employed to ensure representation from the math, science, and English disciplines. Finally, the faculty members did not need to have prior training or exposure to the UDL principles. The sampling size for faculty was 14 faculty members of varying gender, ethnicity, and age out of a total population of 30 general education faculty members, allowing for some participant attrition and minimizing redundancy in the data (Creswell, 2009).

I began the recruitment process by securing permission from the college site's President. I then sent an email to the Dean of General Education also requesting permission to recruit faculty for the study. Finally, I sent a recruitment email to the general education faculty. I noted that the interviews would last approximately 45 minutes to 1 hour. The surveys to collect participants' thoughts after the interview and to determine if they plan to use multiple means of expression in the future would take no more than 30 minutes. I also explained that there would be no compensation for their participation and that the results of the study would be shared anonymously. The names of the participants remained confidential, and participation was strictly voluntary. Faculty were under no obligation to participate. I also provided my Liberty University email address for further contact. I discovered during the interview that one of the participants did not meet the criteria, but wanted to be a part of the study; they were dismissed from the study with many thanks.

Participant Demographic Information

Participant 1 is a full-time math Caucasian teacher that holds a master's degree in mathematics. Has been an employee of the college between 5-10 years and is between the ages of 40-45 years old. Further, the participant teaches in-class and online classes. Participant 2 is also a full-time math Caucasian teacher and holds a master's degree in mathematics and has some doctoral work in the same subject. This participant has taught at the college for over 20 years and is between the ages of 50-55 years old. While this participant was a reluctant participant, they felt it important to express their views because they were on the faculty committee that designed the online course shells. Participant 3 is a full-time Black English teacher and holds both a master's degree in English and a doctoral degree in a related discipline. This participant has taught at the college for more than 25 years and teaches both in-class and

online classes. This contributor also teaches classes in another discipline and is between the ages of 60-65 years old. Participant 4 is a part-time Black English teacher and holds a master's degree in English. This contributor is between the ages of 35-40 years old, and is a part-time instructor for the study site and is a full-time English instructor for another college; however, they have only taught for between 0-5 years at the study site. They teach both in-class and online classes.

Participant 5 is a full-time Caucasian English teacher, holds a master's degree in English, and is between the ages of 40-45 years old. This faculty contributor has taught at the college between 10-15 years and teaches both in-class and online classes. Participant 6 is a part-time Caucasian English teacher and holds a master's degree in English. Further, this faculty member has taught at the college between 0-5 years and teaches both in class and online classes. The faculty participant desires to remain part-time employee, and has not sought to become full-time. Participant 7 is a full-time math Caucasian teacher, holds a master's degree in mathematics, and has taught at the college between 0-5 years. This participant teaches both in class and online classes and is between the ages of 30-35 years old.

Participant 8 is a full-time Caucasian English teacher, holds a master's degree in mathematics, and has taught at the college between 10-15 years. The faculty contributor has also worked in other capacities at the college, teaches both in-class and online classes, is between the ages of 50-55 years old. Participant 9 is a full-time math Black teacher, holds a master's degree in mathematics, and has taught at the college between 20-25 years. This faculty participant teaches both in-class and online. Participant 10 is a part-time Caucasian English teacher and works in another full-time capacity at the college. This participants hold a master's degree in mathematics, has taught at the college between 0-5 years, and is between the ages of 35-40 years old. The participant teaches both in-class and online. Participant 11 is a full-time Black science

teacher, holds a doctorate degree in a science discipline, and has taught at the college between 5-10 years. This faculty member teaches both in class and online and is between the ages of 45-50 years old.

Participant 12 is a full-time Black English teacher who holds a master's degree in English and a master's degree in another discipline. This faculty member has taught at the college between 15-20 years, teaches both in class and online classes, teaches in two disciplines, and is between the ages of 55-60 years old. Participant 13 is a full-time Caucasian math teacher, holds a master's degree in mathematics, and has taught at the college between 20-25 years. This faculty member teaches both in class and online classes, and is between the ages of 60-65 years old. Participant 14 is a part-time Indian science teacher, holds a master's degree in science, and is between the ages of 25-35 years old. This faculty member has taught at the college between 0-5 years, and teaches both in class and online classes. An overview of participants' demographic characteristics is presented below in Table 4.

Table 4

Participant Sample by Employment Status, Subject, Number of Years Teaching Online, Gender, and Race (N=14)

	Faculty Member	Full-time/Part-time	Subject	Years Teaching Online	Gender	Race
Participant 1	Yes	Full-time	Math	3	Male	Caucasian
Participant 2	Yes	Full-time	Math	5	Female	Caucasian
Participant 3	Yes	Full-time	English	3	Male	Black
Participant 4	Yes	Part-time	English	3	Female	Black
Participant 5	Yes	Full-time	English	6	Female	Caucasian
Participant 6	Yes	Part-time	English	3	Female	Caucasian
Participant 7	Yes	Full-time	Math	4	Female	Caucasian
Participant 8	Yes	Full-time	English	4	Female	Caucasian
Participant 9	Yes	Full-time	Math	5	Female	Black
Participant 10	Yes	Part-time	Math	3	Male	Caucasian
Participant 11	Yes	Full-time	Science	4	Male	Black
Participant 12	Yes	Full-time	English	3	Male	Black

Participant 13	Yes	Full-time	Math	3	Male	Caucasian
Participant 14	Yes	Part-time	Science	3	Female	Indian

Results

I collected data from one-on-one interviews, surveys, and course reviews. The first of the three data collection methods was one-on-one interviews. The interviews were held in either an office or a conference room at the college. The content below are the transcripts from the interviews, being careful to bracket my biases or additional thoughts. Additional data was collected through one survey and course reviews.

Interview Responses

There were 14 participant interviews. The interviews were designed to be semi-structured interviews so as to allow for more discussion. I asked seven questions in all interviews. All questions were geared toward learning more about the participants' knowledge of UDL, accommodations for students with documented learning disabilities, use of varied means of assessment, and any barriers to the implementation of varied means of assessment.

Participants expressed a lack of familiarity with UDL. Further, they expressed that the varied means of assessment are determined by the course type and what is deemed appropriate by the department chair and/or publisher. Participants also expressed that the only accommodation offered to students with disabilities among these fourteen participants was additional time for assessments. Finally, some participants expressed concerns about the standardized online course template.

Survey Results

After the conclusion of the interviews, I sent a survey to follow-up on the discussions. Only seven of the participants responded, yielding a 50% response rate, as depicted in Table 5. I sent the initial email, a follow-up email 7 days later, and a final email before closing. There was

one participant that opened the survey; however, this participant did not respond to any of the questions. The results are strictly the replies of the respondents. The survey included the following description and questions: The purpose of my research is to study general education faculty members' perceptions of student achievement when faculty employ multiple means of expression, the third principle of UDL which is to vary the means of assessment.

Table 5 shows that only one respondent added an alternate method of assessment. Further, some respondents still held to the idea that material should be presented based on the course type. One respondent, however, understood why the course content is presented in various ways, and one noted that they will use an additional method of assessment and compare the data to prior semester grades.

Table 5

Survey Results

Since the interview, what strategies have you employed in your class to vary the means of expression?

Response 1: None

Response 2: None

Response 3: None

Response 4: At least I understand what it means now. I may try something new in the future.

Response 5: None

Response 6: I tried one different assessment.

Response 7: None

What benefits have you noted from use of UDL principles including varying the multiple means of expression?

Response 1: None

Response 2: None

Response 3: None

Response 4: None

Response 5: None

Response 6: Now, I see why we have to present material in two different ways, audio, and visual.

Response 7: None

How has it affected overall student performance?

Response 1: I think it's good for students to be able to see the material in different ways.

Response 2: I don't know

Response 3: None

Response 4: None

Response 5: I don't know

Response 6: Haven't seen a difference.

Response 7: None

How has it affected the performance of students with documented learning disabilities?

Response 1: Giving students more time does help in math

Response 2: Don't see a change

Response 3: None

Response 4: None

Response 5: None

Response 6: Not sure

Response 7: None

What do you see as the value of employing multiple means of expression in your online course?

Response 1: It's hard to see the value online

Response 2: None

Response 3: None

Response 4: I can see the value in science, but we need a way to do demonstrations online.

Response 5: Maybe some value, but I need to know how to implement more assessments.

Response 6: We would have to have the approval of the department chair to change anything in the course

Response 7: None

What UDL design principles will you use in the future?

Response 1: None

Response 2: None

Response 3: We already have to present material in two different ways

Response 4: More diverse assessments and actually compare the data

Response 5: None

Response 6: I will try more assessments

I reviewed one online course of each faculty participant to determine if any increased the number and diversified their means of expression. Most of the faculty did not increase the number of change the type of means of expression; however, there were three who did. Table 6 illustrates the details of the review. Although there were multiple means of assessment being used in at least two courses, this was in place prior to this study.

There was consistency among instructors teaching the same subject. There was no variation between full-time and part-time instructors. Both faculty types used the same number of assessment methods, with the exception of one instructor. One instructor actually increased the number of assessment types used in the course.

Table 6

Participant Online Courses Means of Expression

	Faculty Member	Full-time/Part-time	Subject	Number of Means of Assessment	Added Means of Assessment Post Interview
Participant 1	Yes	Full-time	Math	2	0
Participant 2	Yes	Full-time	Math	2	0
Participant 3	Yes	Full-time	English	3	1
Participant 4	Yes	Part-time	English	2	0
Participant 5	Yes	Full-time	English	3	1
Participant 6	Yes	Part-time	English	2	0
Participant 7	Yes	Full-time	Math	2	0
Participant 8	Yes	Full-time	English	3	1
Participant 9	Yes	Full-time	Math	2	0
Participant 10	Yes	Part-time	Math	2	0
Participant 11	Yes	Full-time	Science	3	0
Participant 12	Yes	Full-time	English	2	0
Participant 13	Yes	Full-time	Math	2	0
Participant 14	Yes	Part-time	Science	2	0

Theme Development

Three data collection methods were used in the study. The first data collection method was interviews. I conducted 14 participant interviews with seven questions. Each participant expressed consistent thoughts on the accommodations for the students with documented disabilities. The only accommodation noted was the use of more time for assessments. Further, assessment types were determined by the course type. Neither greater levels of access nor equity are considerations in the development of course assessments. While there are no institutional barriers to implementing varied means of assessment, participants' unfamiliarity with the principles of UDL and course assessments being designed by the publisher and/or the department chair represented a hindrance to faculty exploring different assessment methodologies.

After the data were organized, I read through the all of the data and completed a preliminary interpretation of the data. I used In Vivo, a qualitative data analysis software, to assist in grouping the information into themes. After grouping the information together, themes began to emerge. Table 7 lists the emerging themes and the number of times it occurred throughout the study including interview and survey results. The most frequent theme was using the same assessment, with unfamiliarity with UDL as the second most frequently mentioned barrier to varying the means of assessment. There were several themes that were only noted once, including a displeasure with salary and disliking teaching online, neither of which directly relate to the subject matter presented; however, they were included as comments.

The information in Table 7 also suggests that one of the prevailing themes was the predesigned online course. Although this was not the most frequently mentioned barrier, it was a significant issue cited throughout the study. The lack of understanding of how it was developed

and why certain things were included became viewed as more of a barrier than a standardization designed for the students' benefit.

Table 7

Participant Statements/Emerging Themes

Statements/Emerging Themes:	Number of Occurrences
Unfamiliarity with UDL	7
Limited knowledge of accommodations	1
Predesigned online courses	6
Use of publisher content	4
Only accommodation is extended time	4
Learning styles not being considered in course design	5
Faculty not feeling as though they need to vary teaching styles	2
Displeased with salary	1
Using same assessments	8
Doing only what is required	1
Lack of training	1
Doesn't like teaching online	1

Using the process of horizontalization, as stated in Chapter Three, I identified predominant statements, and themes emerged based on those statements (Moustakas, 1994). Several statements from the interviews, surveys, and course evaluations were noted, including: (a) unfamiliarity with UDL; (b) limited knowledge of accommodations; (c) predesigned online courses; (d) use of publisher content; (e) the only accommodation being offered is extended time; (f) learning styles not being considered in course design; (g) faculty not feeling as though they need to vary teaching styles; (h) feeling as if material needs to be presented in one way; (i) doing only what is required of them; and (j) lack of training. The aforementioned statements were grouped into the following six themes.

Theme 1: Belief that only certain means of expression are best for certain subjects.

Participants that teach English strongly believe that essay is the primary method of assessment

for English. Science faculty do not believe that they can offer the same assessments in-class and online. Math faculty use the assessments from the publisher. Each division is strongly ingrained in traditional methods of assessment for their respective subject.

Theme 2: Lack of knowledge regarding UDL. Based on the comments, only one instructor had a thorough understanding of the principles of UDL. Two other instructors were familiar with the concept; however, they do not actively implement UDL principles. The college offered one training on UDL, and it was recorded to share with others; however, the training was not mandatory. Further, new instructors and instructors that missed the training sessions could not access the course at a later time.

Theme 3: Predesigned courses and/or lack of knowledge regarding the process and material used for designing the course shells. The participants had varied thoughts about the standardized course template. Some participants are clearly disgruntled with the template. It should be noted that each academic division had a representative on the committee that designed the template so varied perspectives were taken into consideration. Based on the comments, information may not have been shared regarding the development of the online course shell with all of the participants for varied reasons including missing the training sessions.

Theme 4: Learning styles not being considered in course design. Faculty expressed that they either did not know or did not include learning styles within the design of the course or the design of assessments. The member of the committee that designed the online course shell expressed that learning styles were considered in the design; however, this information may not have been passed on to all of the faculty or sufficiently covered in the training.

Theme 5: Lack of knowledge regarding multiple means of expression/assessment. The participants expressed that they use multiple choice and essay as the primary methods of

assessment. The assessment methodology is based on what has been done previously or what has been determined as the best assessment for that course. Learning styles are not considered in the assessment methods. Most of the participants did not add an additional assessment method to their course. One participant was candid about the fact that although they are required to use three assessment methods, they currently only use two. In addition, the use of publisher content adds to the standardization of the course.

Theme 6: Limited accommodations for students with documented disabilities. The only accommodation noted by the participants was the extension of time for assessments. Accommodations types are given by the Office of Disability Services. Instructors are not asked to participate in determining the type of accommodations that should be offered; they are told the type that should be offered. Offering different types of assessments is not even considered.

I was able to apply epoche to bracket my biases throughout the data collection and analysis process. Based solely upon the feedback of the participants, I determined that the standardized course template was not rolled out properly and training was not offered to instructors that teach at night or strictly online. In addition, the training was not repeated for new instructors.

Research Question Responses

Research Question 1. What are the online faculties' lived experiences with multiple means of expression and the performance impact on students with documented learning disabilities?

The only accommodation offered by the participants was extended time to complete assessments as stated by many of the participants. While some of the participants perceived this as helpful, none of them can confirm that it helps students with documented learning

disabilities. The instructors are not trained on providing accommodations. As stated by Participants 2 and 7, they are simply given instruction by the Office of Disability Services to provide more time as depicted in themes two and six. Participant 12 stated, “In the few times I’ve received the request, they are just requests for more time. None of my assessments are timed, so it’s irrelevant for me.”

The use of a different assessment methodology is not widely discussed. The science, math, and English faculty all expressed strong views about the type of assessments that work best for their courses, as noted in Theme 5. The math department does not deviate from the assessments provided by the publisher. One participant explained, “I use three basic assessment types, including multiple choice, discussion, and the quizzes at the end of the chapters from the publisher. All of the math department uses the quizzes from the publisher.”

Orr and Hamming (2009) stated that some faculty are becoming more comfortable with making accommodations; however, I did not find that to be accurate in this study. Participants stated that they are given instructions on which accommodation to give which is typically more time. Alternate methods of assessment do not enter in with these faculty members. Themes 2, 5, and 6 all support the assertions that participants do not currently offer accommodations outside of additional time and that the design of means of assessment are not controlled by the individual faculty member.

Research Question 2: How do online faculty integrate the use of multiple means of expression into their pedagogy to meet the needs of all students including those with learning disabilities?

Multiple means of expression is not considered as an option for students with learning disabilities. The primary consideration for the design of assessments are the course types; not

that of varied student types as stated in theme one. Most participants were not familiar with UDL, and moreover, they were also unfamiliar with the concept of multiple means of expression; however, two faculty that had some knowledge about the UDL concepts. Participant 11 described,

As a science teacher and having taught at other colleges, I have a little knowledge about Universal Design for Learning. I was a part of the committee to help design the online shell for all teachers. Yes, we did consider Universal Design for Learning principles. We truly pushed to have the material presented in at least two ways.

While this participant expressed that UDL was considered, they only mentioned multiple means of representation. There was no mention of multiple means of expression, as stated in Theme 4. This supports the assertion that had the curriculum been designed for all students, the student with a disability would have equal access to the information and coursework similar to students without disabilities at the onset of the course (Griful-Freixenet et al., 2017). While most participants were not knowledgeable about UDL, the two that were familiar had some appreciation for the value of UDL principles and what it offers. The principles were considered in the design of the online course template. Other participants stated needing training on it. The introduction of the online course template was an opportunity provide basic information about UDL and its importance and intent. Research and applications of UDL have indicated that designing curricula that are intended to provide greater access to learners with disabilities may also benefit other learners (Bruce, 2015).

Research Question 3: Which contributions can UDL impose upon instructional practices used by online faculty to eliminate the barriers to successful implementation of multiple means of expression?

Based on the participants' feedback, there were minimal barriers to the successful implementation of multiple means of expression. All of the participants cited using at least two different types of assessments. The assessment types are determined by the course type as stated by participant seven and others. Participants had limited knowledge of UDL, and some were reluctant to alter their assessments because of their beliefs regarding their respective courses. It appears that participants do not have barriers to successful implementation of multiple means of expression; they just do not vary the assessments primarily because of the course types. Varied learning styles nor other curricula design principles are considered in the determination of assessment types. Although UDL is an approach to planning and developing curricula that promotes access, participation, and progress for all learners (Huang, 2017), it was not considered by the participants.

Two participants added an additional assessment method after the interview. One was because it was mandatory for their department and the other attempted to apply what they learned during the study. If one was impacted by the study and see the value of alternate methods of assessment and creating greater levels of access, the information shared throughout the study was relevant, applicable, and may perpetuate the advancement of UDL, thereby creating greater levels of access and promoting the social responsibility of access for all, while minimizing the need to disclose. Further, UDL is an approach that promotes equity and social responsibility for all students (Kennedy et al., 2018). Disability disclosures with these fourteen participants only resulted in more time which is needed for some; however, the greater levels of access promotes equity and removes any perceived stigmas for faculty and students.

Member Checking

Participant 4 and 11 were the only two that agreed to participate in the member checking process. This was their opportunity to objectively review the data, themes, and my interpretation of the work presented. This process provided me with some reassurance that I had clearly understood the thoughts and experiences of the faculty that may not always be expressed to me when I am operating in a supervisory role.

I provided them with the transcripts from each interview, the summary charts from the survey, and the course evaluations. I also asked them to read through the themes that emerged from the data. The member checking offered both validity and credibility to the process. These two participants were able to confirm the themes that emerged and offer credibility on the accuracy of the phenomenon.

I took notes during the member checking interviews and transcribed their ideas and feelings about the validity and credibility of the study. Participant 4 was presented with the transcription of their interview and the results of the course review. They were also presented with the results of the survey; however, the survey was anonymous; therefore, the results could not be presented individually. I cannot confirm that Participant 4 actually completed the survey.

Participant 4 confirmed the transcription of their interview and the number of assessments in their online course. After having time to give it some thought, Participant 4 did express a desire to learn more about Universal Design for Learning. They also stated that they did not realize that more accommodations were available to disabled students.

Participant 11 was presented with the transcript of their interview and the results of their course review. They, too, were presented with the survey results. The same scenario applies; the survey was anonymous and Participant 11's individual response could not be identified, nor

could it be confirmed that they completed the survey. I was surprised that Participant 11 agreed to participate in the member checking process because they are part-time. There was clearly a desire to learn. Participant 11 confirmed the transcription of the interview and the number of assessments used in their online course. Participant 11 did express their disappointment with the lack of training that they received.

Summary

The data collection methods were one-on-one interviews, one survey, and course reviews. During the both the collection and the analysis of the data, I bracketed out my own biases and truly listened to the participants' responses. The themes that emerged centered on the lack of knowledge of UDL, lack of training, barriers that included faculty engrained thoughts about what they believed were the best assessments for their courses without ever having compared them or trying different assessment types. Additionally, the standardized course template training was not reviewed or even discussed with a number of faculty.

The research question responses highlighted that the lack of training regarding the development of assessments and other disability services can create a hindrance for students with learning disabilities getting what they need. Further, the lack of training is also a barrier for faculty. Some may be willing to try an additional assessment, but the lack of knowledge as to whether they are or are not assisting students with learning disabilities could deter some from trying.

In Chapter Five, I summarize the entire research project highlighting the findings and make recommendations for future research. Further, a summary of the theoretical and social literature and implications that underscores the research project is also included. Finally, the practical implications for the study are underlined.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this transcendental phenomenological study was to describe faculty's experiences with their use of UDL, particularly multiple means of expression, while teaching online general education courses at a technical college in southeast Georgia. The phenomenon under investigation was faculty's use of multiple means of expression and the perceived impact on student learning outcomes in online general education courses. In this chapter, I will present a summary of the finding and the theoretical and social implications of the findings. My presentation of the evidence of multiple realities includes the results of the interviews, surveys, and course reviews to identify the number of expressions is also included in this chapter. Finally, I will discuss the delimitations and limitations of the study and recommendations for future research, before concluding the chapter with a summary.

Findings

Research Question 1 asked: What are the online faculties' lived experiences with multiple means of expression and the performance impact on students with documented learning disabilities? The only accommodation that the current participants offered was extended time to complete assessments. Additional means of expressions or assessment were not offered as an accommodation. While some of the participants think extended time it is helpful, none of them can confirm that it helps students with documented learning disabilities. The instructors are not trained on providing accommodations; they are simply given instruction to provide more time, as noted in the interviews and surveys results.

Research Question 2 asked: How do online faculty integrate the use of multiple means of expression into their pedagogy to meet the needs of all students, including those with learning

disabilities? Faculty participants did not consider multiple means of expression as an option for students with learning disabilities. Faculty participants expressed that the primary consideration for the design of assessments are the course types—not that of varied student learning styles. Participants further expressed that there are limited accommodations offered for students with learning disabilities. All of the participants only offered one accommodation for students with documented learning disabilities: extended time to complete the assessment. As previously stated, accommodation types are determined by the Office of Disability Services, and instructors are not trained on accommodating students with learning disabilities.

Research Question 3 asked: Which contributions can UDL impose upon instructional practices used by online faculty to eliminate the barriers to successful implementation of multiple means of expression? The current participants stated that they use at least two different types of assessments: essay and multiple choice. Many participants expressed that they had limited knowledge of Universal Design for Learning and were reluctant to alter their assessments because of their beliefs regarding their respective courses. These faculty have beliefs that only specific types of assessments are suitable for specific courses. For example, English instructors posit that essays are the best means of assessment for English courses. Participants did not report any barriers to successful implementation of multiple means of expression; they just do not vary the assessments. Two participants added an additional assessment method. One did so was because it was mandatory for their department, and the other attempted to apply what they learned regarding the importance of varied assessments.

Discussion

These results extend the findings of previous studies by addressing the application of the third principle of UDL. Previous researchers have focused on implementing multiple means of

representation and engagement. In this study, I broadened the scope of the research on multiple means of expression and reviews faculty experiences post-implementation. I reviewed the existing theoretical and empirical literature on the study of faculty lived experiences using the third Universal Design for Learning principle, multiple means of expression in general education, in Chapter Two. In summary, multiple means of expression relates to assessment practices used in educational settings to identify alternative ways an individual can demonstrate their skills/knowledge on a given topic (Center for Applied Special Technology, 2014). In this section, I will discuss the previous body of research on this topic.

Theoretical Literature

Recognizing that UDL can be applied to education and has the potential to improve practice in classrooms while providing opportunities for all students to succeed, the Higher Education Opportunity Act (HEOA), first passed in 1965 and reauthorized in 2008, was the first legislation to establish a statutory definition of UDL. UDL is a framework by which greater access is afforded to all students regardless of learning style or disability (Al-Azawei et al., 2016). UDL is a scientifically valid framework for guiding educational practice that provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the way students are engaged; moreover, UDL reduces barriers to instruction; provides appropriate accommodations, supports, and challenges; and maintains high achievement expectations for all students (Bruce, 2015; Higher Education Opportunity Act, 2016, Section 1111(b) (2)).

The HEOA reauthorization added new and revised provisions for minority groups, English language learners, and students with disabilities. HEOA emphasizes reducing barriers by building appropriate supports and challenges into instruction. It also emphasizes the importance

of teacher preparation programs that incorporate UDL principles into instruction and curriculum development (Takemae et al., 2018). Some higher education institutions may not incorporate HEOA components, however (Brown et al., 2008). Even the addition of teacher professional learning communities to support the implementation of UDL can be beneficial (Owen, 2014). Greater support for teachers throughout the process results in wider acceptance.

There are also compliance issues, such as whether students with print disabilities students who experience barriers to accessing instructional material in a nonspecialized format are receiving properly formatted materials (Embry & McGuire, 2011). These practices do not meet the expectations set by the HEOA; in fact, they often create new barriers (Rao et al., 2014). For example, a substantial barrier for students is not getting accessible books and course materials quickly enough to meet the deadline of a particular course assignment. These barriers to learning and others have been created by educators, administrators, and staff that are unfamiliar with laws, policies, and best education practices, such as UDL (Rao et al., 2014).

Some faculty have expressed the idea that “the lack of fit between the traditional instructional process and the student is perceived as a deficit on the part of the student” (Shaw, 2011, p. 22). This type of attitude from faculty can be a barrier to effective UDL implementation. The very premise of UDL can be hindered, and the benefits for students with and without documented disabilities, faculty, and staff can be jeopardized when it is introduced or implemented with bias (Shaw, 2011). Although the enrollment of students with disabilities continues to rise, students with disabilities continue to underperform in comparison to students without disabilities in terms of college participation and retention rates (Izzo et al., 2008). The current emphasis on the assessment of students’ knowledge and skills acquired in school environments is strong at all levels of education.

Multiple means of expression allow students to demonstrate knowledge gained through various means that directly link to student outcome (Abell et al., 2011). If the knowledge acquired is not validated, educators cannot determine whether the intended student learning outcomes have been achieved. Multiple means of expression allow students to demonstrate the knowledge, skills, and attitudes that they have acquired in various formats. The previously discussed Acts all mandate that assessments serve a broad range of students, yet some faculty members have limited knowledge and experience in designing varied assessment tools (Burgstahler & Cory, 2008). There is a need for more training programs that provide assessment development skills and research on the effects of applying universal design elements in higher education settings (Burgstahler & Cory, 2008). The results of the current research will aid practitioners in documenting the impact on student outcomes.

Educational practitioners must develop and validate universal design principles, guidelines, and checklists across contexts and constituencies. There is a need to conduct and disseminate evidence-based research so that faculty have the foundation upon which to design and select curricula and assessments that meet the needs of diverse learners, without compromising the high standards and outcomes of higher education (Izzo et al., 2008). The results of the current study suggest that faculty and administrators are attuned to the increasing diversity of college students and the need for greater flexibility in instructional design while maintaining high standards to effectively teach these students and prepare them to enter the 21st-century workforce (Bowe, 2000; Brikerhoff et al., 1992; Courey et al., 2012).

Faculty who receive on-demand, multimodal professional development in UDL practices and climate assessment have reported that they are better able to meet the needs of students with disabilities in their classrooms (Izzo et al., 2008). They support the application of UDL as a

paradigm for meeting the instructional needs of students with diverse learning needs. While universal design cannot replace faculty members' responsibility to ensure that qualified students with disabilities have access to necessary accommodations, it has the potential to produce better learning outcomes for all students (Izzo et al., 2008).

All postsecondary regional accreditors have similar requirements. Assessment is essential to the continued effective evaluation of academic programs. Multiple means of expression allow different students to demonstrate the knowledge and skills obtained as a result of instruction. Limiting the ways in which knowledge is expressed, however, can restrict the documented success of some students and some academic programs. It is important to provide students with and without learning disability options for how they take in information (usually referred to as representation), practice new content (engagement), and show what they know (expression) by using varying methods which may include technologically enhanced assessments (King-Sears, 2015). This has become a common method for assessing student work.

In postsecondary settings, the role of the state government in delineating elements of the curriculum is generally far less prescriptive than in the K–12 system, resulting in an atmosphere of flexibility for postsecondary faculty. Curricula and courses differ tremendously among liberal arts, research, vocational, and technical colleges and universities. Although certain disciplines (e.g., education, accounting, occupational therapy) are guided in their curricular offerings by professional standards and certification requirements, many more embody curricular flexibility. Faculty can often choose their own course textbook, and they may decide to use a different text or revised edition every year. For students with disabilities, flexibility in curricular requirements at the postsecondary level facilitates their ability to select a college or program that matches their learning strengths, weaknesses, and interests. Faculty flexibility in choice of curricular materials

can, however, create a challenge for students who rely on an audiotope or electronic version of a text, because the timely ordering of materials is essential and a decision to change a textbook shortly before the start of a semester can create a barrier.

Empirical Literature

The implementation of the principles of UDL demonstrates an appreciation for a diverse student body in the educational setting (Hitt, 2018). The diversity of the postsecondary education student body has expanded over the last 2 decades, creating the need for colleges and universities to vary the presentation of information and examination to supplement traditional teaching methods (García-Campos et al., 2018; Roberts et al., 2011). This diverse population includes over 35% minority students, over 11% of students with disabilities, 45% part-time students, and almost 40% students over the age of 25 years (Roberts et al., 2011). Additionally, scholars have anticipated that by 2021, there will be an enrollment increase of 25% of Black students and a 42% increase of Hispanic students (Chandler et al., 2017). Each population may present a unique learning opportunity due to students' varying learning styles. In addition, this population consists of students from varied ethnic and cultural backgrounds, students whose first language is not English, students who are older than the traditional college-age student, and students with an array of learning, attention, psychological, and physical disabilities (McGuire & Scott, 2006; Roberts et al., 2011). The diversity in student populations is ever-changing.

Originally, students with disabilities were accommodated after the fact. The course curriculum was already designed or created, and then students were accommodated afterwards rather than having the curriculum designed with all students in mind. Had the curriculum been designed for all students, the student with a disability would have equal access to the information and coursework similar to students without disabilities at the onset of the course (Griful-

Freixenet et al., 2017). Block et al. (2009) explained that the UDL model in higher education involves a change in the way one views disability. Rather than viewing disability as a problem, as medical models tend to, the social justice model would view disability as an aspect of one's diversity (Pino & Mortari, 2014; Thornton & Downs, 2010). UDL promotes the social responsibility of all persons in creating an environment that is usable by the highest number of people possible—whether it is a physical, informational, curricular, or social environment (Moore et al., 2018). The focus moves away from accessible and minimum code requirements to usability (Block et al., 2009). Usability aides in the retention of students with and without intellectual disabilities.

Implications

The results of this study have theoretical, empirical, and practical implications for stakeholders such as faculty, students, college administrators, and students with intellectual disabilities. In this section, I will discuss these implications as they relate to Knowles's (1990) theory of andragogy, Mezirow's (1978) transformational learning theory, and the current body of literature and practices within higher education.

Andragogy is an adult learning theory popularized by Malcom Knowles (1990). In this particular theory, Knowles explored the art and the science of helping adults enhance their learning process. This theory was formulated to contrast pedagogy, which explains the art and science of teaching children (Knowles, 1990). Knowles developed assumptions regarding the features of adult learning that vary from the characteristics of children learning. These five adult characteristics are self-concept, adult learner experience, readiness to learn, orientation to learning and finally motivation to learn. Knowles, as well as Kenner and Weinerman (2011), asserted that as individuals mature, their self-concept transforms from one that is dependent

personality into a self-directed person. Regarding adult learner experience, as individuals mature, they gather a growing reservoir of experience that forms their background for learning. Second, the theorist explains readiness to learn among adults in regard to their maturity claiming that when people mature, readiness to learn is inclined in the developmental tasks of the social roles. As individuals mature, their time notion changes from one of postponed orientation of knowledge to one of immediacy of orientation. Their learning orientation, therefore, transforms from one that is subject-centered to one that is centered on their problem. Lastly, motivation among adults is internal. Knowles (1990) formulated five principles of andragogy, one of which is that it is imperative for adults to be incorporated in planning and evaluation of how they are taught. Experience is a key construct of learning activities among adult learners. The third principle states that adults are usually interested in learning disciplines that are of immediate relevance and influence on their job or even personal life. Finally, adult learning is not content-oriented, but rather problem-centered.

As more institutions become more aware of the benefits of adult learning theories, the implementation is become more widespread. One such organization is the London Fire Brigade (Chinnasamy, 2013). This group sought to train firefighters through mentoring. In doing so, the London Fire Brigade implemented the program using adult learning theories. Their primary goal was to have each trainee take ownership for his or her learning through self-direction and relevant experience, thus creating a motivation to learn.

Transformational learning theory is an adult learning theory that uses disorienting dilemmas to challenge how learners think. This theory encourages students to employ critical thinking and questioning to assess whether their perceptions and beliefs are correct regarding the world. The theory was first introduced by Jack Mezirow in the late 1900s (Mezirow, 1978).

Mezirow used the theory to explain how adults changed the way they interpreted their world. This particular theory is considered uniquely adult, as well as grounded in human communication; it explains learning as “the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience in order to guide future action” (Mezirow, 1996, p. 162). The transformative process is formed and circumscribed by a frame of reference. Frames of reference are meaning structures inclusive of assumptions and expectations that frame an individual’s tacit points of view and influence their thinking, beliefs, and actions. It is the revision of a frame of reference in concert with reflection on experience that is addressed by the theory of perspective transformation—a paradigmatic shift. The transformative process explains how adults revise their meaning structures (Calleja, 2014).

Meaning structures act as culturally defined frames of reference that are inclusive of meaning schemes and meaning perspectives. Meaning schemes, the smaller components, are indicative of specific beliefs, values, and feelings that reflect interpretation of experience. They are the tangible signs of the habits and expectations that influence and shape a particular behavior or view, such as how an adult may act when they are around a homeless person or think of a Republican or Democrat. Although changes in meaning schemes are a regular and frequent occurrence, Mezirow (1996) argued that meaning perspectives are often acquired uncritically in childhood through acculturation and socialization, most often during significant learning experiences with parents, teachers, and other mentors, and they usually reflect the dominant culture.

Theoretical Implications

Knowles’s (1990) theory of andragogy explores the art and the science of helping adults enhance their learning process. Knowles developed assumptions regarding the features of adult

learning that vary from the characteristics of children learning. These five characteristics are self-concept, adult learner experience, readiness to learn, orientation to learning, and motivation to learn. Although most of the current participants are unfamiliar with adult learning theories, all have taught adult learners for at least 3 years. Further, the participants are experts in their respective teaching disciplines. Some of the participants, although limited in number, are motivated to learn more about UDL and the use of multiple means of expression. Further, their adult learning experience was directly linked to the relevance of this topic as it relates to their jobs and the ability to impact student learning.

Transformational learning theory is an adult learning theory that uses disorienting dilemmas to challenge how learners think. Also, the theory encourages students to employ critical thinking and questioning to assess whether their perceptions and beliefs are correct regarding the world. Through this study, participants were challenged to think through their views on multiple means of expression and how it relates to students with intellectual disabilities and specific course types. Further, the faculty were challenged to evaluate the offered accommodations and to determine whether these are the best options for students with documented intellectual disabilities.

Empirical Implications

Universal design for learning promotes the social responsibility of all persons in creating an environment that is usable by the highest number of people possible—whether it is a physical, informational, curricular, or social environment (Moore et al., 2018). The focus moves away from accessible and minimum code requirements to usability (Block et al., 2009). As I noted in Chapter One, the number of disabled students is increasing. Fifteen years of data from the National Longitudinal Transition Study have indicated that the rate of postsecondary

participation by youth with disabilities has more than doubled, rising from 15% in 1987 to 32% in 2003 (Newman, 2005); therefore, the removal of the stigma of disclosure is necessary. The faculty participants of this study saw the value of UDL principles and the use of the first principle, multiple means of representation, in their online courses. Additionally, the only barriers expressed were the standardized template which does not limit the number of assessments that can be used and the lack of knowledge of UDL and multiple means of expression.

Practical Implications

The current participants noted that the lack of knowledge regarding UDL and multiple means of expression was a limitation to their ability to effectively use the design principles. This could be easily remedied through training that is accessible to all faculty. Further, some faculty believe that only specific means of expression are best for their respective disciplines of study. While this may not be as easily remedied, more training and exposure could impact or alter these beliefs. Finally, the most noted barrier was the predesigned courses and/or lack of knowledge regarding the process and literature used for designing the course shells. Again, another issue that can be easily rectified through verbal and written communication.

Through studying the faculty lived experiences of the 14 participants, the results of my study offer an understanding of the varying perspectives on the use of UDL, multiple means of expression. The use of UDL as it relates to students with intellectual disabilities and the instructional practices that could be beneficial in online general education courses at a 2-year college.

Delimitations and Limitations

The primary delimitation of using the phenomenological method of research was electing to answer the research questions strictly based on the lived experiences of faculty use of multiple means of expression and the articulation of their points of view. This required that my personal biases regarding the subject matter be bracketed out from potentially affecting the data collection/analysis process (Creswell, 2009; Moustakas, 1994). A second delimitation was that the participants were not required to have any knowledge of the subject matter prior to the study. It was important to minimize any biases participants may have had regarding the use of UDL.

The limitations of the study included the limited number of responses to the survey. An additional limitation was the small scope of the study, with just one institution. Furthermore, there was the limitation of studying only three general education courses. I chose these courses because all college students are required to complete these courses and creating greater levels of access and to have the maximum impact, general education courses are the best place to begin.

Recommendations for Future Research

The current body of research on the use of multiple means of expression is sparse. This is one of the reasons that I chose to pursue this study. While there is significant research on the use of multiple means of representation and multiple means of expression, the research for multiple means of expression, assessment, is limited. Assessment is a tangible method of determining whether the learning experience was successful for each student. The use of multiple means of representation and engagement, while significant, are front end interventions for students with intellectual disabilities; however, the impact is not quantifiable. Multiple means of expression offers both qualitative and quantitative feedback to determine the actual benefit.

Universal design for learning is included in the Higher Education Opportunity Act, 2016, Section 1111(b)(2), as such, there is a need to determine the actual benefit to all stakeholders. The use of multiple means of expression can add to determining these factors. A quantitative study of comparative cohorts could be used to identify the impact of UDL accommodations on student performance. Scholars could perform qualitative investigations to learn more about faculty's knowledge of the development of assessments and experiences with the integration of accommodations into online courses. Finally, qualitative researchers could explore the benefits of collaboration between faculty and the Office of Disability Services in determining the appropriate accommodations for students with documented impairments to their learning.

Summary

In Chapter Five, I discussed the findings from my research on faculty live experiences using the third principle of UDL, multiple means of expression in online general education courses at a technical college. In this chapter, I highlighted the previous theoretical and social research and discussed the theoretical, social, and practical benefits for all stakeholders involved including—but not limited to—online faculty, students with documented intellectual disabilities, and administrators determining accommodations. I also discussed the delimitations and limitations of this study. I closed the chapter with recommendations for future research.

References

- Abell, M., Jung, E., & Taylor, M. (2011). Students' perceptions of classroom instructional environments in the context of universal design for learning. *Learning Environments Research, 14*(2), 171-185. doi:10.2147/AMEP.S60570
- Al-Azawei, A., Parslow, P., & Lundqvist, K. (2017). The effect of universal design for learning (UDL) application on e-learning acceptance: A structural equation model. *International Review of Research in Open and Distance Learning, 18*(6), 54-87. Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/2880>
- Al-Azawei, A., Serenelli, F., & Lundqvist, K. (2016). Universal design for learning (UDL): A content analysis of peer reviewed journals from 2012 to 2015. *Journal of the Scholarship of Teaching and Learning, 16*(3), 39-56. doi:10.14434/josotl.v16i3.19295
- Altay, B. (2014). User-centered design through learner-centered instruction. *Teaching in Higher Education, 19*(2), 138-155. doi:10.1080/13562517.2013.827646
- Americans With Disabilities Act of 1990, Pub. L. No. 101-336, 104 Stat. 328 (1990).
- Begnum, M., & Foss-Pedersen, R. J. (2018). Digital assessment in higher education: Promoting universal usability through requirements specification and universal design quality (UD-Q) reviews. *Universal Access in the Information Society, 17*(4), 791-810. doi:10.1007/s10209-016-0513-9
- Black, R., Weinberg, L., & Brodwin, M. (2015). Universal design for learning and instruction: Perspectives of students with disabilities in higher education. *Exceptionality Education International, 25*(2), 1-16. Retrieved from <https://ir.lib.uwo.ca/eei/>

- Block, L., Loewen, S., & Kroeger, S. (2009). Acknowledging and transforming disabling environments in higher education: AHEAD's role. *Journal of Postsecondary Education and Disability, 19*(2), 117-123. Retrieved from <https://files.eric.ed.gov/fulltext/EJ844628.pdf>
- Bongey, S., Cizadlo, G., & Kalnbach, L. (2010). Using a supplemental online course site to deliver universal design for learning (UDL). *Campus-Wide Information Systems, 27*(1), 4–16. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1068401.pdf>
- Bourke, A. B., Strehorn, K. C., & Silver, P. (2000). Faculty members' provision of instructional accommodations with students with LD. *Journal of Learning Disabilities, 33*(1), 26-32. doi:10.1177/002221940003300106
- Bowe, F. (2000). *Universal design for education: Teaching non-traditional students*. Westport, CT: Bergin and Garvey.
- Brikerhoff, L., Shaw, R., & McGuire, S. (1992). Promoting access, accommodations, and independence for college students with learning disabilities. *Journal of Learning Disabilities, 25*(7), 417–429. doi:10.1177/002221949202500702
- Brown, K., Welsh, L., Hill, K., & Cipko, J. (2008). The efficacy of embedding special education instruction in teacher preparation programs in the United States. *Teaching and Teacher Education, 24*(8), 2087-2094. doi:10.1016/j.tate.2008.02.013
- Bruce, T. (2015). *Early childhood education*. London, England: Hodder Education Group.
- Burgstahler, S. (2009). *Universal design in education: Principles and applications* (#P333A020044). Washington, DC: U.S. Department of Education.
- Burgstahler, S., & Cory, R. (2008). *Universal design in higher education: From principles to practice*. Cambridge, MA: Harvard Education.

- Burgstahler, S., & Moore, E. (2009). Making student services welcoming and accessible through accommodations and universal design. *Journal of Postsecondary Education and Disability*, 21(3), 151-174. Retrieved from <https://files.eric.ed.gov/fulltext/EJ831433.pdf>
- Burgstahler, S., & Russo-Gleicher, R. (2015). Applying universal design to address the needs of postsecondary students on the autism spectrum. *Journal of Postsecondary Education and Disability*, 28(2), 199-212.
- Calleja, C. (2014). Jack Mezirow's conceptualization of adult transformative learning: A review. *Journal of Adult and Continuing Education*, 20(1), 117-136.
doi:10.7227/JACE.20.1.8
- Campbell, J. (2004). *Institutional change and globalization*. Princeton, NJ: Princeton University Press.
- Chandler, R., Zaloudek, J., & Carlson, K. (2017). How do you intentionally design to maximize success in the academically diverse classroom? *New Directions for Teaching and Learning*, 2017(151), 151-169. doi:10.1002/tl.20254
- Center for Applied Special Technology. (n.d.). *Transforming education through universal design for learning*. Retrieved from <http://www.cast.org/search?query=Transforming+education+through+universal+design+for+learning>
- Center for Applied Special Technology. (2014). *UDL on campus: Universal design for learning in higher education—A guide*. Retrieved from <http://udloncampus.cast.org/>
- Centers for Disease Control and Prevention. (2015). *Classification of diseases, functioning, and disability*. Retrieved from <http://www.cdc.gov/nchs/icd/icd10cm.htm>

- Center for Universal Design. (1997). *The principles of universal design* (Version 2.0). Raleigh, NC: NC State University.
- Chaiklin, S. (2003). The zone of proximal development in Vygotsky's analysis of learning and instruction. In *Vygotsky's educational theory in cultural context* (pp. 39-64). New York, NY: Cambridge University Press.
- Chinnasamy, J. (2013). Mentoring and adult learning andragogy in action. *International Journal of Management Research and Reviews*, 3(5), 2835-2844. Retrieved from <http://ijmrr.com/>
- Christensen, L., Shyyan, V., & Johnstone, C. (2014). Universal design considerations for technology-based, large-scale, next-generation assessments. *Perspectives on Language and Literacy*, 40(1), 23. Retrieved from <https://dyslexiaida.org/perspectives/>
- Combs, S., Elliott, S., & Whipple, K. (2010). Elementary physical education teachers' attitudes towards the inclusion of children with special needs: A qualitative investigation. *International Journal of Special Education*, 25(1), 114-125. Retrieved from <https://files.eric.ed.gov/fulltext/EJ890572.pdf>
- Cook, S. E. C., & Rao, K. (2018). Systematically applying UDL to effective practices for students with learning disabilities. *Learning Disability Quarterly*, 41, 179–191.
- Courey, S., Tappe, P., Siker, J., & LePage, P. (2012). Improved lesson planning with universal design for learning (UDL). *Teacher Education and Special Education*, 36(1), 7–27.
doi:10.1177/0888406412446178
- Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.

- Couzens, D., Poed, S., Kataoka, M., Brandon, A., Hartley, J., & Keen, D. (2015). Support for students with hidden disabilities in universities: A case study. *International Journal of Disability, Development and Education*, 62(1), 24-41
doi:10.1080/1034912X.2014.984592
- Coy, K., Marino, M., & Serianni, B. (2014). Using universal design for learning in synchronous online instruction. *Journal of Special Education Technology*, 29(1), 63-74.
doi:10.1177/016264341402900105
- Croxton, R. (2014). The role of interactivity in student satisfaction and persistence in online learning. *Journal of Online Learning and Teaching*, 10(2), 314. Retrieved from http://jolt.merlot.org/vol10no2/croxton_0614.pdf
- Dallas, B., & Sprong, M. (2015). Assessing faculty attitudes toward universal design instructional techniques. *Journal of Applied Rehabilitation Counseling*, 46(4), 18. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1164001.pdf>
- Dallas, B. K., Upton, T. D., & Sprong, M. (2014). Post-secondary faculty attitudes toward inclusive teaching strategies. *Journal of Rehabilitation*, 80(2), 12-20.
- Davis, M. (2014). Assistive tech for testing merges into mainstream. *Education Week*. Retrieved from <http://www.edweek.org/ew/articles/2014/03/13/25assistive.h33.html>
- Dean, T., Lee-Post, A., & Hapke, H. (2017). Universal design for learning in teaching large lecture classes. *Journal of Marketing Education*, 39(1), 5-16.
doi:10.1177/0273475316662104
- Dell, C., Dell, T., & Blackwell, T. (2015). Applying universal design for learning in online courses: Pedagogical and practical considerations. *Journal of Educators Online*, 13(2), 166-192. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1068401.pdf>

- Denhart, D. (2008). Deconstructing barriers: Perceptions of students labeled with learning disabilities in higher education. *Journal of Learning Disabilities, 41*(6), 483-97.
- DeVore, S., Stuart, S., & Riall, A. (2008). Universal design for instruction: A matter of equitable access to learning. *Journal on Excellence in College Teaching, 19*(2-3), 87-106.
- Dolan, R., Hall, T., Banerjee, M., Chun, E., & Strangman, N. (2005). Applying principles of universal design to test delivery: The effect of computer-based read-aloud on test performance of high school students with learning disabilities. *Journal of Technology, Learning, and Assessment, 3*(7), 1-32. Retrieved from <https://ejournals.bc.edu/ojs/index.php/jtla>
- Dona, J., & Edmister, J. H. (2001). An examination of community college faculty members' knowledge of the Americans with Disabilities Act of 1990 at the fifteen community colleges in Mississippi. *Journal of Postsecondary Educaiton and Disability, 14*(2), 91-103.
- Edyburn, D. (2010). Would you recognize universal design for learning if you saw it? Ten propositions for new directions for the second decade of UDL. *Learning Disability Quarterly, 33*(1), 33-41. doi:10.1177/073194871003300103
- Edyburn, D. (2014). *Response to intervention (RTI): Is there a role for assistive technology?* Retrieved from <http://www.setp.net/articles/article0903-1.html>
- Embry, P., Parker, D., McGuire, J., & Scott, S. (2005). Postsecondary disability service providers' perceptions about implementing universal design for instruction. *Journal on Postsecondary Education and Disability, 18*, 34-38. Retrieved from <https://eric.ed.gov/?id=EJ846379>
- Embry, P., & McGuire, J. (2011). Graduate teaching assistants in the learning paradigm: Beliefs about inclusive teaching. *Journal on Excellence in College Teaching, 22*(2), 85-108.

- Field, S., Sarver, M. D., & Shaw, S. F. (2003). Self-determination: A key to success in postsecondary education for students with learning disabilities. *Remedial and Special Education, 24*(6), 339–349. doi:10.1177/07419325030240060501
- Firchow, N. (2014). *Universal design for learning: Improved access for all*. Retrieved from <http://www.greatschools.org/special-education/assistive-technology/785-universal-design-for-learning-improved-access-for-all.gs?content=785>
- García-Campos, M., Canabal, C., & Alba-Pastor, C. (2018). Executive functions in universal design for learning: Moving towards inclusive education. *International Journal of Inclusive Education, 24*(6), 660-674. doi:10.1080/13603116.2018.1474955
- Gawronski, M., Kuk, L., & Lombardi, A. (2016). Inclusive instruction: Perceptions of community college faculty and students pertaining to universal design. *Journal of Postsecondary Education and Disability, 29*(4), 331-347. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1133816.pdf>
- Grande, M., & Whalen, J. (2017). Creating digital science texts: An opportunity for teacher candidates to understand and implement universal design for learning. *Teacher Education and Practice, 30*(4), 616.
- Grier-Reed, T., & Williams-Wengerd, A. (2018). Integrating universal design, culturally sustaining practices, and constructivism to advance inclusive pedagogy in the undergraduate classroom. *Education Sciences, 8*(4), 167. doi:10.3390/educsci8040167
- Griful-Freixenet, J., Struyven, K., Verstichele, M., & Andries, C. (2017). Higher education students with disabilities speaking out: Perceived barriers and opportunities of the universal design for learning framework. *Disability & Society, 32*(10), 1627-1649. doi:10.1080/09687599.2017.1365695

- Habib, L., Berget, F., Sandnes, E., Sanderson, N., Kahn, P., Fagernes, S., & Olcay, A. (2012). Dyslexic students in higher education and virtual learning environments: An exploratory study. *Journal of Computer Assisted Learning, 28*(6), 574–584. doi:10.1111/j.1365-2729.2010.000
- Hanesworth, P., Bracken, S., & Elkington, S. (2018). A typology for a social justice approach to assessment: Learning from universal design and culturally sustaining pedagogy. *Teaching in Higher Education, 1*-17. doi:10.1080/13562517.2018.1465405
- Harris, C. (2018). Reasonable adjustments for everyone: Exploring a paradigm change for nurse educators. *Nurse Education in Practice, 33*, 178-180. doi:10.1016/j.nepr.2018.08.009
- Hartsoe, J., & Barclay, S. (2017). Universal design and disability: Assessing faculty beliefs, knowledge, and confidence in universal design for instruction. *Journal of Postsecondary Education and Disability, 30*(3), 223-236. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1164001.pdf>
- He, Y. (2014). Universal design for learning in an online teacher education course: Enhancing learners' confidence to teach online. *Journal of Online Learning and Teaching, 10*(2), 283. Retrieve from <http://jolt.merlot.org/>
- Higher Education Opportunity Act. (2008). Section 1111(b)(2) of the Elementary and Secondary Education Act of 1965 (ESEA) as amended by the Every Student Succeeds Act (ESSA).
- Hindes, Y., & Mather, J. (2007). Inclusive education at the post-secondary level: Attitudes of students and professors. *Exceptionality Education Canada, 17*(1), 107-28.
- Hitt, A. (2018). Foregrounding accessibility through (inclusive) universal design in professional communication curricula. *Business and Professional Communication Quarterly, 81*(1), 52-65. doi:10.1177/2329490617739884

- Hollingshead, A. (2018). *Designing engaging online environments: Universal design for learning principles*. Hershey, PA: IGI Global.
- Hope, J. (2016). Boost retention with campus-wide access to Universal Design software. *Disability Compliance for Higher Education, 21(7)*, 6-6.
doi:10.1002/dhe.30146
- Horn, L., Berktold, J., & Bobbitt, L. (1999). *Students with disabilities in post-secondary education: A profile of preparation, participation and outcomes*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- Huang, F. (2017). The impact of mass and universal higher education on curriculum and instruction: Case studies of China and Japan. *Higher Education, 74(3)*, 507-525.
doi:10.1007/s10734-016-0061-5
- Hutson, B., & Downs, H. (2015). The college star faculty learning community: Promoting learning for all students through faculty collaboration. *Journal of Faculty Development, 29(1)*, 25.
- Institute on Community Integration. (n.d.). *Institute on Community Integration: University Center for Excellence in Developmental Disabilities*. Retrieved from <http://ici.umn.edu>
- Izzo, M., & Bauer, W. (2015). Universal design for learning: Enhancing achievement and employment of STEM students with disabilities. *Universal Access in the Information Society, 14(1)*, 17-27. doi:10.1007/s10209-013-0332-1
- Izzo, M., Murray, A., & Novak, J. (2008). The faculty perspective on universal design for learning. *Journal of Postsecondary Education & Disability, 21(2)*, 60–72. Retrieved from <https://files.eric.ed.gov/fulltext/EJ822094.pdf>

- Johnson-Harris, K., & Mundschenk, N. (2014). Working effectively with students with BD in a general education classroom: The case for universal design for learning. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 87(4), 168-174.
doi:10.1080/00098655.2014.897927
- Karimi, S. (2016). Do learners' characteristics matter? An exploration of mobile-learning adoption in self-directed learning. *Computers in Human Behavior*, 63, 769-776.
doi:10.1016/j.chb.2016.06.014
- Katz, J., & Sokal, L. (2016). Universal design for learning as a bridge to inclusion: A qualitative report of student voices. *International Journal of Whole Schooling*, 12(2), 36. Retrieved from <https://eric.ed.gov/?id=EJ1118092>
- Kennedy, J., Missiuna, C., Pollock, N., Wu, S., Yost, J., & Campbell, W. (2018). A scoping review to explore how universal design for learning is described and implemented by rehabilitation health professionals in school settings. *Child: Care, Health and Development*, 44(5), 670-688. doi:10.1111/cch.12576
- Kennedy, M., Thomas, C., Meyer, J., Alves, K., & Lloyd, J. (2014). Using evidence-based multimedia to improve vocabulary performance of adolescents with LD: A UDL approach. *Learning Disability Quarterly*, 37(2), 71-86. doi:10.1177/0731948713507262
- Kenner, C., & Weinerman, J. (2011). Adult learning theory: Applications to non-traditional college students. *Journal of College Reading and Learning*, 41(2), 87-96.
- King-Sears, M. (2015). Measuring UDL's effectiveness based on learning outcomes for students with and without high-incidence disabilities. *Implementing Universal Design for Learning*, 45-56. Retrieved from http://daddcec.org/Portals/0/CEC/Autism_Disabilities/Research/Publications/DOJ_Volume4_2017.pdf

- Knarlag, K., & Olausson, E. (2016). Developing inclusive teaching and learning through the principles of universal design. *Studies in Health Technology and Informatics*, 229, 165.
- Knowles, M. (1990). Fostering competence in self-directed learning. In *Learning to learn across the life span* (pp. 123-136).
- Knowles, M. (1998). *The adult learner: The definitive classic in adult education and human resources development*. Houston, TX: Gulf Publishing.
- Kraglund-Gauthier, W., Young, D., & Kell, E. (2014). Teaching students with disabilities in post-secondary landscapes: Navigating elements of inclusion, differentiation, universal design for learning, and technology. *Transformative Dialogues*, 7(3), 1-9. Retrieved from https://www.kpu.ca/sites/default/files/Transformative%20Dialogues/TD.7.3.10_Kraglund_etal_Teaching_Students_with_Disabilities.pdf
- Kumar, K., & Wideman, M. (2014). Accessible by design: Applying UDL principles in a first year undergraduate course. *Canadian Journal of Higher Education*, 44(1), 125-147. Retrieved from journals.sfu.ca/cjhe/
- Lawrie, G., Marquis, E., Fuller, E., Newman, T., Qiu, M., Nomikoudis, M., & Dam, L. (2017). Moving towards inclusive learning and teaching: A synthesis of recent literature. *Teaching & Learning Inquiry*, 5(1), 1-13. doi:10.20343/5.1.3
- Levey, J. (2018). Universal design for instruction in nursing education: An integrative review. *Nursing Education Perspectives*, 39(3), 156-161. doi:10.1097/01.NEP.0000000000000249
- Liasidou, A. (2014). Critical disability studies and socially just change in higher education. *British Journal of Special Education*, 41(2), 120-135. doi:10.1111/1467-8578.12063

- Lillie, J. (2017). Applying universal design for learning to study abroad programs: A best practices model for education abroad professionals. In *Capstone collection* (pp. 1-63). Retrieved from <https://digitalcollections.sit.edu/capstones/3061>
- Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Lombardi, A., Murray, C., & Gerdes, H. (2011). College faculty and inclusive instruction: Self-reported attitudes and actions pertaining to universal design. *Journal of Diversity of Higher Education*, 4(4), 250–261. doi:10.1037/a0024961
- Lowrey, K., Hollingshead, A., Howery, K., & Bishop, J. (2017). More than one way: Stories of UDL and inclusive classrooms. *Research and Practice for Persons with Severe Disabilities*, 42(4), 225-242. doi:10.1177/1540796917711668
- Mace, R. (1985). Universal Design: Barrier free environment for everyone. *Designers West*, 33(1), 147-152.
- Mackenzie, L. (1997). *The complete learning disabilities directory*. Lakeville, CT: GreyHouse.
- Madriaga, M., Hanson, K., Kay, K., & Walker, A. (2010). Marking-out normalcy and disability in higher education. *British Journal of Sociology of Education*, 901-920. doi:10.1080/01425692.2011.596380
- Mamiseishvili, K., & Koch, L. (2012). Students with disabilities at 2-year institutions in the United States factors related to success. *Community College Review*, 40(4), 320–339. doi:10.1177/0091552112456281
- McGuire, J., & Scott, S. (2006). Universal design for instruction: Extending the universal design paradigm to college instruction. *Journal of Postsecondary Education & Disability Special Issue*, 19(2), 124-134. Retrieved from <https://eric.ed.gov/?id=EJ844629>

- Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). Hoboken, NJ: John Wiley & Sons.
- Mezirow, J. (1978). *Education for perspective transformation: Women's re-entry programs in community colleges*. New York, NY: Teachers College, Columbia University.
- Mezirow, J. (1996). Contemporary paradigms of learning. *Adult Education Quarterly*, 46, 158–172. doi:10.1177/074171369604600303
- Miller, D., & Lang, P. (2016). Using the universal design for learning approach in science laboratories to minimize student stress. *Journal of Chemical Education*, 93(11), 1823-1828. doi:10.1021/acs.jchemed.6b00108
- Mislevy, R., Almond, R., & Lukas, J. (2003). *A brief introduction to evidence-centered design*. Princeton, NJ: Educational Testing Service.
- Moore, E., Smith, F., Hollingshead, A., & Wojcik, B. (2018). Voices from the field: Implementing and scaling-up universal design for learning in teacher preparation programs. *Journal of Special Education Technology*, 33(1), 40-53. doi:10.1177/0162643417732293
- Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.
- Mustaquim, M. (2017). A reflection on interdisciplinary research in universal design toward sustainability. *Universal Access in the Information Society*, 16(1), 73-83. doi:10.1007/s10209-015-0425-0
- National Center for Education Statistics. (n.d.). *Students with disabilities*. Retrieved from <https://nces.ed.gov/fastfacts/display.asp?id=60>

- Nyoni, J. (2014). E-readiness of open and distance learning (ODL) facilitators: Implications for effective mediation. *Perspectives in Education*, 32(3), 78-91. Retrieved from https://www.researchgate.net/publication/287393932_E-readiness_of_open_and_distance_learning_ODL_facilitators_Implications_for_effective_mediation.
- Ohio Coalition for the Education of Children with Disabilities. (2012). *Cognitive disability resources*. Retrieved from <https://www.ocecd.org/CognitiveDisabilityResources.aspx#>
- Orr, A., & Hamming, S. (2009). Inclusive postsecondary strategies for teaching students with learning disabilities: A review of the literature. *Learning Disability Quarterly*, 32(3), 181–196. doi:10.2307/27740367
- Owen, S. (2014). Teacher professional learning communities: Going beyond contrived collegiality toward challenging debate and collegial learning and professional growth. *Australian Journal of Adult Learning*, 54(2), 54. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1033925.pdf>
- Park, H., Roberts, K., & Delise, D. (2017). The effects of professional development on universal design for instruction on faculty perception and practice. *Journal of Postsecondary Education and Disability*, 30(2), 123-139. Retrieved from <https://eric.ed.gov/?id=EJ1153546>
- Pino, M., & Mortari, L. (2014). The inclusion of students with dyslexia in higher education: A systematic review using narrative synthesis, *Dyslexia*, 20, 346–369. doi:10.1002/dys.1484
- Pliner, S., & Johnson, J. (2004). Historical, theoretical, and foundational principles of universal instructional design in higher education. *Equity & Excellence in Education*, 37, 105-113.

doi:10.1080/10665680490453913

Quaglia, B. W. (2015). Planning for student variability: Universal design for learning in the music theory classroom and curriculum. *Music Theory Online*, 21(1)

doi:10.30535/mto.21.1.6

Rao, K., Edelen-Smith, P., & Wailehua, C. (2015). Universal design for online courses:

Applying principles to pedagogy. *Open Learning: The Journal of Open, Distance and e-Learning*, 30(1), 35-52. doi:10.1080/02680513.2014.991300

Rao, K., & Tanners, A. (2011). Curb cuts in cyberspace: Universal instructional design for online courses. *Journal of Postsecondary Education & Disability*, 24(3), 211–229. Retrieved from <https://eric.ed.gov/?id=EJ966125>

Rao, K., Wood, O., & Bryant, B. (2014). A review of research on universal design educational models. *Remedial and Special Education*, 35(3), 153-166.

doi:10.1177/0741932507314020

Roberts, K., Park, H., Brown, S., & Cook, B. (2011). Universal design for instruction in postsecondary education: A systematic review of empirically based articles. *Journal of Postsecondary Education and Disability*, 24(1), 5–15. Retrieved from

<https://eric.ed.gov/?id=EJ941728>

Rogers-Shaw, C., Carr-Chellman, D., & Choi, J. (2018). Universal design for learning: Guidelines for accessible online instruction. *Adult Learning*, 29(1), 20-31.

doi:10.1177/1045159517735530

Ryan, S. (2014). An inclusive rural post-secondary education program for students with intellectual disabilities. *Rural Special Education Quarterly*, 33(2), 18-28.

doi:10.1177/875687051403300204

- Scanlon, E., Legron-Rodriguez, T., Schreffler, J., Ibadlit, E., Vasquez, E., & Chini, J. (2018). Postsecondary chemistry curricula and universal design for learning: planning for variations in learners' abilities, needs, and interests. *Chemistry Education Research and Practice*, 19(4), 1216-1239. Retrieved from <https://pubs.rsc.org/en/content/articlelanding/2018/rp/c8rp00095f#!divAbstract>
- Scott, L., Thomas, C., Puglia, L., Temple, P., & D'Aguilar, A. (2017). Implementing a UDL framework: A study of current personnel preparation practices. *Intellectual and Developmental Disabilities*, 55(1), 25-36. doi:10.1352/1934-9556-55.1.25
- Seok, S., DaCosta, B., & Hodges, R. (2018). A systematic review of empirically based universal design for learning: Implementation and effectiveness of universal design in education for students with and without disabilities at the postsecondary level. *Open Journal of Social Sciences*, 6(5), 171-189. doi:10.4236/jss.2018.65014
- Shaw, R. (2011). Employing universal design for instruction. *New Directions for Student Services*, 134, 21-33. doi:10.1002/ss.392
- Shogren, K., & Wehmeyer, M. (2015). A framework for research and intervention design in supported decision making. *Inclusion*, 3(1), 17-23.
- Smith, S., & Basham, J. (2014). Designing online learning opportunities for students with disabilities. *TEACHING Exceptional Children*, 46(5), 127-137. doi:10.1177/0040059914530102
- Smith, R., & Buchanan, T. (2012). Community collaboration, use of universal design in the classroom. *Journal of Postsecondary Education & Disability*, 25(3), 259-265. Retrieved from <https://eric.ed.gov/?id=EJ994291>

- Smith, S., & Lowrey, K. (2017a). Applying the universal design for learning framework for individuals with intellectual disability: The future must be now. *Intellectual and Developmental Disabilities*, 55(1), 48-51. doi:10.1352/1934-9556-55.1.48
- Smith, S., & Lowrey, K. (2017b). Making the UDL framework universal: Implications for individuals with intellectual disability. *Intellectual and Developmental Disabilities*, 55(1), 2-3. doi:10.1352/1934-9556-55.1.2
- Sokal, L., & Katz, J. (2017). Effects of the three-block model of universal design for learning on teachers' behaviors, efficacy, and concerns about inclusive teaching. *Teacher Education and Practice*, 30(1), 157. doi:10.1080/13603116.2014.881569
- Sopko, K. M. (2008). *Universal Design for Learning: Implementation in six local education agencies*. Alexandria, VA: Project Forum, National Association of State Directors of Special Education.
- Spooner, F., Baker, J., Harris, A., Ahlgrim-Delzell, L., & Browder, D. (2007). Effects of training in universal design for learning on lesson plan development. *Remedial and Special Education*, 28(2), 108–116. doi:10.1177/07419325070280020101
- Staats, S., & Laster, L. (2018). Extending universal design for learning through concurrent enrollment: Algebra teachers' perspectives. *Education Sciences*, 8(4), 154. doi:10.3390/educsci8040154
- Strawser, M., Frisby, B., & Kaufmann, R. (2017). Universal adaptation: The need to enhance accessibility in the basic course. *Basic Communication Course Annual*, 29(1), 10. Retrieved from <https://ecommons.udayton.edu/cgi/viewcontent.cgi?article=1518&context=bcca>

- Takemae, N., Dobbins, N., & Kurtts, S. (2018). Preparation and experiences for implementation: Teacher candidates' perceptions and understanding of universal design for learning. *Issues in Teacher Education, 27*(1), 73-93. Retrieved from <https://eric.ed.gov/?id=EJ1174960>
- Thurlow, M., & Kopriva, R. (2015). Advancing accessibility and accommodations in content assessments for students with disabilities and English learners. *Review of Research in Education, 39*(1), 331-369. doi:10.3102/0091732X14556076
- Timmerman, B., Strickland, D., Johnson, R., & Payne, J. (2011). Development of a 'universal' rubric for assessing students' scientific reasoning skills using scientific writing. *Assessment & Evaluation in Higher Education, 36*(5), 509-547. doi:10.1080/02602930903540991
- Thomson, R., Fichten, C., Havel, A., Budd, J., & Asuncion, J. (2015). Blending universal design, e-learning, and information and communication technologies. In *Universal design in higher education: From principles to practice* (pp. 275-284).
- Thornton, M., & Downs, S. (2010). Walking the walk: Modeling social models and universal design in the disabilities services offices. *Journal of Postsecondary Education and Disability Services, 23*(1). Retrieved from <https://files.eric.ed.gov/fulltext/EJ888646.pdf>
- Tobin, T. J. (2014). Increase online student retention with universal design for learning. *Quarterly Review of Distance Education, 15*(3), 13. Retrieved from <https://eric.ed.gov/?id=EJ1144189>
- U.S. Department of Education. (n.d.a). *Distance education*. Retrieved from <https://www.ed.gov/category/keyword/distance-education>

- U.S. Department of Education. (n.d.b). *Students with disabilities*. Retrieved from <https://www.ed.gov/category/keyword/students-disabilities>
- U.S. Equal Employment Opportunity Commission. (n.d.). *The Americans with Disabilities Act of 1990*. Retrieved from <https://www.eeoc.gov/eeoc/history/35th/1990s/ada.html>
- Varonis, E. (2015). From barriers to bridges: Approaching accessibility in course design. *International Journal of Information and Learning Technology*, 32(3), 138-149. doi:10.1108/IJILT-12-2014-0033
- Vasquez, E., Nagendran, A., Welch, G., Marino, M., Hughes, D., Koch, A., & Delisio, L. (2015). Virtual learning environments for students with disabilities: A review and analysis of the empirical literature and two case studies. *Rural Special Education Quarterly*, 34(3), 26–32. doi:10.1177/875687051503400306
- Vie, S. (2018). Effective social media use in online writing classes through universal design for learning (UDL) principles. *Computers and Composition*, 49, 61-70. doi:10.1016/j.compcom.2018.05.005
- Vitelli, E. (2015). Universal design for learning: Are we teaching it to preservice general education teachers? *Journal of Special Education Technology*, 30(3), 166-178. doi:10.1177/0162643415618931
- Watt, S., Vajoczki, S., Voros, G., Vine, M., Fenton, N., & Tarkowski, J. (2014). Lecture capture: An effective tool for universal instructional design? *Canadian Journal of Higher Education*, 44(2), 1. Retrieved from <https://www.learntechlib.org/p/157509>
- Wagner, M., Newman, L., Cameto, R., Garza, N., & Levine, P. (2005). *After high school: A first look at the postschool experiences of youth with disabilities—A report from the National Longitudinal Transition Study-2 (NLTS2)*. Menlo Park, CA: SRI International.

- Webb, K., & Hoover, J. (2015). Universal design for learning (UDL) in the academic library: A methodology for mapping multiple means of representation in library tutorials. *College & Research Libraries, 76*(4), 537-553. Retrieved from <https://eric.ed.gov/?id=EJ1061467>
- Weis, R., Dean, E., & Osborne, K. (2016). Accommodation decision making for postsecondary students with learning disabilities: Individually tailored or one size fits all? *Journal of Learning Disabilities, 49*(5), 484-498. doi:10.1177/0022219414559648
- Wolff, B., Wood-Kustanowitz, A., & Ashkenazi, J. (2014). Student performance at a community college: Mode of delivery, employment, and academic skills as predictors of success. *MERLOT Journal of Online Learning and Teaching, 10*(2), 166-178.

APPENDICES

Appendix A: Permission to Conduct Research

April 2, 2019

Liberty University
1971 University Blvd.
Lynchburg, VA 24515

Re: Monique Baucham (Approval for Dissertation Research Project)

To Whom It May Concern:

Monique Baucham serves as the Executive Vice President for Academics and Institutional Effectiveness at Columbus Technical College. As such this research project will have a significant impact on varying the methods of assessing our diverse student population. Universal Design for Learning is a framework designed to provide access to course material and assessments for all students. The research will provide insight into the faculty views when employing multiple means of expression which is equivalent to employing varied means of assessment.

As the President of Columbus Technical College, I grant Monique Baucham permission to conduct the research with the general education faculty focusing on Universal Design for Learning, multiple means of expression.

If you have any questions or concerns, please contact me.

Sincerely,

Lorette M. Hoover
President

Appendix B: Questions for Recruitment and Purposeful Sampling

1. Are you a faculty member at Southeastern Technical College?
2. Do you teach English, science, or math classes online?
3. Do you have a master's degree in the discipline you teach?
4. Have you taught these courses at least three years?

Appendix C: Interview Questions

The interview will begin with building rapport by arriving on time, enjoying a light snack, and thanking the participants. I will then reconfirm the purpose of the interview and assure confidentiality. Finally, I will discuss how the data will be used.

What design principles of UDL have you incorporated into your online course?

Each semester what percentage of your students has documented disabilities that require accommodations?

What varied means of expression, assessment, do you use in your course?

Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?

What learning styles do you consider when designing your online course?

Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?

What barriers did you experience in implementing the UDL principles in your course?

Appendix D: Survey Questions

Since the interview, what strategies have you employed in your class to vary the means of expression?

What benefits, if any, have you noted from use of all of the UDL principles including varying the multiple means of expression?

How has it affected overall student performance?

How has it affected the performance of students with documented learning disabilities?

What do you see as the value of employing multiple means of expression in your online course?

What UDL design principles will you use in the future?

Appendix E: Informed Consent Form

A Transcendental Phenomenological Study of Faculty Use of Universal Design for Learning
That Includes Multiple Means of Expression While Teaching Online General Education Courses
Taught At a Technical College Consent Form

Investigators:

Name: _____ Dept: _____

Phone: _____

Email: _____

You are being asked to take part in a research study of how universal design for learning that includes multiple means of expression is imperative in the course of teaching online general education courses taught at a technical college.

We are asking you to take part because you signed up at the research's website.

Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: The focus of the study is Universal Design for Learning. Universal Design for Learning has three foundational principles to increase access for all students. We will primarily focus on the third principle, which is multiple means of expression. We want to learn more about your thoughts, when using varied means of assessments.

What we will ask you to do: If you agree to be in this study, we send you a survey to complete. The survey will include questions regarding the research questions for this study. We have planned that the survey should take no longer than 30 minutes to complete.

Risks and benefits: I do not anticipate any risks to you participating in this study other than those encountered in day-to-day life. A benefit of this study is that the research will provide insight into the faculty views when employing multiple means of expression which is equivalent to employing varied means of assessment.

Compensation: There is no remuneration for your participation in this research study. Participation is strictly voluntary. There is no monetary or in kind exchange for your participation.

Your answers will be confidential: The records of this study will be kept private. In any sort of report we make public we will not include any information that will make it possible to identify you. Research records will be kept in a locked file; only the researchers will have access to the records. The survey ISP tracking mechanism will be turned off to help maintain confidentiality.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide not to take part or to skip some of the questions, it will not affect your current or future relationship with the institution. If you decide to take part, you are free to withdraw at any time.

If you have questions: The researcher conducting this study is Monique Baucham. Please ask any questions you have now. If you have questions later, you may contact Monique Baucham.

You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your Signature _____ Date _____

Your Name (printed) _____

Signature of person obtaining consent _____

Date _____

Printed name of person obtaining consent _____

Date _____

This consent form will be kept by the researcher for at least three years beyond the end of the study.

Appendix F: Reflective Journal

Thoughts at the onset of the research:

Thoughts about using multiple means of expressions:

Thoughts after data analysis:

Appendix G: Course Evaluation Measurement Sheet

Course Name (Subject): _____

Instructor Name: _____

Types of Expression (Assessment) Utilized: _____

Frequency Each Form of Expression was Utilized: _____

Appendix H: Participant Interview Transcriptions

(The interview questions and my additional responses are italicized)

Participant One

Q: *What design principles of UDL have you incorporated into your online course?*

A: I'm not familiar with Universal Design for Learning.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: Most of the time none. I may have one from time to time. I just give them more time because we use the same equation sheet for all of our students.

Q: *What varied means of expression, assessment, do you use in your course?*

A: I use three basic assessment types including multiple choice, discussion, and the quizzes at the end of the chapters from the publisher. All of the math department uses the quizzes from the publisher.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: I just give them more time when requested. I do insure they have gone through the Office of Disability Services.

Q: *What learning styles do you consider when designing your online course?*

A: I don't. I have design my courses based on the material. No real room for variation.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I can't answer this question because I just don't know enough about the UDL principles.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: I didn't experience any because I don't use UDL principles. I may consider using this in the future. (December 16, 2019)

Participant Two

Q: *What design principles of UDL have you incorporated into your online course?*

A: I've read about it and am familiar with it, but we don't attempt to use these principles in the math department. We depend on the information we incorporate from the publisher to adhere to the ADA and other requirements.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I have students that request more time; however, our assessments are timed. Some students ask and others request it through the Office of Disability Services from Ms. Kendall.

Q: *What varied means of expression, assessment, do you use in your course?*

A: We use different assessments. Most of ours comes from the publisher. We design our mid-term and final exams. We use the same ones for same class.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: As I mentioned previously, all I do is give them more time. If they need something additional, I work with Ms. Kendall and the Dean to get what the student needs.

Q: *What learning styles do you consider when designing your online course?*

A: We don't. Math is just math. Everyone has to learn it the same way.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: Again, I don't use UDL because our classes are standardized. We are required to use ADA compliant syllabi, shell design, and when we post things. We don't change it much from that.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: This may or may not be helpful. I've been teaching for a long time, so math has to be presented the same way to all students. I'm not sure how to implement UDL principles in a math course. If we change the course, it has to be approved by administration. (December 16, 2019)

Participant Three

Q: *What design principles of UDL have you incorporated into your online course?*

A: During my doctoral studies I learned about Universal Design for Learning. I am not sure that I see these elements in the design of the course. As you know, we don't design our own online courses. We can build our assessments and discussion questions, but the shell is already designed.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: Not a lot. I believe that I have more in my class that do have learning disabilities, but not a lot that actually have the paperwork.

Q: *What varied means of expression, assessment, do you use in your course?*

A: Tell me what you mean.

Q Follow-up: *I am asking how many different types of assessments do you use?*

A: I use more in class than I do online. I like for students to engage and to participate. I don't get as much of that interaction online. I use essays, multiple choice, and discussion questions. I also ask students to post a video of themselves at the beginning of the class.

Q: Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?

A: I really have no idea. I have never compared them to other students. I guess they don't stand out one way or the other.

Q: What learning styles do you consider when designing your online course?

A: I don't. I just try to present the information.

Q: Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?

A: I can't answer that question because I haven't compared the students' results as I mentioned previously.

Q: What barriers did you experience in implementing the UDL principles in your course?

A: I don't have any barriers implementing anything with my job. You know that we want raises, but other than that I don't have any barriers. (December 16, 2019)

Participant Four

Q: What design principles of UDL have you incorporated into your online course?

A: I don't really know. Our shells were designed by the Director of Distance Learning and sent to us for us to facilitate. I don't make many changes to the course. Should I be doing more?

Q: Each semester what percentage of your students has documented disabilities that require accommodations?

A: I haven't had any yet. This is only my second semester teaching at this college. I have some in my full-time job, but none here. Do you want to know about those or just at this college?

Q: Just at this college.

I haven't had any yet.

Q: *What varied means of expression, assessment, do you use in your course?*

A: We use a lot of essay. We also use discussion. We grade using a rubric.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: I guess so. The department chair makes these determinations.

Q: *What learning styles do you consider when designing your online course?*

A: I received training on this at my full-time faculty job. I haven't received any training on learning styles at this job. I don't know all they consider when designing this course.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: Based on what I have learned, yes it would be helpful to present information in different formats like PowerPoints and matching audio. It would help students understand the material better.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: Since our courses are predesigned, I don't experience any barriers to UDL. I think it would be helpful based on what I have learned. We don't have a lot of liberties to change our courses here. Perhaps that is the problem and the reason why people don't really use change the courses. What do you think?

Follow-up: *Our courses are designed with ADA and UDL principles incorporated in the master shell. You are correct; we don't encourage a lot of changes. However, this is about assessments. Your department has the liberty to offer different types of assessments.*

A: I don't have barriers to teaching my course. (December 17, 2019)

Participant Five

Q: *What design principles of UDL have you incorporated into your online course?*

A: Our courses are predesigned.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I haven't had any thus far.

Q: *What varied means of expression, assessment, do you use in your course?*

A: We use three, essays, discussions, and multiple choice. I don't think other forms are appropriate for an English class.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A; I haven't had any accommodation requests.

Q: *What learning styles do you consider when designing your online course?*

A: None. The course is designed for us.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I don't know.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: No barriers; just doing what is asked of me. (December 17, 2019)

Participant Six

Q: *What design principles of UDL have you incorporated into your online course?*

A: I have a very strong opinion on this subject. I don't know what they considered when designing our courses. There was a committee with faculty. They agreed on the design. I just don't know what they took into consideration.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I've taught for a long time, so I have a few every semester.

Q: *What varied means of expression, assessment, do you use in your course?*

A: All English instructors are supposed to use three. We rely heavily on essays for the bulk of our assessments of our students.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: I really don't know. I don't think that students with disabilities do well in our English classes. Our essays are not timed, so giving them more time doesn't help. They don't utilize our office hours until the end of the semester. Well, that most students.

Q: *What learning styles do you consider when designing your online course?*

A: Again, I don't know what they considered when designing these courses. Moving on.

Q: *Why do you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I'm not familiar with it, so I don't know how to answer that question.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: I don't like that our courses are predesigned. I think we should have more freedom in designing our courses. (December 17, 2019)

Participant Seven

Q: *What design principles of UDL have you incorporated into your online course?*

A: I don't know. We use a lot of the information from the publisher.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I have about one each semester.

Q: *What varied means of expression, assessment, do you use in your course?*

A: We use the assessments from the publisher, and we provide formula sheets.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: We give disabled students more time. Sometimes it helps, sometimes it doesn't. If they don't understand the material, it is difficult for them.

Q: *What learning styles do you consider when designing your online course?*

A: I don't know because we use the information from the publisher.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I don't know much about it. I'm sure it could, but I just don't know.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: None, the publisher's information is good and it helps reinforce what we teach. We like it. I don't see a barrier. (December 18, 2019)

Participant Eight

Q: *What design principles of UDL have you incorporated into your online course?*

A: Our courses are predesigned. It works well for me. I don't know if UDL was used. I think it must have been when it was laid out for us. Every department had a representative on the design committee, and I think that our Department Chair was on the committee so I support it.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I don't know the percentage. I typically have one or two per semester.

Q: *What varied means of expression, assessment, do you use in your course?*

A: I use three. I was part of the team that decided to use three. Essays, multiple choice, and discussion questions.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: I do not know. We have a high failure rate in this course, so it is with all of the students.

Q: *What learning styles do you consider when designing your online course?*

A: I hope that the committee did when designing the courses.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I don't know. Some of the full-time faculty volunteer in the writing center. We don't see many students with disabilities until the end of the semester. I wish that this was a requirement for all students with disabilities at the beginning of the semester.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: None at this time. (December 18, 2019)

Participant Nine

Q: *What design principles of Universal Design for Learning have you incorporated into your online course?*

A: In Math, we mostly use the information from the publisher. I assume they use Universal Design for Learning. I really don't know.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I don't get a lot. Each time I do, I give them more time.

Q: *What varied means of expression, assessment, do you use in your course?*

A: In math, we use two main assessments, quizzes and exams. They are mostly multiple choice, but they have to work through the equations or problems to get the answer. It works well for us.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: Giving more time does help sometimes.

Q: *What learning styles do you consider when designing your online course?*

A: I really don't because the shell is presented to us and we use a lot of the publisher's information. I do believe that the publisher takes this into consideration.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I'm not really sure. I think that our teaching has the greatest impact. I don't know that a design in math makes a difference. We work hard to teach our traditional and online students. Math is a different element.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: We use the publisher's information so there were no barriers. We just phase it in.

(December 18, 2019)

Participant Ten

Q: *What design principles of Universal Design for Learning have you incorporated into your online course?*

A: I do not like teaching math online. It is ineffective for students. Math should be taught in person. I don't think it is a good idea.

Follow-up: *I understand. If you feel so strongly about not teaching online, why do you teach online?*

A: We are required to teach online. I just don't agree with it.

Q: *Are you familiar with Universal Design for Learning?*

A: No, not really.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: This is part of the reason I don't agree with teaching math online. We just receive note asking us to give specific students more time. We don't know if that is all they need.

Q: *What varied means of expression, assessment, do you use in your course?*

A: I use two. I don't think I need more than that.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: I hope so, but I really don't know.

Q: *What learning styles do you consider when designing your online course?*

A: I don't know. I'm part-time and we are given our book and our course shell. I don't actually know a lot about different learning styles. Hopefully, they are considering all of this when designing the course.

Q: *Is this something you would like to learn more about?*

A: I'm just a part-time teacher, so I'm not sure I really want learn more about this. This will not impact my evaluation will it?

Follow-up: *No, it will not. This is strictly confidential.*

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: As I said previously, I don't know a lot about Universal Design for Learning. I can't answer the question.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: No, barriers. We just teach the course. Nothing hard about it. (December 19, 2019)

Participant Eleven

Q: *What design principles of Universal Design for Learning have you incorporated into your online course?*

A: I am a science teacher and have taught at other colleges, so I know a little about Universal Design for Learning. I was a part of the committee to help design the online shell for all teachers. Yes, we did consider Universal Design for Learning principles. We truly pushed to have the material presented in at least two ways.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I do have at least one every semester. I also try to let them know that I am here to help, but I am strict. This is a weed-out courses so it is hard.

Q: *What varied means of expression, assessment, do you use in your course?*

A: I use three. You are the one that started the science faculty having consistent assessments.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: I don't know if it works online. We have demonstrations as part of our assessments. It is not as easy for online.

Follow-up: *I understand that and agree. When we look at the performances of those online versus those in class the in-class students do have a stronger performance.*

Q: *What learning styles do you consider when designing your online course?*

A: The committee primarily focused on audio and visual learners. However, in science we also have to address the kinesthetic learner. Wasn't as relevant for other subjects.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I think UDL does. Having all of the information presented in two ways, is helpful. I'm not sure about assessments. I just don't know much about. We write them based on the chapter material.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: You know about the biggest one. I didn't like it when you did it because we were able to do our own thing. We were all upset. However, since the changes and more standardization

we have had fewer student complaints. I can't say that I like it which I have said several times to you and others, but I can see the value. (December 19, 2019)

Participant Twelve

Q: What design principles of Universal Design for Learning have you incorporated into your online course?

A: I really don't want to say anything that could be held against me later.

Follow-up: I assure you that there will no repercussions for your responses. I am not operating as a supervisor in this setting. I am simply a student. You all know how long I've been working on this (laughter).

A: Okay. As long as nothing is held against me. I just don't know a lot about it. I don't know if I am supposed to, but I just don't.

Q: Each semester what percentage of your students has documented disabilities that require accommodations?

A: Perhaps it's just me, but I don't get a lot. I am fair, but some students think I am hard so they avoid my class.

Q: What varied means of expression, assessment, do you use in your course?

A: I just use two. I don't think multiple choice is good for English, so I use discussions and essays. Essay really tells us if the students are really learning.

Q: Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?

A: In the few times I've received the request, they are just requests for more time. None of my assessments are timed, so it's irrelevant for me.

Q: What learning styles do you consider when designing your online course?

A: I don't. Writing is just writing.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: I am guessing, but I think they would. I don't really know. I just really don't know.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: No barriers. (December 19, 2019)

Participant Thirteen

Q: *What design principles of Universal Design for Learning have you incorporated into your online course?*

A: I've worked here a long time. I don't want to bring any attention to myself. I just want to offer some thoughts. I like what we do in the math department. We have a good chair.

Follow-up: Sounds good. This information will be held in confidence.

A: Okay, I've actually done some research in Universal Design for Learning. I teach gateway courses. We see so many students fail. We really want to help them. Based on what I know, the publisher information we use is reflective of Universal Design for Learning. We don't try to fail our students. We try to help them. This material help.

Q: *Each semester what percentage of your students has documented disabilities that require accommodations?*

A: I have one to two students each semester with a disability. We do give them more time.

Q: *What varied means of expression, assessment, do you use in your course?*

A: We use two. Mostly multiple choice. In math the answer is either right or wrong.

Q: Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?

A: I don't know. We give them more time. Some of them need more time to get their thoughts together and be able to focus. So I think so, but not sure.

Q: What learning styles do you consider when designing your online course?

A: Math can be complex; however, the main thing is to understand each principle because they build on each other. I don't think the learning style matters; rather it is how we present it so that everyone can understand.

Q: Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?

A: My research shows that if we present the material in different ways, it is more easily absorbed. Reinforcement helps. I don't know how to change the way we assess in an online class.

Q: What barriers did you experience in implementing the UDL principles in your course?

A: None at this time. (December 19, 2019)

Participant Fourteen

Q: What design principles of Universal Design for Learning have you incorporated into your online course?

A: We must need training on this because I have no idea what you are talking about outside of what you just said.

Q: Each semester what percentage of your students has documented disabilities that require accommodations?

A: I have some in different semesters. I don't have one every semester.

Q: *What varied means of expression, assessment, do you use in your course?*

A: With the changes you and the Dean Burgan implemented we are supposed to use three; however, I will be honest I only use two. I am part-time so I haven't figured out how to implement the third one. I use multiple choice, discussions – not so much, and long answer.

Q: *Based on the types of accommodations requested, do these varied means of expression, assessment; meet the needs of students with disabilities? If so why, if not why?*

A: Sometimes giving them more time does help. I do reach out to my students that do poorly on exams that includes everyone.

Q: *What learning styles do you consider when designing your online course?*

A: I don't at this time.

Q: *Why you believe the principles of Universal Design for Learning enhance student learning outcome achievement?*

A: Again, I don't know anything about this so I can't say.

Q: *What barriers did you experience in implementing the UDL principles in your course?*

A: As a part-time instructor, I don't get much training. That would be my only barrier.

(December 20, 2019)