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Teacher Perspectives of Fidelity With Universal Design for Learning in the Classroom

Sharon Rehenea Hamilton

Teacher Perspectives of Fidelity With Universal Design for Learning in the Classroom

by
Sharon Rehenea Hamilton

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Approval Page

This applied dissertation was submitted by Sharon Rehenea Hamilton under the direction of the persons listed below. It was submitted to the Abraham S. Fischler College of Education and School of Criminal Justice and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Herminia Rivera, PhD
Committee Chair

Jia Borror, EdD
Committee Member

Kimberly Durham, PsyD
Dean

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_Sharon Rehenea Hamilton_____
Name

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Abstract

Teacher Perspectives of Fidelity With Universal Design for Learning in the Classroom, Sharon Rehenea Hamilton, 2020: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education and School of Criminal Justice. Keywords: teacher perspectives, UDL implementation, UDL enablers, UDL barriers, UDL sustainability, rural elementary school

The purpose of this qualitative case study is designed to explore teachers' perspectives on the implementation and sustainability of Universal Design for Learning (UDL) in the classroom at a local rural Title I elementary school. The rural elementary Title I school classroom presents a unique dynamic in comparison to its surrounding rural elementary school counterparts. The most significant difference is the students residing in poverty and the circumstances associated with poverty. Despite this school's rural Title I circumstance UDL is used to encourage and stimulate students.

Teachers are the primary source of UDL implementation. It is vital for teachers to express their opinions on the implementation and sustainability of UDL. Allowing teachers to express their opinions provide a sense of how well the strategy might work when implemented. For UDL to be effectively implemented in the classroom and throughout the school, teachers must have the proper supplies, time to prepare extended lesson plans, and any procedural changes needed for the implementation of UDL.

The methodology for this study will involve interviewing nine first grade through third-grade rural elementary school teachers. The NVivo coding software will be used to analyze the interview data collected to assist with determining the results of the study.

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Chapter 1: Introduction

In 2010, the United States Department of Education published a paper titled, *Transforming American Education: Learning Powered by Technology*. This was a comprehensive plan to generate more engagement, increased empowerment, and more personalized learning experiences (Atkins et al., 2010). Throughout this plan, the authors continuously mentioned the idea of instructing all students and the notion of concentrating on student dissimilarity by preparing a more wide-ranging learning atmosphere. The model put forth in the report highlighted Universal Design for Learning (UDL) to empower, encourage, and stimulate all students to accomplish goals and tasks despite background, language, or disabilities (Atkins et al., 2010). Five years later, the UDL method has gained much more interest and has excited, for the most part, transformative practices in K-12 education. To comprehend why it is first essential to appreciate what UDL is and how attributes of its framework may perhaps influence the teaching and learning paradigm, the researcher will investigate this learning and teaching strategy. This investigation will provide the reader with more information about the UDL framework.

As an early childhood education teacher, the researcher has confidence in the potential to provide quality education for all students. A firm belief exists among scholars and educators that the right to a quality early childhood education enhances the abilities of children and forms the pathway to success in higher education, even for children growing up in a low-income rural Southwest Georgia community. Through many years of teaching, the researcher watched students struggle to learn. During ten years in early childhood education, the researcher has not encountered a group of students in which all

students were successful. It is disappointing to the researcher to see children struggle to learn and, over time, lose their confidence to learn. Action is needed to ensure that all learners can gain full admission to the curriculum within the classroom. Rather than approach education with an all-purpose mentality, and at best, adjust the curriculum to put together the needs of *non-average* learners, what is needed is a framework that encourages the mindset in teachers to create, from the beginning, lessons that provide access for all learners. This learning and teaching framework designed to accomplish this kind of instruction is UDL, developed by the Center of Applied Technology (Cast, 2015).

Statement of the Problem

Nationwide, teachers face the daunting task of reteaching content before they can begin teaching the current required content. The area of most concern is mathematics. Rural areas experience the most struggles (Wang, 2018). The researcher has observed that students in a rural area elementary school at times have limited resources, such as manipulatives, often due to a lack of funding, time, and space. Many public schools are in a rural community, which constitutes a considerable portion of American schools. However, this situation is changing due to the development of information, technology, and greater access to computers. The goal is to prevent students from being retained and the deterrence of special education remedial services, and preferably to provide an increase in yearly promotion of students from one grade to another. In general, there is considerable research available about the fidelity of UDL with individual education students within the inclusion classroom. The problem, however, is that there is limited research in the teacher perspective of UDL fidelity within the early childhood education classroom.

Research Problem

The average mathematics score for most students in the 2017 school year for fourth grade did not display a significant comparison to 2015 (NAEP Mathematics, 2018). Nationwide there is concern revolving around the growing number of students struggling in mathematics comprehension (Hornung, Schiltz, Brunner, & Martin, 2014). Nationally, standardized testing for mathematics skills does not begin until the third grade (Hornung et al., 2014). The lack of testing in the earlier grade levels leaves kindergarten through second-grade teacher's judgment to determine if a student is beginning to lag behind his or her peers in numeracy skills (Hornung et al., 2014). Often this scenario results in the student being underserved in intervention services that would allow him or her to catch up to their grade-level peers. Once the teacher has determined that a student is beginning to lag behind his or her peers, the teacher must determine the best intervention method to elevate the student's mathematics comprehension skills. The purpose and research problem for this study is to discover the teachers' perspectives of UDL as an intervention method in mathematics comprehension levels for first through third grade students within an elementary school located in rural Southwest Georgia.

Background and Justification

In any given classroom, there are learners who consistently do not connect with what is taught. A textbook can feel thick and mind numbing to finish. Even an audiovisual resource can place restrictions on learners with sight or hearing complications. The minute these become the only choices accessible, due to students having different learning styles and the one-size-fits-all affecting their mathematics comprehension, some learners will undoubtedly fall behind, while others will move

ahead. The use of UDL would serve as a viable teaching and learning method to close this gap.

Universal Design for Instruction (UDI) and UDL are frameworks aimed at curriculum design**,** teaching, and evaluation that give all students the same opportunities to learn and to validate what they have learned (Maryland Department of Education, 2016). Many professionals in the area of education use these expressions interchangeably. Use of the terms UDI or UDL refers to the same teaching and learning model, as both support to the idea that there is no one technique for learning but many learning modalities such as kinesthetic, auditory, and visual learning. Due to the variances in how children learn, learning will fluctuate across tasks, across growth, and among individual students (Maryland Department of Education, 2016).

UDL contains several principles that are concerned with the why, how, and what of learning (Rose & Meyer, 2002). These principles scaffold learning by offering a variety of pedagogical techniques for all levels of the student (Rose & Meyer, 2002). UDL targets the best practices of differentiating pedagogy, thereby reaching all learning styles of students (Ralabate, 2011). One primary feature of UDL is adjustability to suit the needs of the student. Perceptible information makes material available in a variety of ways, permitting diverse sensory strengths and weaknesses. Tolerance for error requires teachers and paraprofessionals to understand that the starting point for learning is not the same for all students and those students have different paces for learning. The low physical effort requires the teacher to contemplate which method is a suitable means to sustain the concentration of students and to diminish learning fatigue. Dimensions and areas for the use of this approach involve teachers and staff reflecting on the physical

space of the learning environment and considering the placements of learning materials within instruction. The progress of a group of learners helps to grow connections between pupils and teachers. For instructional climate, the focus is on reflection of the learning environment; if expectations were high, encouraging learning would continue to take place (Ralabate, 2011).

Deficiencies in the Evidence

In the arena of academics and giving knowledge to the student, UDL offers the opportunity to students of all learning levels to participate and show improvement on the required core curriculum skills. UDL also decreases barricades teachers face in instruction (Ralabate, 2011). Despite the apparent benefits of UDL, little research exists about teachers' perspectives of how well the execution of UDL works in the early childhood education classroom.

Audience

The audience for this study is early childhood education teachers and school administrators.

Setting of the Study

The study takes place within a rural elementary school in Southwest Georgia.

Researcher's Role

The researcher's role is a first-grade teacher and principal research investigator within the targeted school system. The study also involves other research participants and co-workers.

Purpose of the Study

The purpose of this study is to discover teachers' perspectives of UDL as an intervention method in mathematics comprehension levels for first, second, and third grade students in an elementary school located in rural Southwest Georgia. A vital part of the future successes in children is the learning that takes place in an early childhood classroom (Zhai, Raver, & Jones, 2012). Rather than interacting with new information presented and interpreting that information through the lens of their world, students are recipients of deposits of didactic, one-size-fits-all lessons meant to cover grade-level standards (CAST, 2015). It is important to note that UDL is not a core curriculum in and of itself (Rose & Meyer, 2002). When a classroom has diverse learner needs, this one-size-fits-all lesson planning will not allow all students to access needed content (CAST, 2015). UDL consists of a group of philosophies that pilots the growth of aspirations, evaluations, and core curriculum, which attempts to distribute information smoothly and evenly across all learning levels for all students.

Research Questions

The purpose of this study is to discover teachers' perspectives of UDL as an intervention method in mathematics comprehension levels for first-grade students in an elementary school located in a rural Southwest Georgia district. The following research questions will guide the inquiry:

Research Question 1. What are teachers' perspectives of implementing UDL in early childhood classrooms?

Research Question 2. What are teachers' perspectives of barriers to UDL implementation in the early childhood classroom?

Research Question 3. What are teachers' perspectives of enabling the sustainability of UDL in the early childhood classroom?

Research Question 4. What are teachers' perspectives on the impact on students' learning when using the UDL model on students in early childhood classrooms?

The researcher will accomplish this discovery by interviewing eight early childhood teachers at the elementary school's first grade, second grade, and third-grade levels.

Chapter 2: Literature Review

Introduction

Successful early childhood education classrooms are reliant on assistance from school administrators, peer teamwork, and experts who administer professional development on UDL (Boyd et al., 2010; Leatherman, 2007; Odom et al., 2011). Teachers' understanding of early childhood education is also essential. When there is a perception of early childhood education classrooms as merely a settlement, then students frequently are incapable of being provided meaningful instruction via creative methods (Florian & Black-Hawkins, 2011). All students should be given an equal opportunity to be academically successful throughout their school journey, and UDL is a way of thinking about teaching and learning that affords educators to give students that opportunity. As teachers begin to view UDL as a pedagogical support system, individual students then begin to approach all areas of the curriculum in ways that address their unique individual needs. The UDL approach offers flexibility in students' access to curriculum information and engagement within the program, as well as displaying students' knowledge of skills learned. UDL's goal is to give all students an equal opportunity to succeed by removing barriers and using a variety of teaching methods. UDL is about building flexibility that will provide for every student's strengths and needs.

Universal Design for Learning Allowances

UDL is one of many strategies that focus on the obstacles that face students who work hard to learn. It also addresses Vygotsky's (1986) suggestion for the conditions for learning as well as the least restrictive environment (LRE). Learning in the classroom

should allow students to learn with little to no accommodations or modifications, and UDL allows students to learn in this way. No matter the learning needs of students, it is universally designing instruction that allows for success in the classroom. This design instruction may allow students who do not fall under conventional methods to learn and master content to do just that (Meyer, Rose, & Gordon, 2014). When the content is customized for individual students through the use of technology, and when instructors can incorporate a variety of ways within which students can participate and work together with the material, obstacles are minimized, and students learn. UDL puts accessibility of content at the forefront of planning and allows instructors to be more proactive in their planning to engage students at the highest level possible (McGuire, Scott, & Shaw, 2003).

Instructors must first understand what UDL means to education and how teachers can put it into practice in the early childhood education classroom. UDL is a set of guidelines or a framework. The goal of UDL is to inspire creativity and stimulate each type of student in a class. Thus, instructors are not merely trying to reach students identified with disabilities, students in the middle, or students at the top. Instead, the goal is to reach all students. It is a framework that suggests flexibility not only in the goal's instructors use to teach but in the methods of delivery of information and the assessment of knowledge learned (Meyer, Rose, & Gordon, 2014). By utilizing the UDL principles in the development of curriculum and daily lessons, instructors have a more exceptional ability to meet the needs of all students in their classes, as without this process, it is cumbersome, time-consuming, and expensive (Meyer, Rose, & Gordon, 2014). The three underlying principles of UDL are (a) using multiple means of representing the

information students are to learn, (b) using numerous means for students to convey what they have learned, and (c) using various means of engaging students with the information or concepts learned (Meyer, Rose, & Gordon, 2014). UDL lays the framework for teaching and learning goals, which provide the appropriate challenges for every student. Materials have a flexible format, which in turn supports all students' learning. UDL allows for and encourages flexible and diverse teaching methods or methods for learning so that the learning experience is appropriate for all students. Assessment is completed in a manner, which is conducive to all students' needs as it is flexible and allows students to demonstrate more appropriately what they know or can do (Hitchcock et al., 2002).

The essence of care is evident in early childhood education, and Noddings' (2003) depictions regarding performances displayed from compassionate teachers line up with the objectives of UDL (Johnson, 2004). UDL is not a standard set of lessons, nor is it a direct manual for incorporating students inside a general education classroom. The principles of UDL allow students to learn the curriculum through the use of incorporating their innate skills combined with their interests. At its premise lies the ability for teachers to design their instructional techniques that afford opportunities for academic instruction that is equally delivered for all student learning levels. It is a design for instructional development that is founded on conveying learning opportunities equally for every student (Horn & Banerjee, 2009; Rose & Meyer, 2002). Universal Design for Learning provides modifications and accommodations already ingrained into lessons from inception; therefore, it can benefit all students in the classroom.

An example of universal design is the architecture required to build elevators found in tall buildings. They are beneficial for everyone, particularly people with

ambulatory issues. By ensuring equitable structure to the elevator, the architecture allow individuals with ambulatory issues the equal capability of utilizing the same entry as those who are non-ambulatory. This ensured equity in access to the elevator provides no indignity related to using an elevator in a structure. These individuals' function in the typical functioning world; no matter if a person has his or her hands filled with bags, is lugging a child, or is controlling a wheelchair.

Similarly, UDL supplies the same type of equality and non-judgmental environment for students. UDL provides all students the same opportunities to use identical or equivalent resources, opportunities, and variations for the given curriculum. The foundations of UDL is constructed on the subsequent ideologies: (a) various techniques for demonstrations, (b) several methods of achievement and appearance, and (c) numerous methods of commitment (Rose & Meyer, 2002).

Teachers make available various techniques for demonstration by collaborating visually, verbally, and utilizing several media to represent material. All students need the opportunity to express what they have learned to their teachers in various forms, and UDL allows educators to build multiple means of expression into each lesson, such as (a) oral responses to a question, (b) sketching a picture, or (c) developing a PowerPoint or Prezi presentation. Offering various resources for student engagement includes the provision of resources to develop active brain networks. Engagement consists of offering students' choices in topics throughout each lesson as well as offering opportunities for students to maintain track of their improvement and aspirations. The appearance of UDL in a lesson is diverse, varying with each learning goal individual teachers set in their weekly lesson plan. It is quintessential with UDL that every student has an exclusive and

personalized understanding within the lesson. UDL foundations also stipulate that, in addition to an understanding of the lesson, the student must also obtain the lesson objective. Imperative to the core tenants of UDL that it is not singularly restricted to academics, but that UDL also offers a framework for establishing and producing assessment for students.

Early childhood classroom study is the foundation for every student's educational journey, and it is an excellent reason for educators to implement the principles of UDL into classroom lessons. Just as if the foundation of a structurally sound house, the educational foundation of students needs to be structurally sound as well, so studying how teachers prepare to implement UDL is essential. Of course, learning starts before children enter school, but when children enter preschool, they must master the curriculum in order to build a strong foundation and make their educational journey more fluid for future learning. There is an expectation that children will not attain the required fluency that is essential to allow for educational and social achievement in the future if mastery is not achieved in the early years of education. Training provided to teachers in the application of UDL sets the anticipation level in utilizing its ideologies in the early childhood classroom and curriculum. It also establishes how UDL preparation alters the familiarity and behaviors of individual teachers and their well-thought-out lessons before implementing explicit sanctions and oversimplifications for implementation in the classroom.

Implementing UDL in early childhood education classrooms is seen by many as the biggest challenge. It requires planning and creation, but once completed, the benefits to instructors and students are worth the effort (Dell, Dell, & Blackwell, 2015). This

planning includes the multiple ways in which students are engaging and interacting with the curriculum. Rather than the creation of a single mode of delivery of information, a single assessment, and a singular manner in which to engage with the material, the instructor must think about how he or she might complete the teaching role using multiple modes of each principle.

Universal Design for Learning Framework

The UDL framework was developed by researchers at the Center for Applied Special Technology (CAST) (CAST timeline, 2018). Within a few years of formation, the founders realized the standards-based curriculum created barriers to the variety of learning needs of students (CAST timeline, 2018). These barriers include lack of student motivation, poor socialization skills, cultural differences, family problems, a medical disability, and difference in language, to name a few (What are the most common barriers to learning at school, 2018). It is at this time the founders began to develop and research the efficacy of UDL as an effort to reduce learning barriers in the classroom, and to ensure inclusion of all lessons and students (CAST timeline, 2018; Rao & Meo, 2016; Yeager, Bryk, Muhich, Hausman, & Morales, 2013). At its core, UDL is grounded in the thought that instruction can and should reach a more extensive range of learning needs and transpires when lessons are designed to incorporate varying methods for processing, internalizing transference of information, and assessments (Rao & Meo, 2016). It offers flexibility to teachers when designing lessons as well as flexibility in materials required for each lesson, thereby meeting the learning needs of a variety of learners in the classroom (Rao & Meo, 2016).

This flexibility allows teachers, like the founders of UDL, to consider student barriers to learning. In this consideration, teachers are then able to establish learning supports from the start rather than a continuous cycle of after the fact lesson modification to address the needs of diverse learners (Rao & Meo, 2016). These supports are the scaffolding of the curriculum. Creating academic scaffold supports are necessary when developing lessons that focus on the varying learning needs of students (Rao & Meo, 2016). As the student progresses in the acquisition of learned concepts, then the scaffolds are gradually faded until mastery is shown (Rao & Meo, 2016). Embedded within the three major UDL framework principles are three guiding principles: representation, action and expression, and engagement (Overview of three UDL principles, 2018; UDL principles, 2018). These principles of UDL assist the teacher in scaffolding the curriculum for students in ways that lead to personal pathways of success (Rose & Meyer, 2002).

The blueprint. UDL is a framework for approachability in curriculum and teaching (Edyburn, 2010; King-Sears, 2009; Rose & Meyer, 2002). A fundamental component of UDL is the allowance for modifications within student capabilities. These modifications are inserted in the curricula in a manner that encourages engagement, accessibility, and the overall progression in academics (Horn & Banerjee, 2009; McGuire, Scott, & Shaw, 2006). Rose and Meyer (2002) elucidated on neuroscience research that is merged with the perspectives and ideologies found in academia and psychological reasoning. The merger was established from a belief that was initiated in the construction of a framework which would sustain initial learning for a diverse student population. The UDL's framework is constructed on three doctrines: (a) endorsing the

students' diverse credit systems with numerous approaches of depiction (*what* is learned), (b) supporting the students' various tactical networks with a variety of methods of expression (*how* the lesson will be transcribed to students), and (c) supporting students' assorted active networks with copious approaches of engagement (*why* of learning) (CAST, 2015; Rose & Meyer, 2002). Utilizing these principles, UDL aids in addressing what, how, and why of learning.

Multiple means of representation. The first principle of UDL guiding belief is making various available approaches of representation within the curriculum because not all students comprehend information the same way, so the first guiding principle helps to take this into account. It inspires teachers to implant the presentation of material into teaching in quite a few ways. For example, under the first principle, that of multiple means of representing material and information, instructors consider the possibilities of delivery, thinking about how students learn, such as visual or hands-on. The material can be adjusted to match the students' cognitive learning methods in the classroom (Cognitive constructivism, 2018). Incorporating these methods of delivery into one's teaching requires a shift in mindset if the instructor has been a lecturer in the past. One might consider the use of videos or graphs to present material in addition to lectures so that students are interacting with the information using multiple senses (Meyer, Rose, & Gordon, 2014). One might also incorporate music into the presentation of content. Instructors will support the various paths that students will take to engage with the curriculum materials.

Using any of these strategies allow students who are mostly bimodal in learning style, such as visual and auditory, to engage with the material at a deeper level (Pisha &

Coyne, 2001). Each student will be afforded the scaffolding needed to engage and interact in a way that results in successful completion and a complete understanding of the concepts presented (Hitchcock et al., 2002). Students can have models of skilled performance at their disposal to use as a reference for their practices. Students will frequently receive feedback about their performance as well as how they are engaging with the content and materials for the curriculum. They will also be given ample opportunity to practice the skills being learned in more meaningful contexts as the planning has included real-world application, if done well (Hitchcock et al., 2002). For example, some students comprehend lessons better through auditory learning, while others grasp lessons visually, and yet other students excel by learning things kinesthetically. Proposing numerous approaches of depiction translates into providing opportunities for awareness and proposing additional possibilities for auditory and visual data. It also offers techniques for customization of displaying information (CAST, 2015; Conn-Powers, Cross, Traub, & Hutter-Pishgahi, 2006; Darragh, 2007; Rose & Meyer, 2002).

The CAST (2015) guiding principles further define abundant methods of depictions as well as techniques for furnishing choices for language, mathematics terminologies, and signs. It is imperative for teachers to use clear language and vocabulary as well as to endorse knowledge across languages. UDL generates classroom instruction that is available to all learning levels, not just for students with extraordinary abilities. Nevertheless, UDL ensures that any challenge a student may encounter in the classroom is addressed. Granting many methods of illustration inspires students to grasp new levels of comprehensible information and the value of the lesson concerning world

experiences. For example, educators can galvanize or provide contextual information before presenting an activity or lesson, thereby increasing comprehension. Employing UDL, educators bring to light patterns and associations in the curriculum that assist students' ability to generalize for future learning.

Multiple means of expression. The second edict of UDL, as described by the framework (CAST, 2015), is to make available numerous methods of expression. Just as students differ in the manners in which they obtain knowledge, they also fluctuate in the methods that best articulate the information learned. For example, children lagging in language development often fail to have the capability to provide an answer to the teacher. Children with motor development delays may find it challenging to express answers on an outdated written assessment. By merely offering choices in situations that require physical action, such altering approaches of reply or improving access to fine and or gross motor tools, and assistive technologies will permit students the ability to express their familiarity with a subject in a manner that is best appropriate to their capabilities while still achieving the academic goal of the lesson (Rose & Meyer, 2002). In many instances, the utilization of digital technology for communication is the optimal tool for the arrangement or creation for students in need of alternative forms of self-expression when completing assignments. The second edict, multiple means of expression, allows students to demonstrate what they have learned in a variety of ways. Under the UDL approach, assessment is suited to the task as well as the means (Meyer, Rose, & Gordon, 2014). Rather than the instructor creating a single test or project for the end of a unit or chapter, for example, one could offer the students a choice of two or three different paths of assessment to achieve their end. UDL allows for flexibility, as well as student learning

style and expression, to become more individualized, allowing students more successful completion of the content.

Additionally, and of great importance, the multiple means of expression allowed for assessment purposes will provide more accurate knowledge of the progress all students are making (Hitchcock et al., 2002). As instructors, it is essential to know whether the assessment task assesses the students' ability to engage with an assessment (such as a media type for a film product) rather than the content being assessed. Allowing students, a choice of multiple pathways to achieve the end goal of assessment, removes this question, as students will engage with the pathway most easily managed to complete the assessment (Hitchcock et al., 2002).

Representation

The principle of representation refers to the presentation of each lesson in multiple manners (Overview of three UDL principles, 2018; [UDL principles, 2018]). The presentation of lessons in multiple forms ensures that all learning styles of students are met (UDL principles, 2018). Examples of alternative means of providing access to information can include visual and or auditory methods (UDL principles, 2018). The teacher must provide background knowledge of concepts to be learned in multiple methods as well (UDL principles, 2018). Multiple means of transference of knowledge will assist in not only reaching varying learning styles but also in retention of knowledge gained (UDL principles, 2018).

Action and Expression

Action and expression are the processes of allowing for differentiation of student expressions of lessons learned (UDL principles, 2018). It can be further broken down into

methods for students responding to and completing assignments. When responding, students can be offered the option of using a keyboard or physically writing out the assignment (UDL principles, 2018). When completing assignments, students could be afforded the option of utilizing multimedia such as film or music, writing an essay, or even trifold board presentations (UDL principles, 2018).

Multiple means of engagement. UDL's third edict consists of *a number* of methods for interactions and the recognition that students frequently have their motivation for learning as well as the ability to engage with the learning and materials being used. There is no one specific method of learning interactions that drives work for all students. Again, offering students a choice by allowing more than one option for ways to engage with material allows for more student engagement and, thus, success.

An example might be allowing students to view a video of the instructor's lecture outside of the classroom as often as needed to grasp the key concepts (Meyer, Rose, & Gordon, 2014). Additional resources can be offered to students allowing for varying levels of engagement as needed by the individual student. Students who prefer reading about the subject at hand can choose that pathway to attain the content. Others might prefer to look at visual examples or video, if available, to enhance their understanding of the content. Still, others may prefer to listen to someone, perhaps the instructor lecturing about the content to add to their understanding. Having all options available to students to choose from as they engage with the content allows the flexibility necessary for all students to achieve success in understanding the content being taught (Hitchcock et al., 2002). When educators speak about accessing the curriculum, they must remind themselves that access is the plan for learning, not the activities or the information. It is

the learning that must be accessible to all students in the classroom (Hitchcock et al., 2002). Using these principles as the foundation for the curriculum, instructors allow for those students with visual, auditory, reading, or other kinds of learning issues to interact with the material and respond in a manner conducive to demonstrating what they know in the best possible light (Hitchcock et al., 2002). This flexibility allows students to demonstrate their ability with the content and the assessment.

Importance should be given to the observation of students during their academic engagements, taking particular notice that student interactions and engagements consist of more than seeking the student's attention, as described in the UDL Guidelines (CAST, 2015; CAST timeline, 2018). Student interactions and engagement consists of encouraging learning and participation as well as making possibilities for singular choices, yet ensuring the academic goals and methodologies applicable to the student (Darragh, 2007). The most popular type of engagement with students involves noise and flashing lights, but contrary to what others believe, some students are more engaged when the learning space is quiet and free from distraction. In order to have several methods of participation, students should be permitted various pedagogical techniques as well as have numerous occasions to discover academic associations with the materials. As stated by CAST (2015), teachers should also deepen their mastery-oriented responses and assist students in building up self-evaluation and reflection. In cooperation, self-evaluation and reflection will aid students in recognizing the significance and magnitude of what is being learned in addition to assisting teachers in the efficacy in developing the neural networks in the brain (Rose & Meyer, 2002). Teachers should offer opportunities to students that will intensify the authenticity and significance of lessons and skills

learned, for example, using play money or pizzas to teach mathematics skills (UDL principles, 2018). Team projects or peer tutoring are additional options to build upon active engagement in lessons (UDL principles, 2018).

The strategic network of UDL denotes the *how* learning takes place, and the affective network indicates the *why* of techniques used in transcribing learning. According to Rose and Meyer (2002), barriers can exist in students' learning. Nevertheless, students can discern subtle differences in learning patterns and presentations of curricula, which thereby would reach the diverse needs of students (Rose & Meyer, 2002). The three main embedded principles of UDL were created as guidelines to inform teachers regarding the variability that can be presented to learners and therefore serve as a scaffold for learners (Rose & Meyer, 2002). When using the three principles embedded within the UDL framework, which are representation, action and expression, and engagement, teachers can design their curriculum in such a manner as to diminish or remove barriers that impact students' ability to learn (UDL principles, 2018). The UDL framework offers teachers the ability to reach and support all learners' needs, no matter the students' background or development level **(**Lowery, Hollingshead, & Howery, 2017). Finally, the UDL framework assists in the creation of meaningful educational practices and additional options for all students by providing a means for the teacher to understand better each student's needs **(**Lowery, Hollingshead, & Howery, 2017).

UDL in the literature. Studies on UDL has a broad reach, extending from the application of UDL, the capability seen in the use of UDL, exhibits into the utilization of a specific lesson, and the findings of the theoretical framework on school-wide implementation. Courey, Tappe, Siker, and Le Page (2013) delved into the application of

enhancing lesson planning development via educating teachers to consider potential obstacles in their philosophies regarding student instruction along with including the tenets of UDL. Teachers demonstrated considerable progress in their capabilities in UDL utilization in their lesson plans after a three-hour online training on how to use UDL. Researchers had assigned the lesson plans as an assignment during teacher training and indicated they, the researchers, were uncertain of the teachers' capacity to envision UDL implementation in the teachers' classroom.

Another study fixated on the utilization of UDL as a method for coaching literacy skills to students with substantial academic disabilities. In this study, instead of training teachers on overall UDL concept, teachers were explicitly taught how to employ alphanumeric texts and other software correspondences (Coyne, Pisha, Dalton, Zeph, & Smith, 2012). Additionally, teachers in this study were afforded preparation time to establish the best methods of integration of the new knowledge into their literacy program. Teachers practiced entrenching individualization into the curriculum for each student. In this study, only general education scholars were allocated the use of the computer program. In order to facilitate this software, teachers had to work individually with the student.

Creating Lesson Plans

Nationally, school systems must ensure the academic success of all students. This success is based on established standards, which are the benchmarks of crucial skills and knowledge that are necessary to master before promotion to the next grade level (Rao & Meo, 2016). These benchmarks are met through lesson plans that teachers have created. To ensure benchmarks are met, these lesson plans encompass four components, which are

(a) goals and objectives, (b) pedagogy and methods, (c) materials and resources, and (d) assessment (Rao & Meo, 2016). Lesson goals or objectives lay out what standard(s) will be taught, and mastery expected during the week or weeks (Rao & Meo, 2016). Pedagogy or methods of instruction are the *how* lessons, which are used in conveying concepts and skills required in state standards (Rao & Meo, 2016). Materials include all items needed to conduct the lesson, which are varied according to the lesson. These can range from items such as electronic equipment that comprise of laptops, whiteboards, writing paper, and pencils, to materials required for a science project (Rao & Meo, 2016). Finally, the teacher will conduct an assessment to ensure that learning and comprehension have occurred. The assessment can be formative or summative but should align closely with selected state standards (Rao & Meo, 2016).

Due to the homogenous nature of state standards, teachers often find themselves teaching to the *average* learner. Meyer, Rose, and Gordon (2014) believed curricula are specially developed and designed in a homogenous manner to teach to the average student. However, this average student is a myth, and as such, the homogenous curricula creates a barrier to learning. Students are not homogenous and do not learn in a homogenous manner (Rao & Meo, 2016). Examples of these differences include how the student processes information, organization skills, pace in working, communication skills, approach in task completion, and family background and experiences (Rao & Meo, 2016). Therefore, it is incumbent upon teachers to not only develop a lesson plan that meets state standards but also to develop lessons that allow flexibility in instruction and assessment (Rao & Meo, 2016). Aligning lessons to state academic standards as well as with the learning needs of the students is a daunting task for most teachers (Rao & Meo,

2016; Tobin & Tippett, 2014). A framework developed to assist teachers in this daunting task is UDL (Rao & Meo, 2016).

UDL and technology. Teachers who remain open to technology and the admission to digital content deliver a more meaningful opportunity for all their students to thoroughly engage with the content, as well as accurately complete the assessment for that content. Technology permits for flexibility in the use of published materials, whether the typeface needs to be diverse or the color of the page altered (Hitchcock et al., 2002). Computers and software programs available today can help students with diverse needs navigate more easily the content with which they are required to interact. Technology allows students a more significant opportunity to master content as the programs remove some of the barriers present in print materials (Pisha & Coyne, 2001). Other supports from the digital world could include glossaries or other informational resources; graphics, and animation, which could be used to highlight information; and tools for students to express their thinking, such as through recordings or a notepad, that can store text (Hitchcock et al., 2002). These supports can enhance the presentation of information so that students can interact at the highest level (Pisha & Coyne, 2001). An example of this support is flexible digital textbooks. These textbooks are based upon the Center for Applied Special Technology (CAST) principles developed after gathering data from students and teachers in a study completed in 1999 with Microsoft. The digital textbook is a model for the students and is personally flexible for each student's needs (Pisha & Coyne, 2001).

UDL and engaging students. While concentrating on an amalgamation of various methods in expression and representation of the curriculum, teachers should

envision ways of offering students many occasions in understanding knowledge and life. Teachers must understand the holistic needs of their students in conjunction with making available an atmosphere that allows all students to encounter the lesson similarly. Rose and Meyer (2002) described interaction as a more intricate rationale for students to be connected to the curriculum. Furthering the importance is knowing the students in the classroom and what their learning strengths are. Brainstorming a list of the multiple intelligences that lend itself to the content learning for the lesson is critical. Instructors look to the learning needs of the students to decide the best ways to deliver the content and then assess the learning. The idea behind UDL is to stimulate and motivate each kind of learner (Noonoo, 2014). This kind of preplanning and planning allows for less concern about individual support as each student can choose the pathways that best fit his or her learning. It is also critical that students develop skills embedded in content learning activities. These skills can include learning how to plan a task, evaluate a task, or complete the task in front of them (Hitchcock et al., 2002). To accomplish this, it is suggested that instructors do not ignore technology; instead, they should use it well. Technology has a significant position in expanding the plan for information and content distribution as well as assessment. Once more, the goal is to involve all students, and technology can allow for that goal. One example might be the use of a computer that allows a student to turn on the speech-to-text option or allows students to choose background colors and icons to motivate learning (Noonoo, 2014).

It is recommended that further engagement of students could happen if the instructor solicited more input from students in the planning phase of the lesson and design. Once they have begun, students will note that something is different in the

instruction of lessons using UDL. Noonoo (2014) suggested that instructors explain the reason or reasons for the change in instruction to provide a vehicle for further engagement and to understand the goal the instructor hopes to accomplish. Students should be intrinsically motivated to learn, but it is recognized that many either lose this motivation after the start of school or have not fully developed it.

To facilitate opportunities for developing this intrinsic motivation for learning, instructors can do some of the following as part of the prepping and planning for UDL. Instructors can begin by thinking carefully about the arrangement of the classroom and the seating of students. What kind of learning opportunities are students being offered in the lesson? Would small group work be an option? If so, the instructor must provide a way for room arrangement, such as moving desks together for students choosing this option. Instructors should also make time during the lessons to hear what students have to say. Allowing students to voice their opinions allows the instructor not only individual time with each student but the opportunity to assess and correct any thinking that is incorrect or incomplete. Instructors could plan for students to lead discussions as part of the class. Student-led discussion requires preparation ahead of time; however, the results can often be more profound than in teacher-led discussions. A final strategy that instructors could implement is one that might take time to grow but has ultimate rewards. This strategy is creating a culture of reflection by the students. Students in this kind of classroom feel that reflection is an actual part of the learning process and is not an assignment or an add-on. Student self-reflection requires the instructor to regularly embed opportunities into lessons for students to accomplish the task of reflecting on their work, their effort, their learning, and their progress. It is this opportunity that will allow

students to connect with learning, how they feel about it, and perhaps be more open to learning in general (Stein, 2015).

UDL in early childhood. Structures and meditations in the use of UDL in early childhood classrooms have been suggested and hypothesized (Conn-Powers et al., 2006; Darragh, 2007), but experiential research in this area is rigorously missing. Conn-Powers et al. (2006) clearly explained that the edicts of UDL pertain to early childhood education. They make available an explanation of how a UDL edict parallels with the design and instruction of early childhood teachers. Concerns in the methods of the utilization of UDL edicts into mainstream early childhood teaching, such as the classroom assembly, are supplied.

Nevertheless, they suggest methods that are not corroborated by empirical research. Darragh (2007) developed the submissions from Conn-Powers (2006) through forming a techniques theory framework for Universal Design for Early Childhood Education (UDECE). This framework describes each of the three edicts of UDL and how the edicts contribute to each other, yet remain diverse sections of the paradigm.

Lieber, Horn, Palmer, and Fleming (2008) applied edicts to UDL to create the Children's School Success curriculum. They believed that this curriculum would aid in entering kindergarteners that were recognized as *at-risk* for academic delays. Lieber (2008) asserted that the results of the study were encouraging, displaying the accomplishments of delayed students in the early childhood general education classroom. Results were determined by comparing the scores on standardized early childhood literacy and mathematics assessments in addition to standardized social skills rating systems. Still, the researchers stated the application of the curriculum in conjunction with

the teachers' knowledge regarding the amount of individualization and any accommodations each student required resulted in the success of the students. The unscripted, individualized accommodations were considered in the study via the application of Sandall and Schwartz's (2008) list of curriculum modifications.

Mathematics Skills

Young students' mathematics skills appear to be quite stable over time, but differences between their skills increase during primary school (Aunola, Leskinen, Lerkkanen, & Nurmi, 2004). Children with low skill levels in basic mathematics tasks during kindergarten or at the beginning of primary school tend to be low mathematics achievers at the end of primary school (Krajewski & Schneider, 2009). The gap in students' skills is inclined to widen, which means that those students who start with better mathematics skills or numerical cognition develop their skills faster than students with below-average skills (Bodovski & Farkas, 2007; Geary, 2011; Jordan, Kaplan, Ramineni, & Locunial, 2009; Kikas; Peets, Palu, & Afanasjev, 2009; Shin, Davidson, Long, Chan, & Heistad, 2013). There is an ongoing debate on the causality of the developmental steps. However, it is well known that other factors, besides previous mathematics skills, are related to students' later mathematics proficiency. Namely, longitudinal relations between mathematics skills at the beginning of school and further points in education are mediated or moderated by individual factors such as self-regulation and motivation as well as environmental factors (Gottfried, Marcoulides, Gottfried, & Oliver, 2013; Watts et al., 2015). Thus, understanding relations between mathematics skills and self-regulation in young students is essential to support the development of both. Further, differences in mathematics skill development between children with different academic

abilities (Shin et al., 2013) refer to the possibility that mathematic skills and the relation to self-regulation may differ in different cognitive ability groups.

The Development of Mathematics Skills

The theoretical models of mathematics skill development recommend domain-general such as cognitive skills and domain-specific factors, such as primary number and calculation skills, as prerequisites for further skills. The independent sub-skills form a hierarchy of developmental steps in mathematics, as learning basic skills is necessary for learning more complex skills (Dowker, 2005). Mathematics skills are distinguished as calculation and problem-solving skills (Dowker, 2005; Rittle-Johnson & Schneider, 2015). Calculation skills are mostly procedural, while problem-solving skills demand both bits of knowledge of mathematics concepts and application of mathematics competency into real-world situations (Rittle-Johnson & Schneider, 2015; Verschaffel, De Corte, & Lasure, 1994).

Calculation skills are the most crucial in early mathematics because automatization of calculation opens the opportunity to understand number related concepts and solve more complex problems (Gersten, Jordan, & Flojo, 2005). It should be emphasized that calculation skills only open the doors to, but do not automatically lead to conceptual understanding. As summarized by Dowker (2005), practicing calculation brings about better calculation skills but not necessarily the ability to solve more complex tasks down the line, and not having higher mathematics motivation. Furthermore, although calculation skills may be attained through computational drilling, it would be beneficial for young children's conceptual mathematics development if arithmetic procedures are taught with an explanation of concepts behind them (Resnick,

1989). As discussed above, the ability to solve complex or novel mathematics problems assumes conceptual knowledge in mathematics. The reason why these tasks are more demanding is that there is no direct link from the problem to the procedure for solving it (Resnick, 1989). Therefore, skillful solving of complex and novel tasks, including word problems, requires students to understand not only mathematics concepts but also relations between concepts (De Corte, Mason, Depaepe, & Verschaffel, 2011).

Word problem-solving skills are essential to master, as these pave the way for obtaining further mathematics skills. For example, problem-solving skills are more reliable predictors of later mathematics skills compared to calculation skills in primary grades, where students who have difficulties in word problem-solving tend to struggle with mathematics later (Fuchs, Powell et al., 2014; Powell & Fuchs, 2014). Procedural calculation skills and conceptual knowledge assuming problem-solving skills are strongly related to each other, although conceptual knowledge has a more significant role in supporting procedural skills than procedural skills have in supporting conceptual knowledge (Rittle-Johnson & Schneider, 2015). From the developmental perspective, studies of antecedents of young students' mathematics skills, as well as intervention studies, indicate that calculation skills and problem-solving skills tend to have different developmental trajectories, and many students have problems in transferring one particular proficiency to another (Fuchs, Geary et al., 2010; Fuchs, Powell et al., 2014).

Motivation and Mathematics Skills

Motivation and related behavioral self-regulation are necessary for learning and achievement. Motivated students put more effort into their school tasks and show better performance. Developing and sustaining optimal motivation is one of the critical

challenges of the educational system, and it is sometimes even considered a more critical school outcome than domain-specific skills (Lazowski & Hulleman, 2015). Thus, it is necessary to examine how to promote and sustain student motivation, even if tasks are exhausting or tedious (De Corte et al., 2011; Gottfried et al., 2013). Motivation also plays a vital role in domain-specific skill development, such as learning and understanding mathematics. In current mathematics interest, self-concept and performance goals are taken under closer examination from motivational frameworks and task-persistent learning behavior as an expression of motivation in behavioral self-regulation.

In discussions about mathematics and motivation to learn mathematics, the question of causality or the direction of relations between motivation and related learning behavior or skills has been a topic of interest (Aunola, Leskinen, & Nurmi, 2006; Zimmerman & Schunk, 2008). Longitudinal interrelations between students' motivation or learning behavior and academic achievement in mathematics have differed in various studies. For example, Green, Pasnak, and Romero (2009) showed that children's motivation predicted later numeracy while numeracy did not affect later motivation. In another study, primary school students' interest in mathematics revealed better subsequent mathematics skills, which in turn resulted in higher interest down the line (Aunola et al., 2006). Moreover, relations between motivation and mathematics achievement might be culture-specific. Studies based on Trends in International Mathematics and Science Study (TIMSS) and Programme of International Students Assessment (PISA) indicated that countries differ considerably in average mathematics self-efficacy and self-concept, and relations between motivation and mathematics achievement (Lee, 2009; Marsh et al., 2014). This difference emphasizes the need for

examining relations of young students' motivation and skills in mathematics among Estonian students, specifically with a future perspective of knowledge from such studies influencing educational policy and classroom instruction.

Among several frameworks of interest, some emphasize its cognitive components, and others emphasize its affective components (Hidi, Renninger, & Krapp, 2004). It has been suggested that learning mathematics demands more effort than many other subjects, making interest in mathematics more crucial (Gottfried et al., 2013). In the framework of expectancy-value theory, interest is addressed as a part of task value; the degree of which a task or domain that is learned satisfies student's needs, assists in gaining goals, and corroborates with personal values. Together with attainment and utility value, interest refers to the value a student attributes to the learning activity. Interest is also referred to as an antecedent of self-regulated learning, which directs students toward self-regulation, as well as a related outcome of self-regulated learning (Zimmerman & Schunk, 2008).

An Interdisciplinary Approach

With the education of young children at risk, it is crucial to gain viewpoints from numerous specialties, thereby guaranteeing an excellent and comprehensive resolution to the topic. Interdisciplinary approaches in understanding the best method teachers use to educate young students necessitates the integration between two or more fields of research into one solution. This integration should include the research literature as well as the perception of results (Repko, 2008). Examples of disciplines with relations to education include ethics, sociology, psychology, and education. There is a smooth incorporation of shared psychological perceptions among teachers when employing innovative UDL instructional and pedagogical methods and ethics in the early childhood

classroom when concepts are derived from all these disciplines. UDL, when offered to teachers during professional development, proposes innovative approaches in thinking about the accessibility of the curriculum. The approachability and encouraging nature of UDL are augmented with the caring and understanding of students' abilities, as seen in teachers' pedagogical techniques.

Nevertheless, teachers cannot be forced into a *caring* posture (Noddings, 2003, 2005). Despite UDL encouraging teachers to develop their lessons with a shared objective for all students, a built-in pedagogical flexibility grants access to lesson accommodations or modification to individual students if they are needed. This degree of individualization allows occasions for teachers to propagate social models of engagement in the classroom. Nevertheless, a potential exists for teachers' opinions on professional development and their psychological perceptions to be in conflict resulting in an impact on the aspiration and or capacity to care. According to Repko (2008), the causes of prospective conflict substantiate a need for an interdisciplinary tactic in the study of this issue.

The Role of Teachers

If the pathway to student success can be found at the joining of equitable access and the curriculum, then surely, the classroom teacher must provide the connection. Teachers are exceptionally positioned to influence and affect student learning outcomes in both positive and negative ways. Darling-Hammond (2009) stated, "Teaching quality has to do with strong instruction that enables a wide range of students to learn. Such instruction meets the demands of the discipline, the goals of instruction, and the needs of students in a particular context" (p. 3). Sanders and Horn (1998) agreed that teacher

quality is key to student achievement, “it is clear that teacher effectiveness is the major factor influencing student academic gain” (p. 6). National educational reform movements have led to higher levels of scrutiny of teachers and teacher preparation. The reauthorization of the Elementary and Secondary Education Act (ESEA) in 2001 as No Child Left Behind (NCLB) led to measures that ultimately brought into specific focus the breadth of the student achievement gap. Meyers (2012) stated, “NCLB has been the most explicit federal effort to close achievement gaps in the history of American education” (p. 470). NCLB highlighted students who were, in many cases, years behind their peers in terms of student learning outcomes. NCLB also brought to the forefront of the expectation that all teachers be *highly qualified*. This legislation included three major benchmarks that teachers must demonstrate including, holding a bachelor’s degree, holding state certification or licensure, and demonstrating competency in the subject matter being taught.

Psychological Experiences of Teachers

Teachers' psychological experiences influence their mindsets concerning the execution of new pedagogical processes and proposals. Regardless of teacher burnout or an elevated perception of self-efficacy, teachers' psychological experiences correlate to how they decide to execute new procedures and modify their instituted classroom habits. A more seasoned teacher will likely rebuke the suggestion of a new routine, opting to have his or her routine remain unchanged. More seasoned teachers are also less likely to be inspired by activities performed in professional development (Maskit, 2011). There is a higher chance of implementation of new procedures learned in professional development when the professional development is seen to increase a teacher’s sense of

self-efficacy (Ransford, Greenberg, Domitrovich, Small, & Jacobson, 2009). Elevated levels of confidence in utilizing novel pedagogical methods are seen when teachers see support in the implementation from members of the administration.

There is a profound recognition that teachers sustain singular accountability for the most substantial part of instruction in the classroom. Responsivities which fall under the purview of the teacher include planning lessons, preparation for daily activities, monitoring student progression, and parental communication. Teacher attitudes and expectations of learning outcomes are the consequence of their broad authority over the performance and atmosphere of their classrooms (Male, 2011). While contemplating early childhood education, professional development occasions must assist teachers in preserving positive mindsets and efficient instructional procedures for young students. Teachers should feel that professional development training is pertinent to their pedagogical subject matter knowledge and classroom circumstances. Van Driel and Berry (2012) determined in order for this to occur, training cannot be generalizable to the *expert teachers*, rather it should instead be detailed to teachers' situation. They also established that professional development training must be carefully associated with teachers' classroom procedures so they will be able to take pieces immediately to their classroom for application.

Learning Styles and Teaching Styles

The number of students that is taught in a class is partially regulated by students' innate skills and past academics. Students' learning styles and teacher's instructional styles also contribute to the amount of learning that students retain. Misalignments amid learning and teaching styles create situations of tediousness in students, which might

include inattentiveness, poor test performance, and a sense of discouragement ensues. When these consequences are observed by the time a student has reached high school, if changes are not made to the curriculum or teaching styles, the students can be seen dropping out of school (Felder & Silverman, 1988). Learning retention is shown to increase and last for extended periods when the teaching styles and learning styles are in tandem. Students also display an increased perception of post-course positivity stance towards academics in comparison to their counterparts experiencing mismatched learning and teaching styles.

The synthesized findings of Felder and Silverman (1988) are derived from several studies coagulated to articulate a multidimensional learning style method. The answers to five questions can characterize the learning style of a student:

1. What form of material ensures the student favorably understands the lesson? This could be sensory, which comprises of visual, auditory, and tactile sensation. In addition, this could also be intuitive, which comprises of recollections, concepts, and perceptions.

2. Across which methods is sensory information most efficiently identified? This could be visual, which comprises of images, illustrations, graphs, and presentations. This could also be auditory, which comprises of sounds, and vocalized expressions.

3. Which establishment of gaining information is the student most contented with? It could be inductive reasoning, which comprises of details and interpretations, or inferences of fundamental tenets? In addition, it could also be deductive reasoning, where tenets are afforded, after-effects, as well as functions are determined.

4. In what manner does the student desire to obtain information? It could be active participation, via physical interaction with the activity or dialogue. It could also be contemplation, such as introspection.

5. How does the student comprehension level improve? It could be successively, which comprises of progressing in a logical series of incremental steps, or comprehensively, which is through significant leaps, holistically.

The dichotomous learning style components displayed within this model exist as a continuum and not an either-or category. Student predilections on any presented range may be robust, measured, or virtually absent. This continuum can alter with time or fluctuate between subject matters or learning environment (Felder, 1993).

According to Katsioloudis and Fantz (2012), learning styles are subjective attributes influencing students' interaction within the learning environment, among peers, and teachers. Katsioloudis and Fantz (2012) conveyed four dimensions of learning style: (a) sensing learners (tangible, applied, oriented towards facts and procedures) or intuitive learners (conceptual, innovative, concerned with philosophies and denotations); (b) visual learners (preference for visual depictions-images, illustrations, and flow charts) or verbal learners (a preference for spoken or written expression); (c) active learners (learn by doing and physical interactions with others) or reflective learners (learn by postulating issues, preference for solitary work); and (d) sequential learners (learn in minuscule incremental steps, linear, methodical) or global learners (learn in immense bounds, holistic, and organizational thinkers) (Felder, 1993).

Similar to students' preference for learning styles, teachers also have a favorite teaching style. Jain (2008) characterized four instructional styles:

1. Formal authoritative, which is when a teacher delivers and controls the stream of content; students are projected to accept the content.

2. Demonstrator or personal model, which is when a teacher exemplifies desired learning expectations, demonstrating skills and procedures, coaching students in emergent skills and knowledge, and the application of skills and knowledge.

3. Facilitator, which is when instruction emphasizes student-centered learning.

4. Delegator, which affords students the ability to design and implement learning assignments, and the teacher acts as a consultant during the lesson.

Grasha (1994) theorized that, to varying degrees, teachers possess the attributes and *expert* style for quality instruction, as they are the keepers of knowledge and ability that all students should acquire in the classroom. Teachers make use of some methods more frequently than others, and some mixes of methods are more dominant than others. Grasha (1994) further added that a conferred teaching style generates a specific ambiance or emotional climate in the classroom.

Katsioloudis and Fantz (2012) asserted that when teachers modify their teaching style to be inclusive of various student learning styles, then the provision of optimum learning should transpire. Complementary teaching approaches to a student's desired learning style is expected to stimulate comprehension and retention of knowledge. Teachers increase their understanding of themselves when they are cognizant of their preferred teaching technique. They also glean manners in which their teaching style can be modified and supported to enhance their collaborations with students (Evans, Harkins, & Young, 2008). Once teachers master differentiated instruction, ensuring consistent

student experiences in the realm of success, then the result is increased job satisfaction (Adami, 2004; Tomlinson, 1999).

Research Based Practice

Teachers, schools, and school systems could select between several research-based procedures, interventions, and curriculums. It is to the benefit of all students that academic procedures that are employed are rooted in a foundation of research-based initiatives. Research-based initiatives are proven to be valid for general education classrooms because there is an inclusion of differentiated instruction, peer mentoring, co-teaching, and direct instruction. Additional research has indicated that methods that provide for individualizing instruction, involving presenting the option of rewards, delivering flexible degrees of challenges, supplying methods, stressing crucial elements, and applying assorted tools and media are also valid for the general education classroom (Burns & Ysseldyke, 2009). When used in conjunction, these styles and procedures operate in tandem in the creation of a universally accessible lesson or curriculum (Rose & Meyer, 2002).

Universal Design for Learning and Teacher Preparation

Despite the mandated use of UDL in the Higher Education Opportunity Act of 2008, UDL is not used comprehensively in teacher preparation programs. In many cases, UDL is taught to some preservice education teacher candidates but not to general education preservice candidates. The literature on UDL focuses on teacher preparation programs and almost exclusively refers to UDL being taught in programs designed for teachers of special education. The UDL framework and principles, when applied to the lesson planning of special educators, can help remove barriers for exceptional children in

their classrooms. Nevertheless, the law calls explicitly for UDL to be used to guide educational practice for all teacher candidates in order to reach all children. Thus, this preparation in UDL includes general education teachers.

Consequently, students with disabilities are not the only students who would profit from educators use of the UDL framework. Students for whom English is a second language, students who are gifted, or students who struggle with an identified concept within a content area can all reap the rewards from the application of UDL by their teachers applying it to their classroom lessons. Is it possible that in attempting to level the playing field of learning for one group of students, those with disabilities, we have created an uneven learning landscape for other groups of students?

In addition to UDL as a framework through which teacher preparation programs should develop their curriculum for *all* teacher candidates, UDL takes place when assessing the competency and effectiveness of both general education and special education preservice teachers. Review of lesson plans and observations of the implementation of those lessons by all pre-service teachers should be viewed through the lens of UDL. It is not enough that each preservice teacher can write a lesson plan that includes correct subject matter content if said content does not translate to actual student learning. The same time spent on how learning will take place within the classroom, specifically, how each child, whether he or she is economically disadvantaged, disability challenged, or an average learner, can find his or her entry point into the lesson. Every child must be able to secure access to all content that is present. The utilization of the framework of UDL by preservice teachers when creating their lesson plans may be followed by close observation of UDL principles in action within the implementation of

the lesson. If teacher preparation programs are to effectively include UDL as the lens through which each preservice teacher creates instruction, it must also ensure that it utilizes assessment tools that reflect and measure UDL.

With all the standards-based testing and accountability measures that developed in the name of closing the achievement gap, we appear to have forgotten those who are languishing in the chasm of that achievement gap. Further, what if there are students who do not live within the confines of the stated achievement gap but still struggle to find access to learning? What if all this focus on achievement has led us to lose our focus on the children themselves? Children fundamentally want to learn and want to be engaged. They are, by nature, curious about the world. Before ever entering a classroom, children observe their world, explore their world by seeing, touching, and hearing all that is around them. They are engaging learners from the start. Then, they become school-aged, and, for some, the joy of learning goes away.

Children who cannot find access to the joy of learning within the confines of a classroom are the very children who lack access to the curriculum. This lack of access can occur for many types of learners. Others cannot access the classroom content because it is not relevant to the context of their lives and, therefore, does not make sense. Some cannot access the learning taking place within the classroom because it is presented in a language incomprehensible to them. Furthermore, there are yet others who are not able to access the curriculum of their classroom because they are tired and hungry.

As educators, if we believe that all children have a right to education, and if we believe that all children can learn, then we must believe as well that all children must have access in order to learn. These beliefs then become the foundation for the imperative

of every educator, it is not enough to present knowledge to students and hope that they learn. We are called and chosen, and we are responsible for ensuring the success of every child. We must then find a way to create temporary access to learning that all children seek and deserve. This is a difficult journey to be sure, but it is not an impossible one. The destination is clear access for all children. UDL provides the framework, or the roadmap, for this journey.

Purpose of the Study

The purpose of this study is to discover the teacher's perspectives of Universal Design in Learning (UDL) as an intervention method in mathematics comprehension levels for first, second, and third grade students in an elementary school in a rural Southwest Georgia school district. The learning that transpires in an early childhood classroom is essential to the forthcoming social and academic achievements of all children (Zhai, Raver, & Jones, 2012). Rather than interacting with new information presented and interpreting that information through the lens of their world, students are recipients of deposits of didactic, one-size-fits-all lessons meant to cover grade-level standards (CAST, 2015). When a classroom has diverse learner's needs, this one-size-fits-all lesson planning will not allow them to access the content (CAST, 2015). The age of educational accountability has not guaranteed equal access to education. Orfield, Frankenberg, Ee, and Kuscera (2014) stated, "The impact of the standards and accountability era has been felt more acutely in minority-segregated schools where a focus on rote skills and memorization, in many instances, takes the place of creative, engaging teaching" (p. 38). UDL is established on tenets that direct the development of goals, assessment, and curriculum, all the while endeavoring to equal accessibility to all

students. It is not a curriculum in and of itself (Rose & Meyer, 2002). The purpose of this study is to discover the teacher's perceptions of UDL as an intervention method in mathematics comprehension levels for first, second, and third grade students in an elementary school in a rural Southwest Georgia school district. The following research questions will guide the researcher's inquiry:

1. What are teachers' perspectives of implementing UDL in the early childhood classroom?

2. What are teachers' perspectives of barriers to UDL implementation in the early childhood classroom?

3. What are teachers' perspectives of enabling the sustainability of UDL in the early childhood classroom?

4. What are teachers' perspectives on the impact on students' learning when using the UDL model for teaching students in early childhood classrooms?

Chapter 3: Methodology

Research Questions

The purpose of this study is to discover teachers' perspectives of the implementation of UDL for the retention of mathematics skills in students of a first, second, and third grade class in an elementary school in a rural Southwest Georgia school district. The following four questions guided the researcher's inquiry:

Research Question 1. What are teachers' perspectives of implementing UDL in early childhood classrooms?

Research Question 2. What are teachers' perspectives of barriers to UDL implementation in the early childhood classroom?

Research Question 3. What are teachers' perspectives of enabling the sustainability of UDL in the early childhood classroom?

Research Question 4. What are the teacher's perspectives on the impact on students' learning when using the UDL model on students in early childhood classrooms? The researcher will accomplish this discovery by interviewing eight early childhood teachers at the elementary school's first grade, second grade, and third-grade levels.

The literature surrounding early childhood education and the implementation of UDL procedures in early childhood classrooms is prodigiously qualitative. Opinions, perceptions, procedures, and teachers' functions cannot be quantified as effortlessly as specified in academic conclusions. To comprehend by what methods teachers use to enable the implementation of UDL, it is essential researchers delve deep into the activities seen in early childhood classrooms and to have the capacity to decipher the findings in an unbiased manner. In particular, when seeking to identify and comprehend a

phenomenon that is as so understudied as is the application of UDL in an early childhood education classroom, the use of an in-depth descriptive case study would be the most illuminating. A descriptive case study, as defined by Merriam (1988), introduced a thorough account of the phenomenon.

Design

Creswell (2012) stipulated that qualitative research is most appropriate if the objective of the study, which is to achieve an in-depth insight into a dilemma or phenomenon. According to Stake (1995), a "qualitative study capitalizes on ordinary ways of getting acquainted with things" (p. 49). Additionally, qualitative research permits the researcher to keenly concentrate on the analysis of replies from a small number of participants. A small quantity of participants allows for further personal discussions between the researcher and participants during the qualitative data gathering timeframe than would ensue in a quantitative study. Individual interviews and group interviews enable the researcher to reshape and elucidate during data gathering. Consistent within the qualitative methodology is an innate curiosity in processes rather than a focus on the conclusions (Merriam, 1988).

Maxwell (2013) expounded on how the differences between qualitative and quantitative methodologies, which are succinctly separate concerning philosophy and procedure. The main focus of qualitative research is on people, circumstances, and/or experiences. In addition, Maxwell clarified qualitative methodology as permitting the researcher to explore and analyze themes and connections. Qualitative research influence stems from the practice of attaining deeper echelons of information that provide in-depth descriptions of understanding of a phenomenon rather than numerical

data of quantitative research. For these reasons, a qualitative methodology was carefully chosen for this research. The researcher seeks to obtain a substantial understanding of the what, why, and how of teachers' perspective concerning the implementation of UDL.

The researcher considered the following qualitative research methods: ethnography, case study, grounded theory, and phenomenology. Each of these methods presents useful information from a diverse perspective. However, after much consideration, the researcher decided that the most enlightening method for the study is a case study formula. Merriam (1988) rendered that the classification of case studies falls into four forms, and that is psychological, sociological, historical, and ethnographic. The nature of this case study is sociological design since the study concentrates on an academic phenomenon.

In contrast to other qualitative research designs, case studies permit the ability of researchers' weighty reliance on inductive reasoning when evaluating multiple sources of data. Paired with an emphasis on sociology, the case study qualitative design offers insight by way of a thick description of variables that influence a functional issue. Therefore, it was concluded that the case study design would have the maximum capacity for yielding data inherent to answering the research questions.

To solicit inherent data, interview questions were planned in a manner that would ask specific questions addressing what, why, and how of teachers' perspectives of UDL. Interview questions one and two seek to discover what teachers know about UDL as well as its employment in the classroom. Interview question three seeks to discover teachers' perspectives on the operational aspect of UDL and any

philosophical walls in the application of UDL. Interview question four is designed as a connection between teachers' perspectives of the why and how of UDL. It makes this connection by seeking precise information concerning the application of UDL. Responses from teachers involving a consensus, or lack of consensus, on a specified application would furnish a thicker, more abundant and vibrant level of understanding in the personal and cultural dynamics of UDL. Lastly, interview question five seeks to uncover how teachers establish their motivation in applying UDL frameworks in their classrooms. Question five also will assist in the identification of prospective logistical or training needs.

Participants

The participants in the study are eight elementary school teachers with three or more years' experience from Grades K to three. They teach at an elementary school located in rural Southwest Georgia, and they are from diverse backgrounds and different ages. Participants are all female elementary school teachers at the school where the research was conducted. The researcher takes note that only female instructors are employed at this school where the research was conducted. Participants' teaching experiences ranged from three to 22 years. Purposefully selecting teachers who classified themselves at the instructional level allowed for maximal variation sampling. This strategic approach of selecting teachers allowed for a variety of perspectives from each participant and their use of technology (Creswell, 2007; 2012).

Qualified participants were emailed an invitation to participate in the study. Qualified participants were then notified that signed invitations would be gathered at a later point in the school day. Invitations were individually collected, which allowed

potential participants to ask questions or address concerns confidentially. This separate data collection process served as a triangulation component for this study, and all potential participants were invited, but not required, to participate in this study. When developing the interview questions, the researcher created each data collection procedure to perform a marginally unique objective. Interview questions were devised to pursue a more profound reply from participants and allow for further clarification of replies. It was postulated that comparable results will be amassed from the same pool of participants who receive like questions.

For this reason, the results are regarded as reliable. It is anticipated that study replication would be achieved if the study were to be conducted by a different researcher. Nevertheless, the degree of transferability to other schools in alternate districts is limited.

Data Collection Tools

The following methods were used to collect data for this qualitative study. This study took place for two weeks during the third semester of a regularly scheduled school year at a rural public elementary school in a rural Southwest Georgia District. Data was collected from interviews for this qualitative case study (see Appendix A). Interviews and observations are used in qualitative studies, either alone or in some combination (Creswell, 2007). In qualitative case studies, both are commonly used in conjunction (Merriam, 1988). The universal spirit of a case study design necessitates the researcher to gather a plethora of data that is considered to be in-depth, at more productive levels. This intensity of collaboration with a case study design allows the researcher to reveal meaning and understanding. To better comprehend teachers' perspective of implementing UDL in an early childhood classroom, the researcher collected data using notes and

recordings from interviews with early childhood teachers. Participants' interviews and data collections were completed separately and independently of each participant. This separation of data collection process served as a triangulation component for the study.

Rich and thick descriptions. The collection of data using this strategy allowed for detailed descriptions of the setting and activities, enabling readers to transfer information into other settings to see how they could apply. When individuals can connect with the same experience, credibility can be considered for the research findings (Cope, 2014; Creswell, 2012).

Procedures and Approvals

The researcher completed the Collaborative Institutional Training Initiative (CITI) on November 2018. This training ensured the protection, safety, and anonymity of participants and was completed before conducting the study (see Appendix B). Approval to conduct the research was gained from the school district's superintendent first. Once the superintendent's approval was given, the researcher sought approval of research from the school principal. Each received a letter requesting permission to conduct the study. The letter included the location of the study, the purpose of the study, how participant anonymity would transpire, and a guarantee to share results with the principal, district superintendent, and participants once the study was complete. Each approval letter was provided to Nova Southeastern University's IRB as supporting documentation. To safeguard the confidentiality of participants, all identifying information that could ascertain the identity of the school and participants was omitted from the dissertation and from any future study reports. However, all

signed documents with the contact information of the superintendent and school principal, including their signatures, was sent to Nova Southeastern University's IRB.

Upon approval from the IRB, ten potential participants were emailed an invitation letter to participate in the main study, in which a total of eight potential participants actually participated. Potential participants were informed of their opportunity to ask questions about the study by email, telephone, or face-to-face before signing the consent to participate form. After assigned consent forms were received from participants, the researcher contacted each person to set up an appointment time, which was convenient for that person to conduct the semi-structured interview. Each interview was conducted in a private conference room, located in the library of the elementary school. Each interview took less than 45 minutes to complete and was audiotaped for accurate transcription. Before ending each interview, the researcher addressed participants' questions and or concerns. The researcher thanked each participant for their participation in the research study.

Once all interviews were completed, the researcher transcribed the interview responses, searching for themes and categories in their replies. After the researcher completed the transcription and applied results to the dissertation, participants were emailed a summary report detailing the researcher's findings. Findings were also provided to the Principal and the School District Superintendent. All research data were secured in a locked filing cabinet and a password-protected computer. The researcher will be the only person with access to the research records and data will be kept for a least five years per NSU policy.

Analysis

The NVivo coding software was used to organize and analyze the data. During the preliminary examination of participants' responses, the researcher drew suppositions that fell into specific themes and categories. The responses were then sorted according to the researcher's analysis, inserting data as Nodes into the software. The coding of interview text was divided into three principal themes: (a) appropriate support for UDL's: Impact on implementation by instructors, (b) appropriate support for UDL: Impact on students, and (c) teachers and students: Extra efforts using UDL. Knowledge of UDL was coded in a manner to correspond with the level and degree of the participants' knowledge about UDL and its framework. Specifically, responses were designated and placed under categories within themes. Participants expressing little to no background knowledge of the UDL model were placed within categories under the theme teacher and student's extra effort for UDL. Participants classified as having some knowledge of UDL, but failed to execute UDL in their classroom were placed in categories under the theme appropriate support for UDL: Impact on students. Participants that actively applied UDL frameworks were placed in categorizes under the theme appropriate support for UDL: Impact on students.

Ethical Considerations

All participants were informed of the purpose of the study. Aliases were used to protect participants. This practice reduces the potential for negative consequences that might arise from participation in the study. The role of the researcher was defined, and boundaries set in relationship to the participants. Consideration was made not to disrupt the natural setting of the classroom. The collection of data was done in a

private and respectful manner. The researcher has completed CITI Training for this research (see Appendix A). After approval by Nova Southeastern University's IRB to conduct research, written confidentiality agreements between participants and the researcher were secured.

Trustworthiness

The use of a constructivist style of research is regarded as very suitable for qualitative inquiry, according to Creswell (2012) and Stake (1995). The testimony of individual participant's trustworthiness was constructed on their assertion of having supplied accurate responses. Analysis of data was trustworthy in that the researcher's knowledge as a researcher and educator enabled the researcher to assemble precise and pertinent discoveries for the research setting. Participants were informed of the purpose for the study. The setting for the interviews was comfortable and reasonable for the participants. The length of time for each interview was established to be appropriate for the participants. Ensuring a sense of trustworthiness, Lincoln and Guba (1985) suggested that credibility and confirmability be established. In this study, triangulation consisted of continuously checking responses during the data collection process for detailed, thick descriptions to gain credibility. Checking with the participants adds another means of triangulation that allowed for validation and reliability of the data. It also provided an opportunity to assess questions asked, obtain additional information, and summarize findings (Creswell, 2012; Shenton, 2004). Rich and thick descriptions enable readers to transfer information to other scenarios and settings. Data was shared with participants after the completion of this study. The results of the study may allow for application to other similar settings.

Potential Researcher Bias and Role of Researcher

The qualitative researcher's role permits the researcher to concurrently be immersed in the investigation process as well as act as a critical analyst (Bloomberg & Volpe, 2012). Due to the researcher's own experiences and personal biases, as an early childhood teacher, the researcher was committed to continuing to be receptive and reflective of results concerning participants' replies. The researcher made a cognizant resolve to abstain from reacting to responses from participants in the hopes of suppressing personal biases. A potential research reaction consists of verbal comments or facial expressions.

Presently, the researcher is employed as a teacher at the school where the study was conducted. In anticipation of the study, the researcher obtained written authorization to interview teachers for their perspectives of UDL. The researcher's employer gave permission for the research to be conducted and provide a formal letter of Cooperation. Upon approval by Nova Southeastern University's IRB to conduct research, written confidentiality agreements between participants and the researcher were secured. Furthermore, the researcher then provided each volunteer participant with a copy of the Invitation to Participate, which outlined the obligations of the researcher. Informal verbal invitations were extended to 10 colleagues requesting their consent to participate in the study. Of those, eight teachers agreed to participate in the interview process.

No conflict of interest or problematic bias contributed to the commencement or conclusion of the research. Further, the researcher did not have an administrative role of the program or tactic application of the IDL program, nor did the researcher have an

evaluative or supervisory role over the participants at the time of the study. Instead, the researcher's personal bias correlated to students' presentation of academic mastery. However, the researcher's bias was in support of students obtaining various occasions to demonstrate academic mastery, such as displayed through UDL in the classroom and during informal, formal, and high-stakes assessments. According to Stake (1995), the researcher's experiences are essential in establishing solid understandings and in articulating vigorous interpretations. The researcher's expertise consists of certification and instruction in exceptional student education as well as educational leadership in K-12 and higher education.

Limitations

A variety of limitations existed in this study. Sample size frequently believed to be a risk to validity, is not contemplated as a limitation in this study because preservative responses provided an in-depth representation of their perspectives of a shared experience. As previously stated, the purpose of this qualitative case study was to investigate teachers' perspectives in an early childhood education classroom, and the practical integration of the principles of Universal Design for Learning to support mathematics skill development of early childhood in a small elementary school in a rural Southwest Georgia district.

The central limitation of this study relates to the setting of the participants. Participants are employed in a small rural elementary school in Southwest Georgia. The objective of the qualitative research design was to offer an in-depth understanding of particular issues as perceived by participants (Lincoln & Guba, 1985). Furthermore, credibility was founded on member check-ins and participants' verification of the

researcher's response analysis. Therefore, the depth of participants' responses enhanced the understanding of the UDL and the barriers to UDL implementation through their eyes. The researcher did not see any issues, as there are only females employed as instructors at the school. Furthermore, the coach and assistant principal are the only males at this small rural elementary school in the Southwest Georgia district.

Chapter 4: Findings

Introduction

The purpose of this case study was to determine teachers' perspectives of the implementation of UDL for the retention of students' mathematics knowledge and skills in first-grade through third-grade classes in an elementary school in a rural Southwest Georgia school district. This particular rural school is considered K-5, although importance was placed on grades one through three. The researcher analyzed data from face-to-face interviews, audio recording, and field notes. Each interview was audio-recorded to ensure an accurate transcription of responses. The interview data were transcribed and then coded so that the researcher would have access to rich contextualized data. The use of multiple resources allowed the researcher to create a comprehensive narrative with vivid examples and rich dialogue. The researcher developed three major themes, with four to five categories under each theme, which are provided in the findings section of this study. These themes and associated categories served as a map to guide the researcher's narrative in developing the research report.

As the researcher's goal is to present a reliable account of the teachers' perspectives, the chapter begins with a description of the teachers' experiences in early childhood classroom settings and the teachers' demographics. The participants' discussions provided in-depth data. The central question that guided this study was stated as follows: "What are teachers' perspectives of UDL as an intervention method in mathematics comprehension levels for first-, second-, and third-grade students in an elementary school located in a rural Southwest Georgia district?" The following research questions supported the central question,

1. What are teachers' perspectives of implementing UDL in early childhood classrooms?

2. What are teachers' perspectives of barriers to UDL implementation in the early childhood classroom?

3. What are teachers' perspectives of enabling the sustainability of UDL in the early childhood classroom?

4. What are teachers' perspectives on the impact on students' learning when using the UDL model in early childhood classrooms?

Participants

At the beginning of the study, an invitation to participate was extended to 10 elementary education teachers at the research site. However, only eight teachers agreed to participate. Each participant was assigned a number to protect anonymity (see Table 1). All participants in the face-to-face interviews were females. Of these, seven were general education teachers, and one was an Instructional Lead Teacher and Response-to-Intervention Coordinator. The participants' experiences as teachers varied from 3 to 32 years teaching in kindergarten, first-, second-, third-, fourth-, and fifth-grade. The content areas taught included mathematics, reading, social studies, and language arts.

Variations were also noted in the education level of participants. Two teachers hold a bachelor's degree, four teachers hold a master's degree, and two hold an education specialist degree. All participants participated completely in the research project. Of the eight participants, only six had received UDL training, whereas, the other two participants were only shown some features of the UDL framework by other teachers, but had not had any former formal UDL training experience.

Table 1

Demographic Breakdown of the Participants

Participants	Gender	Grade taught	Years at study school	Total years teaching	Education level
1	Female	1st to 4th	4	16	B.S.
2	Female	K to 5th	10	10	Ed.S.
3	Female	1st	20	20	M.S.
4	Female	3rd	24	24	M.S.
5	Female	1st	3	3	M.S.
6	Female	K and 1st	36	34	Ed.S.
7	Female	K and 2nd	6	8	B.S.
8	Female	2nd and 5th	27	29	M.S.

Participant interviews were arranged by email at a time that was suitable for each participant. The interview procedure was performed for over five weeks. One-on-one interviews were conducted with each participant in a private location at the school. Individual interviews with participants play a central role in data collection in case study research, as interviews help with examining the individual's perspective (Creswell, 2007). Before initiating the interview, the researcher shared the purpose of the study and the participant's role in the research study. To help ensure anonymity and confidentiality, participants were asked to exclude all identifying information. Identifying information included participants' names, school names, names of colleagues, and names of administrators.

Participants were informed that their participation was voluntary and that they could withdraw from the study at any time. Each interview was audio-recorded and lasted approximately 30 to 45 minutes in duration. The interviews were structured in a way that allowed participants to engage in discussions about questions from the list of interview questions based on their perspectives. The use of open-ended interview questions

permitted each participant to answer without restrictions or swaying too far from the researcher's purpose. However, participants were able to add complementary annotations and expressions about topics from the questions asked and draw connections from the discussion to events that happened during their teaching experience. Furthermore, utilizing open-ended questions allowed the researcher opportunities to ask clarifying questions, thereby delving deeper into the discussion to provide thick, rich descriptions of participants' perspectives (see Appendix B).

Findings

To organize and make sense of the narrative data collected, the interviews were transcribed by the researcher and were later used to provide more in-depth, rich, and authentic descriptions of the participants' perspectives of UDL. The researcher transcribed interviews, field notes, and documents using descriptive analysis (Merriam, 1998). The researcher organized the data into relative chunks and coded the data. This process involved taking raw data from interview transcripts, compressing the data into codes, grouping the codes in meaningful ways to create categories, followed by grouping these categories into meaningful themes as they relate to the research questions (see Figure).

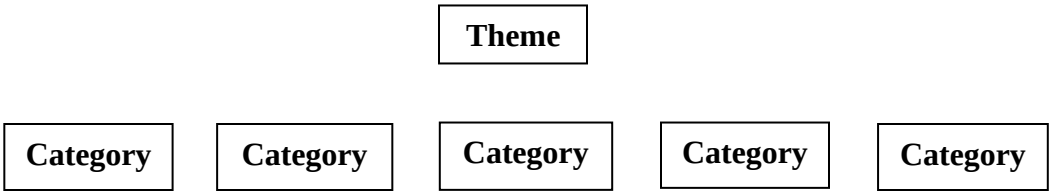

Figure. Diagram of the Hierarchal Relationship Between Themes and Categories.

According to Merriam (1998), the process used to devise these categories is "largely an intuitive process, but it is also systematic and informed by the study's

purpose, the investigator's orientation and knowledge, and the meanings made explicit by the participants themselves" (p. 179). Also, according to Merriam (1998), the term coding when referring to the data analysis process suggests, outlining a systematic process that uses a combination of intuition and the researcher's personal orientation and knowledge, while keeping the purpose of the study in mind.

The goal of coding is not to count things or produce enumerate measures, but it is to *fracture* (Strauss, 1987, p. 29) the data and rearrange it into specific categories that facilitate the comparison of data within and between these categories (Maxwell, 1996). Accordingly, Maxwell (2013) reported that coding categories may be developed inductively by the researcher during the analysis, while others might be taken from conceptual structure of the people studied. However, the key feature of most qualitative coding is that it is developed in interaction with, and tailored to the understanding of the particular data being analyzed (Glaser & Strauss, 1967).

The presentation of narrative data relative to participants' responses to the interview questions showed the relative connections between themes and categories that were coded and displayed by the NVIVO Qualitative Data Analysis Software for process rich text-based data. This process allowed participant's responses to the researcher's interview questions to be classified, sorted, and arranged into cells called nodes or themes that contained categories for each theme. Having the collected data organized in this manner allowed the researcher to examine relationships within and across established themes and categories.

The text-based data collected from eight participants interviewed for this study were divided into three major themes with four to five categories under each theme. These

themes and categories allowed the researcher to organize and report the analysis of the research data in a logical and comprehensive narrative manner. The NVIVO bar graphs and associated tables for each theme and associated categories are used to represent the participants' interview responses in graphic and table form. The narrative profile associated with the analysis for each of the three themes and associated categories are provided below after each theme and its categories. The three major themes and associated categories for each theme are listed below.

Themes

The purpose of this case study was to determine teachers' perspectives of the implementation of UDL for the retention of mathematics knowledge and skills in students in first through third-grade classes in an elementary school in a rural Southwest Georgia school district. The researcher developed three themes from the data analysis process in combination with the purpose of the research study and participants' responses to the interview questions. The researcher reflected on the research goals and the responses provided by the participants, then intuitively developed several themes, which were narrowed down to three themes. Evidence is shown in the form of participants' responses. Bar graphs and thematic tables with associated categories are provided in the research report, with the thematic tables provided after each theme is discussed, however, the bar graphs are listed in Appendix D. All themes and the associated categories were established from the development of data received from the participant interviews and the researcher's intuitive reflections.

Theme 1. The first theme discovered was the appropriate support for UDL's: Impact on implementation by instructors. This theme focused on the extent

administrators, supervisors, peers, and other support staff influenced instructors' use of UDL in the classroom for teaching and learning. The categories associated with this theme are, (a) barriers for implementing UDL, (b) classroom arrangement and size, (c) implementation of UDL, (d) technology, and supplies, and (e) UDL training and time and effort. Participants and the frequency of their perspectives relative to each theme and category are listed in Tables 2, 3, and 4.

Table 2

Appropriate Support for UDL's: Impact on Implementation by Instructors

Participants	A: Barriers for implementing UDL	B: Classroom arrangement and size	C: Implementation Of UDL	D: Technology and supplies	E: UDL Training and time and effort
1	3	0	4	1	2
2	6	0	2	2	4
3	6	0	3	1	1
4	5	0	4	1	1
5	3	0	4	1	6
6	2	0	1	2	4
7	6	0	6	1	10
8	3	0	3	1	6

Barriers for implementing UDL. The researcher noted that when asking the research participant about barriers for implementing UDL, they responded in terms of what challenges they experienced when implementing UDL. In response to the interview Question 11, "What do you see as the challenges of implementing the UDL model in the classroom? Please give me an example." Participant four indicated that, "The one challenge I have is finding the time to fit the lessons in during my busy day. As a third-grade teacher, we have so many standards to cover and we are pressured for time."

Additionally, regarding this category and responding to the interview Question 11, “What do you see as the challenges of implementing the UDL model in the classroom? Please give me an example.” Participant two and three both responded that student behavior and planning for implementing UDL lesson is a huge barrier. They both responded with the same answer, “The challenges of implementing the UDL model in the classroom for me is planning, and student behavior.”

Classroom arrangement and size. It is worth noting that none of the participants in the study placed emphasis on classroom arrangement and class size.

Implementation of UDL. In response to the research question, “What are your perspectives on district administration actively supporting UDL?” Participant seven stated, “Our administration promotes utilizing UDL and actively engaging our students in this process. The district emphasizes using rigor in the classroom through hands on activities and strategies that encourages students to become higher-order thinkers.”

Technology and supplies. In response to the research question, “What are your perspectives on the adequacy of technical resources that are allocated for UDL?” Participant seven commented as follows, “To have the adequate use of technical resources for UDL can be challenging at times. Technology is forever changing and is a tool that can be an asset for today’s students. There is so much that can be done with the use of technology to promote learning in students. However, I feel that more training in ways to implement technology for UDL is greatly needed.” In general, participants did not state that technology and supplies were a significant component for UDL instruction.

UDL training and time and effort. Teachers reported a significant need to undergo the necessary time and effort required for appropriate training to effectively

instruct using UDL. Participants placed a fair amount of significance on category (e). Participant three stated in response to one of the interview questions, “I am comfortable with the UDL framework; however, I could use some more in-depth training.”

Theme 2. The second theme was the appropriate support for UDL’s: Impact on students. This theme focused on students’ behaviors and learning while persisting under UDL. The categories associated with this theme are, (a) challenges (students), (b) differentiated instructions, (c) improvement of student learning and understanding, (d) student lack of time to complete activities and assignments, and (e) successful student learning environment.

Table 3

Appropriate Support for UDL’s: Impact on Students

Participants	A: Challenges (students)	B: Differentiated instructions	C: Improvement of students learning and understanding	D: Student lack of time to complete activities and assignments	E: Successful student learning environment
1	2	2	7	0	4
2	1	2	4	0	4
3	1	2	6	1	7
4	1	3	4	1	5
5	0	6	5	1	3
6	0	2	2	0	1
7	0	4	6	1	5
8	0	4	3	0	1

Challenges (students). When participant seven responded to the question “What are your biggest challenges/frustrations in creating a successful learning environment? Please give me an example.” She responded,

> Depending on the student’s level it can be a challenge to attain a favorable or encouraging learning environment. One of the challenges in creating a successful

> learning environment is having an academically challenging environment for all students. It is my goal to create an environment in which my students can learn by higher order thinking and the students are self- directed learners. However, depending on the level in which the child is on it can be challenging to attain this type of setting. For example, one year I had a class in which it was very challenging to achieve self-directed learners because most of the class were very much dependent on direct instruction from the teacher. It was difficult to implement tasks to be done by groups or independently because so many depended on my assistance to get the task done.

Differentiated instructions. Responding to the interview question, "What do you foresee your students will gain from your implementation of UDL?" Participant five felt very strongly that because UDL naturally contain differentiated instruction that her student would receive quality instruction. She responded, "I believe my students will gain the best instruction and learning possible through the implementation of UDL because their instruction will be differentiated in order to help them."

Improvement of student learning and understanding. As shown in Table 3, category (c), six of eight participants placed significance on improvement of students learning and understanding.

Student lack of time to complete activities and assignments. The responses provided by participants in this study suggest that there was not a lack of time for students to complete UDL activities and assignments. The research shows that teachers might have struggled on occasion to plan and develop UDL lessons and activities that would reach all students and offer them the opportunities to learn at their level and

achieve desired outcomes. The UDL that resulted implies that students did not suffer a lack of time to complete activities and assignments. In response to interview question eight, “How do you think UDL has impacted your students’ learning?” Participant three, responded, “It offers several activities for different styles of learning. It is not a one size fits all for the students. It gives all my students a chance to learn on their level.” In response to interview question nine, “What are your perspectives on how school personnel perceive UDL as an effective tool in achieving desired outcomes?” she responded, “We have been implementing UDL lessons for several years and we find it quite effective when it comes to reaching all the students.”

In response to question eight, “How do you think UDL has impacted your students’ learning? Please give me an example.” Participant seven responded,

> UDL can have a great impact on students’ learning. For example, I had a student who was really struggling. However, when implementing a UDL and placing her in a group in which I was able to work with her more times throughout the day in a smaller group setting; allowed her to make some improvements. The more time and direct instruction in small group through implementing the UDL helped her tremendously. I believe creating a diverse setting for her and working with her strengths as well as weakness help her make improvement.

Successful student learning environment. As shown in Table 2, five of eight participants placed significance on establishing a favorable learning environment for students. Participants expressed that improvement of student learning and understanding is quite significant. When participant seven was asked, “What are your perspectives on district administration actively supporting UDL?” She responded, “Our administration

promotes utilizing UDL and actively engaging our students in this process. The district emphasizes using rigor in the classroom through hands on activities and strategies that encourages students to become higher-order thinkers."

Theme 3. The third theme was teachers and students: Extra efforts using UDL. This theme addresses the extent of the overall effort of implementing UDL in classroom instruction. The categories associated with this theme are, (a) difficulties and ease in lesson plans, (b) ease in learning and the ability to learn mathematics, (c) methods for assessment of student learning, (d) teachers' perspectives of UDL framework, and (e) the value of UDL to teachers.

Table 4

Teacher and Student: Extra Efforts Using UDL

Participants	A: Difficulties and ease in lesson plans	B: Ease in learning and the ability to learn mathematic	C: Methods for assessment of student learning	D: Teachers perspectives of UDL framework	E: The teacher's value of utilizing UDL
1	3	10	4	3	2
2	4	7	3	2	2
3	5	1	3	4	3
4	7	8	2	4	3
5	3	8	4	4	2
6	7	3	2	0	0
7	3	9	1	2	6
8	6	6	3	1	2

***Difficulties and ease in lesson plans*.** Table 4 above shows that five of eight teachers indicated that they place a high degree of significance on category (a). Participant six expressed,

> I will say somewhat. I'm certainly not in debt with my knowledge completely. In fact, I really had to go back and, and review a little bit, uh, because you know, I've been out of the classroom three years and I since I left the classroom, I

> haven't had really any involvement with UDL. However, during the time that I was teaching in the classroom I was much more familiar with UDL than I am now. I remember writing UDL lesson plans every week and those lesson plans are very in-depth and could be taught for two days easily.

Ease in learning and the ability to learn mathematics. Participant five felt strongly about creating appropriate lesson plans for UDL instruction. To interview question seven, "What are your perspectives of the UDL framework in improving students' mathematic knowledge in rural elementary school?" Participant five addressed this question, by stating, "I believe the UDL framework improves students' math knowledge because it is customized to meet them at their level in order to build upon their specific level of understanding." Participant six covered a lot of ground related to category (b), when she addressed interview question seven, "What are your perspectives of the UDL framework in improving students' mathematics knowledge in rural elementary school?"

> Well, the whole premise of a UDL and its name is universal. That means they compensate all, all the learners in your classroom. And if you can actually implement it, UDL as it is, designed to do, you are hitting the needs of all those diverse, diverse learners in your classroom and you're teaching toward their learning style. And if you could do that, you are going to be successful with more students. But then again, you know, it, it just, it's not the easiest thing to do to plan all of that data plan all that out. And, and of course with universal design for learning classrooms, you're, you know, you're setting your goals, your children know those goals, they know what they have to do to work toward those goals.

> Um, and, then the end, um, you're assessing supposedly according to that child's learning style, how they best test out. I mean, if you could actually follow all of these, well, you know, the way this is designed, I feel like it would have great impact in math and all subjects. Like I said, we've only tried it in math. I couldn't imagine the, the work in the detail would, that would go into designing ELA. It really would be excellent if we did UDL in ELA it would require a lot of planning.

Methods for assessment of student learning. An example for this category is provided by researcher participant three as she responds to interview question seven, "What are your perspectives of the UDL framework in improving students' math knowledge in rural elementary school?" "I like that a goal is established and students are made aware of the goal. Formative and summative assessments allow not only the teacher but students/parents to identify if the goal was learned."

Teachers' perspectives of UDL framework. Several research participants provided favorable remarks regarding category (d), teachers' perspectives for UDL framework for teaching and learning. An example follows in participant two's response interview question seven, "What are your perspectives of the UDL framework in improving students' mathematic knowledge in rural elementary schools?" Participant two responded, "If utilized properly, the UDL framework can greatly improve students' math knowledge, by increasing student engagement and motivation." Also, regarding teachers' perspectives for UDL framework, participant five responded,

"I believe the UDL framework improves students' math knowledge because it is customized to meet them at their level in order to build upon their specific level of understanding."

The value of UDL to teachers. Responses to the interview questions in this research study suggest that UDL is a valuable instructional framework for effective teaching and learning mathematic in first through third grade. Participant one responded to interview question 10, "What are your perspectives of UDL being valuable to teachers?" "I believe that UDL is valuable to teachers because students learn in different ways. And by using UDL the teacher can show different ways of learning a math concept." Participant two responded to interview question 10 by saying, "It is valuable to teachers because it allows them to see what practices and strategies are most effective in their classrooms."

Summary

Chapter 4 provided the purpose of the research, which was a case study for determining teachers' perspectives on the implementation of UDL in first, second, and third-grade mathematics classes at an elementary school in a rural Southwest Georgia School District. For this case study, the researcher developed 21 opened-ended interview questions and interviewed eight research participants who were teachers at the elementary school. All participants were given pseudonyms and interviewed in a private location at the school where they taught. The research participants were confidentially interviewed, and no one was informed as to who was participating in the research study. Each interview was audio-recorded and lasted approximately 30 to 45 minutes in duration. The interviews were structured in a way that allowed participants to engage in a

discussion about questions from the list of interview questions based on their perspectives.

Data from the interviews were collected using audio recording and handwritten notes. The data was then transcribed and arranged into chunks of related data, after which various categories and themes were created by the researcher. The themes and categories were entered into the NVIVO Qualitative Research Analysis Software Program, where the data were organized and arranged into particular categories, placed under appropriately related themes. Then the data was presented in graphs and related tables. The research analyzed the data for finds and conclusions. The thematic Tables 2 *Appropriate Support for UDL's: Impact on Implementation by Instructors;* 3 *Appropriate Support for UDL's: Impact on Students;* and 4 *Teacher and Student: Extra Efforts Using UDL,* show the significance and emphasis each interview participant placed on their response to each interview question.

The data analysis provided a clear insight into the perspectives and thought processes of the research participants. The eight research participant's responses provided relative and consistent perspectives that connected the participants' perspectives on classroom experiences when using UDL and the implementation of UDL's teaching and learning strategies. The research participants shared their personal philosophies about teaching, and as educators with the ability to manage problems and practices that teachers and school administrators might face in an elementary school where UDL has been implemented. The analysis of all data yielded a story of reliable triangulated communications between teachers that allowed the researcher to capture and gain a rich

understanding of the participants' perspectives on implementing UDL in their school (Shelton, 2004).

Chapter 5: Discussion

This chapter provides a discussion and interpretation of the results of the applied dissertation. The case study was completed using data collected from interviews of eight research participants. The research problem, a discussion of the findings, conclusions, implications, limitations, and recommendations for future research and practice are included in this chapter.

Overview of the Study

Over the years, the public-school educational system has undergone many changes (Sinclair, Christenson, & Thurlow, 2005). One of the most controversial changes is that it is necessary to determine how teachers implement intervention methods to reteach mathematic content before they can begin teaching current required mathematic content. Rural areas experience the most struggles (Wang, 2018). Therefore, implementing inclusive pedagogy, such as UDL, will ensure that students will have access to all the mathematic learning opportunities in an early childhood environment. This study was designed to answer the central question, "What are teachers' perspectives of UDL as an intervention method in mathematics comprehension levels for first-, second-, and third-grade students in an elementary school located in a rural Southwest Georgia District?" The four research questions that support the central question will shield light on the extent to which teachers need to be trained to pose the appropriate knowledge, skills, and tools needed to implement UDL.

1. What are teachers' perspectives of implementing UDL in early childhood classrooms?

2. What are teachers' perspectives of barriers to UDL implementation in early childhood classrooms?

3. What are teachers' perspectives of enabling the sustainability of UDL in early childhood classrooms?

4. What are teachers' perspectives on the impact on students' learning when using the UDL model in early childhood classrooms?

Participants in this case study were eight experienced elementary early childhood teachers in a Southwest Georgia rural elementary school. The participants taught grades that ranged from K-through fourth-grade. Additionally, participants' education levels range from a Bachelor of Science degree to an Educational Specialist degree. The researcher analyzed data from face-to-face interviews, field notes from interviews, and an audio recording. UDL is a scientific framework for teachers that cultivates different learning styles and skills for all students. The Center for Applied Specialized Technology (CAST), the organization that authored the framework of Universal Design for Learning (2011), stated,

> UDL is a framework that addresses the primary barrier for developing expert learners within instructional environments: inflexible, "one-size-fits-all" curricula. It is inflexible curricula that raise unintended barriers to learning. Learners who are "in the margins," such as learners who are gifted and talented, are particularly vulnerable. However, even learners who are identified as "average" may not have their learning needs met due to poor curriculum design. (p.4)

CAST's focus on UDL as the framework teachers should use to eliminate barriers to learning provided the rationale for the central question, "What are teachers'

perspectives of UDL as an intervention method in mathematics comprehension levels for first-, second-, and third-grade students in an elementary school located in a rural Southwest Georgia district?" Even more substantial is teachers being trained to recognize and remove barriers to learning for all students. Producing a learning environment for all types of students is no small task for a teacher. It takes time, patience, and a lot of hard work. Universal Design for Learning (UDL) is a learning method that targets students' needs and produces a more effective learning environment for all proficiencies.

Implementing UDL in the classroom happens in a variety of ways. Although there appear to be numerous benefits of UDL, there are some apprehensions with this approach as well. Many instructors think that in order to implement UDL, they need access to large amounts of technology. While some technology quantity increases students' interface with materials required inside and outside of class, the level of technology required differs from teacher creativity (Meyer & Rose, 2005). An additional concern includes the amount of time vital for advanced planning prior to implementation. Though starting small has been the answer for some teachers who have implemented UDL in their classrooms (Noonoo, 2014). Instructors who have chosen to start small chose either a pre-assessment to work with or a chapter lesson which includes a module in which to implement UDL.

An essential phase to implementing UDL is the consideration that occurs before planning what the instructor will implement into the lesson. Significantly, the instructor thinks about the students in his or her class and their requirements for learning. This is very helpful for directing the foundation for what an instructor should build into his or her UDL classes. Instructors must include this step so that the time, work, and effort they

put into implementing features of UDL have a positive outcome. This preparation will simplify the implementation of UDL that instructors are looking for and the learning they look forward to for their students. The purpose of this phase is to organize what practical steps are typically taken to deliver effective instruction using UDL.

Next, administrators and principals may wish to consider providing professional development training or extended planning for faculty members. Wastler (2014) found that Professional Learning Communities are by their very design, beneficial to intensive professional problem solving, strategizing, and training. Publications or supplementary resources relating to UDL implementation can be made available to staff in advance of faculty meetings or extended planning to allow teachers more time to review the material for discussion and collaboration. In addition, teachers may benefit from combining their current strategies with the use of new technologies to implement UDL fully. Furthermore, teachers should be persuaded to participate in workshops, training activities, online or electronic media, and reading relevant books to progress their knowledge of how UDL can help struggling students.

The purpose of this case study was to determine teachers' perspectives of the implementation of UDL for the retention of students' mathematics knowledge and skills in first-, second-, and third-grade classes in an elementary school. The researcher analyzed data from face-to-face interviews, audio recording, and field notes. The use of multiple resources allowed the researcher to create a comprehensive narrative with vivid examples and rich dialogue. The researcher developed three significant themes- *Appropriate Support for UDL's: Impact on Implementation by Instructors; Appropriate Support for UDL's: Impact on Students;* and *Teacher and Student: Extra Efforts using*

UDL, with four to five categories under each theme. These themes and associated categories served as a map to guide the researcher's narrative in developing the research report.

Interpretation of the Results

In this section, the researcher provides a summary of the central question's findings and the four research questions. The central question was, "What are teachers' perspectives of UDL as an intervention method in mathematics comprehension levels for first-, second-, and third-grade students in an elementary school located in a rural Southwest Georgia district?" Findings revealed a consensus of UDL value both with students and teachers concerning the improvement in mathematics comprehension, knowledge, and skills. However, it was also expressed that UDL only has efficacy with some teachers, resulting in a negative outlook towards preparing lesson plans that take much time and effort to complete.

Overall, consensus also revealed that teachers believed the UDL framework could work more effectively with initial and sustained training. After collecting and analyzing data, three themes emerged, (a) appropriate support for UDL's: Impact on implementation by instructors, (b) Appropriate support for UDL's: Impact on students, and (c) teacher and the student: Extra efforts using UDL. Each theme was discussed in chapter four.

Research Question 1of this study asked, "What are teachers' perspectives of implementing UDL in early childhood classrooms?" In relation to this question, three key findings appeared. The first finding was that teachers in each grade level did UDL lesson planning in pairs of two during their informal planning so that they could have a clear and honest discussion and collaborate on how best to produce the most effective lessons for

student learning. By utilizing the UDL principles in the development of curriculum and daily lessons, instructors have a more exceptional ability to meet the needs of all students in their classes without the process is cumbersome, time-consuming, and expensive (Meyer & Rose, 2005). When teachers collaborated in groups in order to reflect on difficulties, it resulted in positive outcomes for the classroom, such as a greater understanding of the needs of children in the classroom (Campbell et al., 2001). Therefore, given a very short window of opportunity during planning time without children in the classrooms, there was not a chance for teachers to make in-depth and deliberate changes to explicitly describe the principles of UDL in their curriculum and instruction.

However, teachers did express that they were given extended planning time, which is half-day planning once every other month. During this extended planning time, teachers try to develop and write several UDL lesson plans together since they have more time to discuss and collaborate on UDL lesson plans for the coming weeks. Courey, Tappe, Siker, and Le Page (2013) studied how to improve lesson planning in general by training teachers to account for barriers in their instruction and include the principles of UDL. Extra time for collaboration, teacher planning, and early childhood curriculum improvements appears to be a school district priority, according to interview participants. Additionally, the extra time given to teachers is not enough time to complete the in-depth UDL lesson plans.

The second finding was the need for more training on how to implement UDL for new teachers and veteran teachers. Smith and Smith (2000) noted that teachers need additional time for planning to provide quality instruction and suggested that

administrators become more involved in UDL and inclusion training to understand better the extra effort that goes into planning for UDL and inclusion classrooms. In some instances, new teachers were being told how to implement UDL in their classrooms by veteran teachers. Also, in some instances, veteran teachers expressed, they would like to have updated training on implementing UDL annually, due to the rate of the development of new technology arising yearly. Thus, new teachers want to have the same advantage of experiencing UDL training and not being shown by a veteran teacher who may or may not implement UDL correctly.

The third finding was the implementation of UDL instructional framework in early childhood classrooms. However, implementing UDL in early childhood education classrooms is seen by many as a considerable challenge. It requires planning and creativity, but once completed, the benefits to instructors and students are worth the effort (Dell, Dell, & Blackwell, 2015). Teachers were providing multi learning experiences, and they were very focused on at-risk students and engaging in small groups with at-risk students while providing multiple opportunities for students experiencing the early childhood curriculum. The essence of care is evident in early childhood education, as Noddings' (2003) depictions regarding performances displayed by compassionate teachers align with the objectives of UDL (Johnson, 2004).

In relation to Research Question 2, "What are teachers' perspectives of barriers to UDL implementation in the early childhood classroom?" The first key finding that emerged is how teachers were concerned about not having enough allotted time during a class period to implement all the activities and differentiated instruction strategies in a UDL lesson in one class period. Here again, implementing UDL in early childhood

education classrooms is seen as an enormous challenge for teachers. Once completed, the benefits to instructors and students are greatly appreciated (Dell, Dell, & Blackwell, 2015). The second finding was that teachers felt that when conducting and implementing the UDL lesson, it can become difficult to step back and monitor the students' performance and behavior while working with an at-risk group. It is also critical that students develop skills embedded in content learning activities. These skills can include learning how to plan a task, evaluate a task, or complete the task given to them (Hitchcock et al., 2002). Noonoo (2014) suggested that instructors explain the reason(s) for the change in instruction to provide a vehicle for further engagement and to understand the goal the instructor hopes to accomplish.

In relation to Research Question 3, "What are teachers' perspectives of enabling the sustainability of UDL in early childhood classrooms?" The three key findings emerged to explain how teachers find UDL quite useful and how the teachers observe the district supporting UDL to address students' needs. The first finding was that teachers perceived UDL as a great way to implement differentiated instruction in order to meet all students' needs, and for teachers to see the benefits of the UDL lesson. The flexibility of UDL allows teachers to consider student barriers to learning. In this consideration, teachers can establish learning supports from the start rather than a continuous cycle of after-the-fact lesson modification to address the needs of diverse learners (Rao & Meo, 2016). Having all options available to students to choose from as they engage with the content allows the flexibility necessary for all students to achieve success in understanding the content being taught (Hitchcock et al., 2002).

The second finding was that teachers were observant of the district's positive support by implementing the UDL model in the classroom and making sure the use of rigor is incorporated into the lesson every week. Students should also be given ample opportunity to practice the learned skills in more meaningful contexts as the planning has included real-world applications if done well (Hitchcock et al., 2002). There is no one specific method of learning interactions that drives work for all students. It is the learning that must be accessible to all students in the classroom (Hitchcock et al., 2002).

In relation to Research Question 4, "What are teachers' perspectives on the impact on students' learning when using the UDL model in early childhood classrooms?" Three key findings emerged to describe how teachers appreciated their students' increased knowledge of mathematics and how it changed due to UDL lessons being taught. Students show gains in independence, which increases their motivation, and students increase their learning gains in mathematics. Once more, it is the learning that must be accessible to all students in the classroom (Hitchcock et al., 2002). The first finding was that teachers cherished those teachable moments when their students began to retain the knowledge learned during the lesson. Having all options available to students to choose from as they engage with the content allows the flexibility necessary for all students to achieve success in understanding the content being taught (Hitchcock et al., 2002).

The second finding showed that teachers were excited to see students gain independency that motivated them to become self-directed learners. Student interactions and engagement consists of encouraging learning and participation, as well as making possibilities for singular choices, yet ensuring the academic goals and methodologies applicable to the student were met (Darragh, 2007). The idea behind UDL is to stimulate

and motivate each kind of learner (Noonoo, 2014). The third finding showed that teachers observed students engaged in multiple ways of learning different mathematics concepts. Noonoo (2014) suggests that instructors explain the reason(s) for the change in instruction to provide a vehicle for further engagement and to understand the goal the instructor hopes to accomplish.

Namely, longitudinal relations between mathematics skills at the beginning of school and further along in education are mediated or moderated by individual factors, such as self-regulation and motivation, and other environmental factors (Gottfried, Marcoulides, Gottfried, & Oliver, 2013; Watts et al., 2015). Thus, understanding the relationship between mathematics skills and self-regulation in young students is essential to support both. Further, differences in mathematics skills development between children with different academic abilities (Shin et al., 2013) suggest that mathematics skills and the relation to self-regulation may differ in different cognitive ability groups.

Implications

The researcher understands that this research study has practical implications in the field of education. Moreover, it can be inferred from the findings of this study that other elementary school teachers and administrators might strongly consider implementing the UDL framework in their lower grades or even middle and high school grades. These implementations might then be studied to assist teachers in determining the extent to which the UDL model of instruction and delivery might empower, encourage, and stimulate students to accomplish academic goals better, internalize knowledge more easily, and improve skills that are taught. A second implication of this study is that as UDL becomes more widely used in schools, teachers and administrators might begin to

advocate for the implementation of UDL as the standard for instructional practices. Administrators might even push to evoke policy changes that lend themselves to more training and general practice for teachers and encourage teachers to incorporate UDL as a standard practice in their classrooms. Finally, another implication of this study is that more teachers will consider embarking on research involving UDL in order to gain insight and knowledge about this teaching and learning strategy and its benefits or lack of benefits for students' learning.

Limitations

> The limitations of the study are those characteristics of design or methodology that impacted or influenced the interpretation of the findings from your research. They are the constraints on generalizability, applications to practice, and/or utility of findings that are the result of how you initially chose to design the study or the method used to establish internal and external validity of the result of unanticipated challenges that emerged during the study. (Price & Murnan, 2004, pp. 66-67)

"Limitation derives from the conceptual framework and the study's design. A discussion of these limitations early on in the proposal reminds the reader of what the study is and is not its -boundaries- and how its results can and cannot contribute to understanding" (Marshall & Rossman, 2016, p. 85).

Equally important, though, is that statements about limitations, while acknowledging limits to generalizability, should reemphasize the qualitative study's very different purposes and strengths. As we discussed in earlier chapters, one chooses a qualitative approach to understand phenomena from the participants' perspectives and

exploring and discover, in-depth and in context, what may have been missed when studies were done with predetermined assumptions (Marshall & Rossman, 2016, p. 85).

According to Glesne (2010), the limitations of a study include the "documents, people, or places" unavailable to the researcher (p. 212). This UDL case study had four limitations. To begin with, the sample of participants was limited to eight female teachers, therefore, failing to incorporate a heterogeneous group for the study, which could very well limit broader and even different perspectives. Secondly, the study occurred at a single school, which limited and confined the participants to only methods and rules for functioning in a manner only authorized by that particular school.

Thirdly, the research study participants were limited to those who worked at the school, where the research occurred; therefore, only allowing for a closed that might not have allowed outside diverse conceptual thinking. Finally, the qualitative study was conducted in a rural region of southwest Georgia, which did not allow for the inclusion of urban customs, traditions, greater diverse ethnicities, and values, which might certainly be different from those found in a rural region.

Recommendations

While this research study provided rich data from experienced elementary school teachers with many years of teaching experience in a rural region, it should be noted that it was conducted with only eight participants. Some of the participants lacked formal training on UDL, and at least one teacher was a teacher who had not taught in the classroom for a few years. As a result of the study taking place under these conditions, the researcher recommends that teachers receive training prior to implementing UDL and time to prepare in-depth lesson plans, and appropriate use of supplies and materials.

Additionally, the researcher recommends that administrators and principals provide appropriate support to teachers to implement the UDL framework for teaching and learning. Lastly, the researcher recommends that a replicated study be done in an urban school to compare the results to those of a rural school.

Conclusion

The purpose of this study was to gain a greater understanding of teachers' perspectives regarding UDL as an intervention method in mathematics comprehension levels for first-, second-, and third-grade students in an elementary school located in a rural Southwest Georgia district. Participants' responses helped illuminate potential barriers in addition to various degrees of knowledge about UDL. Likewise, participants' responses exposed intuitions as to the participants' points of concern or opposition to implementing and applying the UDL model. Research is valuable for this study, particularly since UDL has already been acknowledged as an appropriate way to support unbiased opportunities for learning with all students. Based on the analysis from the research data in this study, the researcher believes that the UDL framework is a viable model for teaching and learning in other elementary schools in both urban and rural districts.

The data shows that teachers' general attitudes towards implementing UDL in the classroom are favorable. However, some teachers expressed challenges that must be dealt with for the effective implementation of this model. Additionally, the data indicated that the UDL model for teaching and learning enhanced the ability for student learning in mathematical knowledge and skills. Based on a complete examination of the interview

responses, teachers indicated a need for substantial time and effort to be fully trained for using the UDL framework in the classroom.

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Appendix A

Interview Protocol Questions

Interview Questions

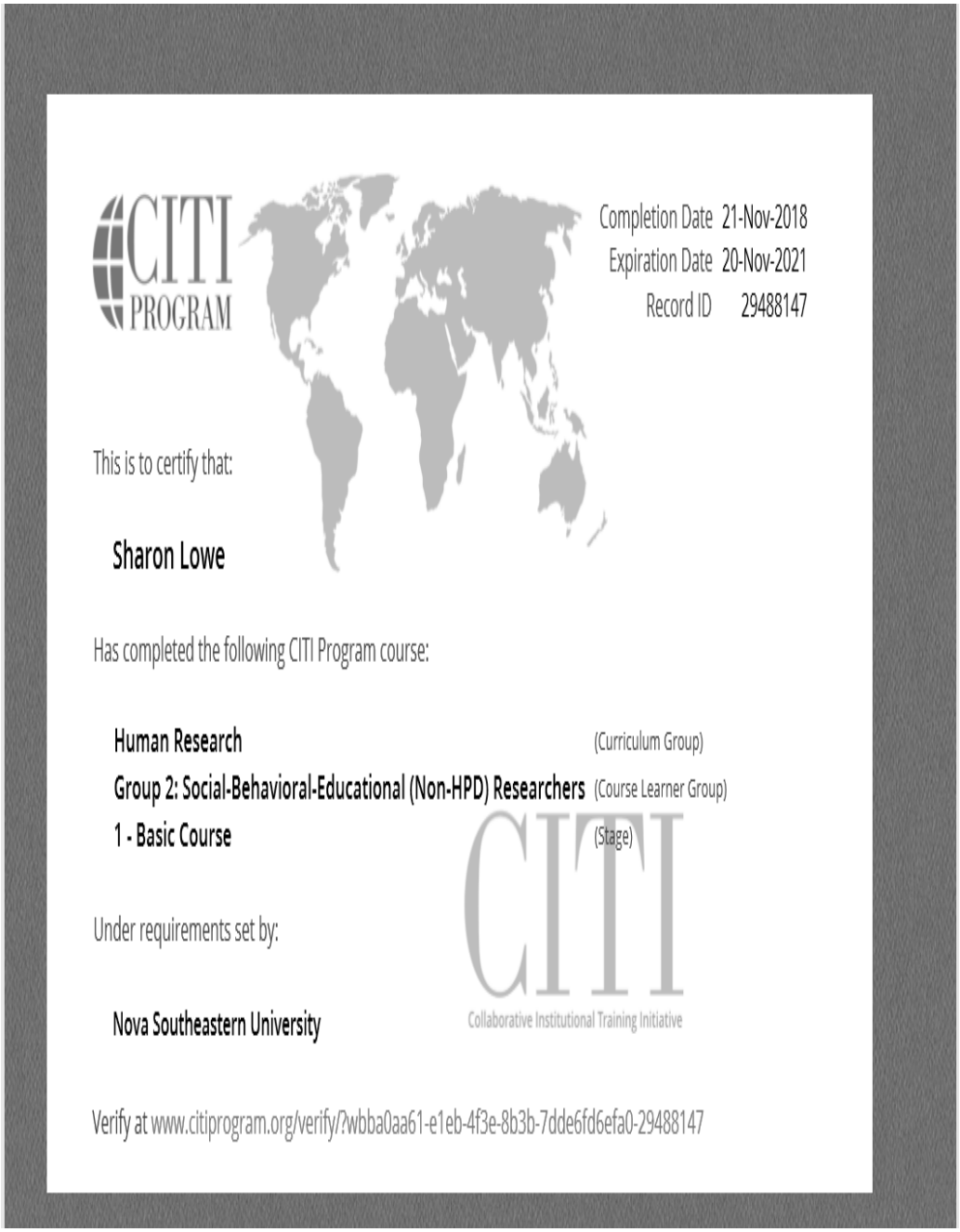
1. What grade do you teach?
2. How long have you been teaching?
    a. How long at this school?
    b. Have you taught at any other schools?
        i. How many years?
3. What brought you to teaching? Early childhood?
4. What is your education level?
5. How familiar are you with Universal Design for Learning (UDL)?
6. What are your perspectives of the implementation of UDL in the school and your class?
7. What are your perspectives of the UDL framework in improving students' mathematics knowledge in rural elementary school?
8. How do you think UDL has impacted your students' learning?
9. What are your perspectives on how school personnel perceive UDL as an effective tool in achieving desired outcomes?
10. What are your perspectives of UDL being valuable to teachers?
11. What do you see as the challenges of implementing the UDL model in the classroom?
12. What are your perspectives about how well UDL training prepared you to implement UDL within the classroom?
13. What are your perspectives about the limitations of the UDL framework?
14. In your experience, how is UDL being received in the school district?
15. What are your perspectives about how the UDL framework could be improved?
16. What are your perspectives on UDL becoming easier to implement with continued experience?
17. How do you see the principles of UDL coming into play in an early childhood classroom?
18. What are your biggest challenges/frustrations in creating a thriving learning environment?
19. What are your perspectives of the adequacy of technical resources that are allocated for UDL?
20. What are your perspectives of district administration actively supporting UDL?
21. What do you foresee your students will gain from your implementation of UDL?

Interview probes that will be used during interviews:

1. Please give me an example.
2. Please tell me more about it…

Appendix B

CITI Certificate



CITI PROGRAM

Completion Date 21-Nov-2018
Expiration Date 20-Nov-2021
Record ID 29488147

This is to certify that:

Sharon Lowe

Has completed the following CITI Program course:

Human Research (Curriculum Group)
Group 2: Social-Behavioral-Educational (Non-HPD) Researchers (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

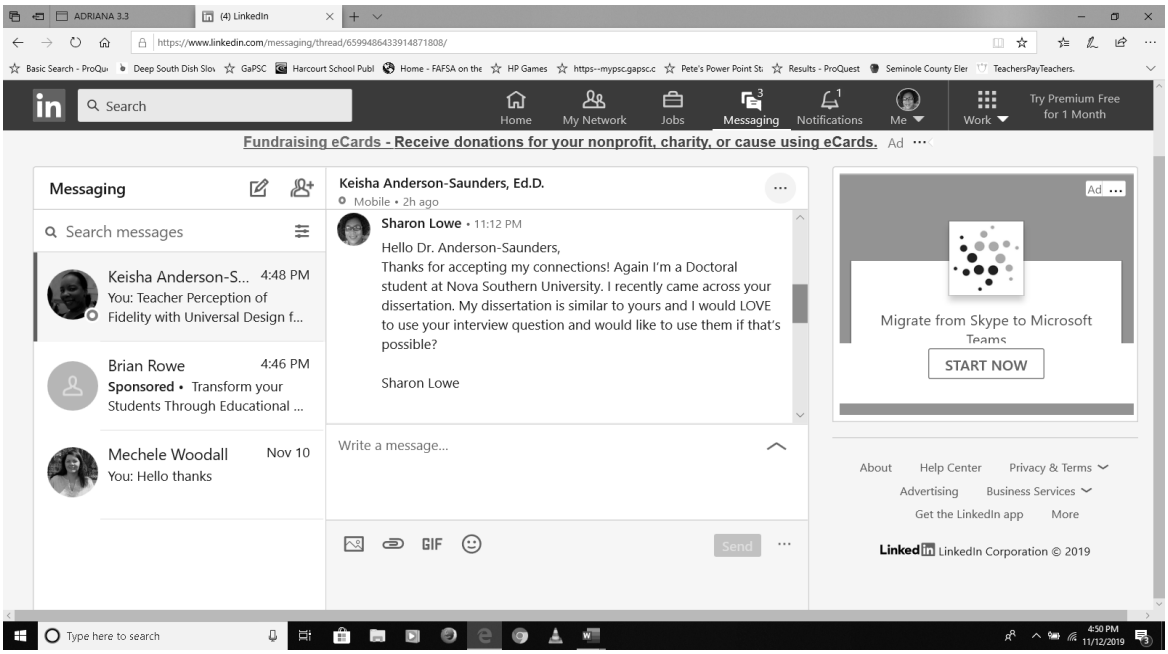
Nova Southeastern University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wbba0aa61-e1eb-4f3e-8b3b-7dde6fd6efa0-29488147

Appendix C

Approval to Use Interview Questions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(4) LinkedIn
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Work
Try Premium Free for 1 Month
Fundraising eCards - Receive donations for your nonprofit, charity, or cause using eCards. Ad
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Keisha Anderson-S... 4:48 PM
You: Teacher Perception of Fidelity with Universal Design f...
Brian Rowe 4:46 PM
Sponsored • Transform your Students Through Educational ...
Mechele Woodall Nov 10
You: Hello thanks
Keisha Anderson-Saunders, Ed.D.
Mobile • 2h ago
Sharon Lowe • 11:12 PM
Hello Dr. Anderson-Saunders,
Thanks for accepting my connections! Again I'm a Doctoral student at Nova Southern University. I recently came across your dissertation. My dissertation is similar to yours and I would LOVE to use your interview question and would like to use them if that's possible?
Sharon Lowe
Write a message...
GIF
Send
Ad
Migrate from Skype to Microsoft Teams
START NOW
About
Help Center
Privacy & Terms
Advertising
Business Services
Get the LinkedIn app
More
LinkedIn Corporation © 2019
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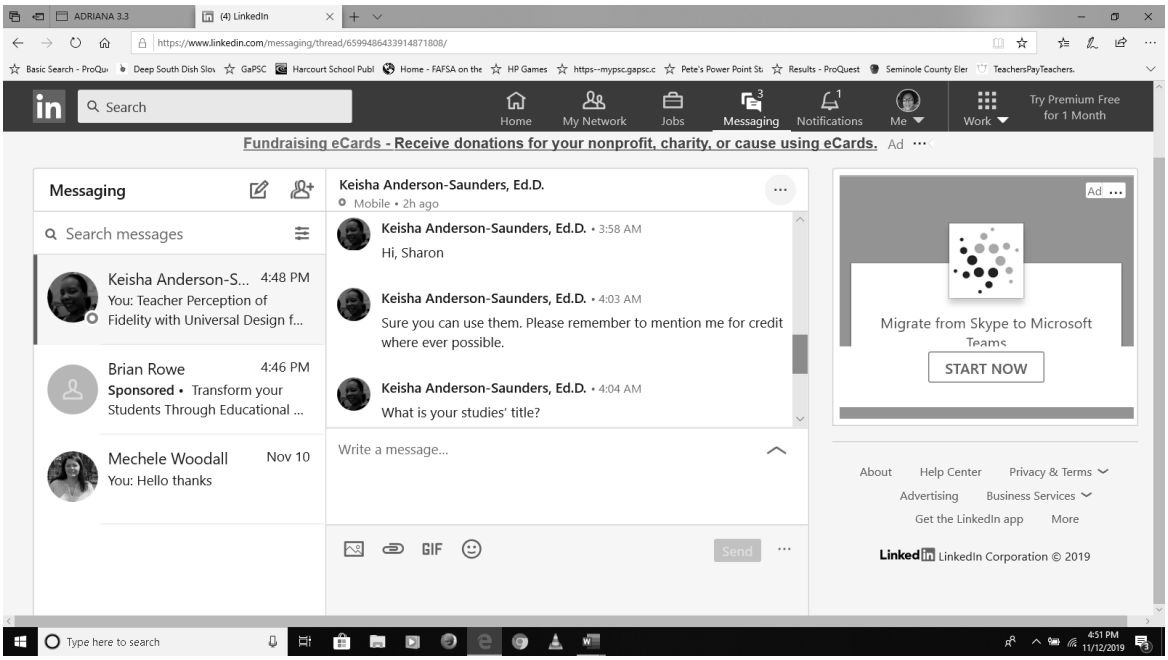
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Fundraising eCards - Receive donations for your nonprofit, charity, or cause using eCards. Ad
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Keisha Anderson-S... 4:48 PM
You: Teacher Perception of Fidelity with Universal Design f...
Brian Rowe 4:46 PM
Sponsored • Transform your Students Through Educational ...
Mechele Woodall Nov 10
You: Hello thanks
Keisha Anderson-Saunders, Ed.D.
Mobile • 2h ago
Keisha Anderson-Saunders, Ed.D. • 3:58 AM
Hi, Sharon
Keisha Anderson-Saunders, Ed.D. • 4:03 AM
Sure you can use them. Please remember to mention me for credit where ever possible.
Keisha Anderson-Saunders, Ed.D. • 4:04 AM
What is your studies' title?
Write a message...
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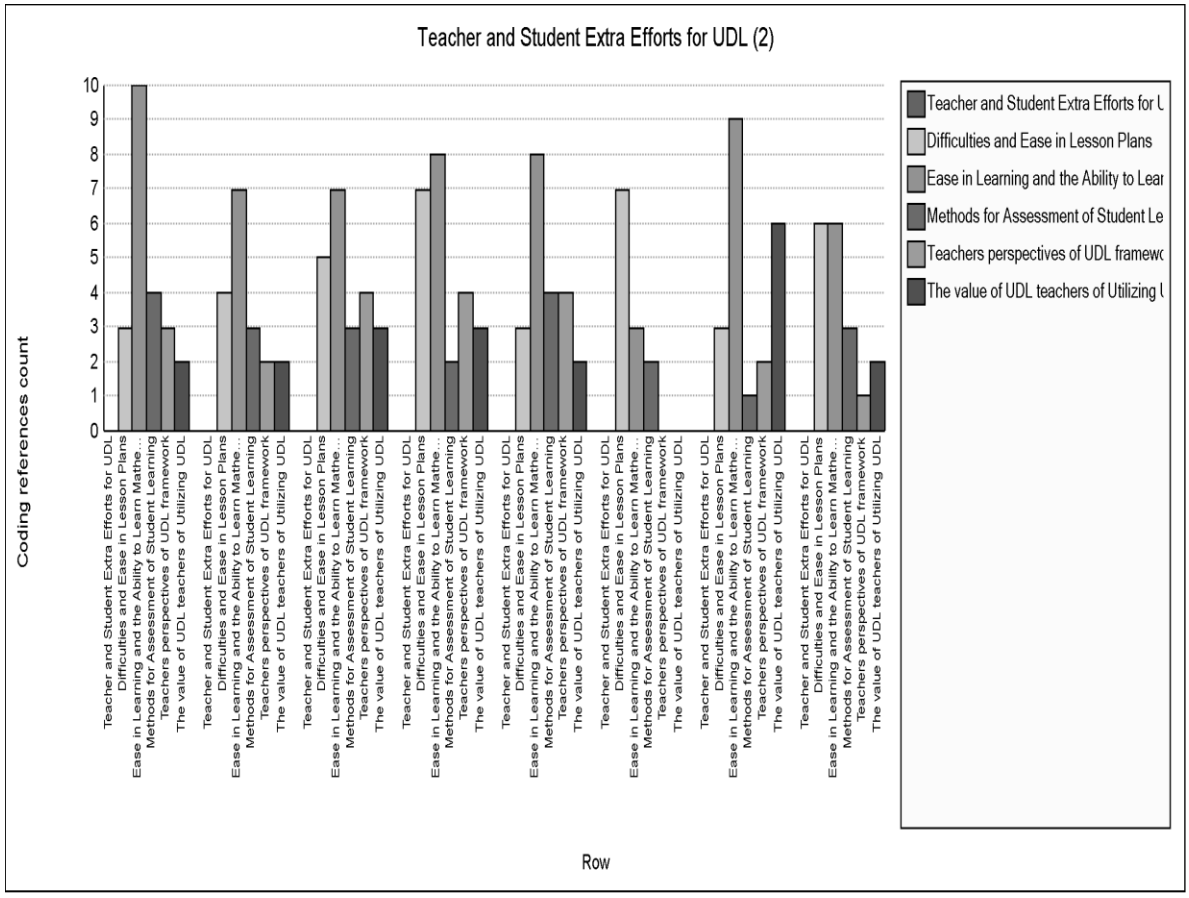
Appendix D

NVIVO Bar Graphs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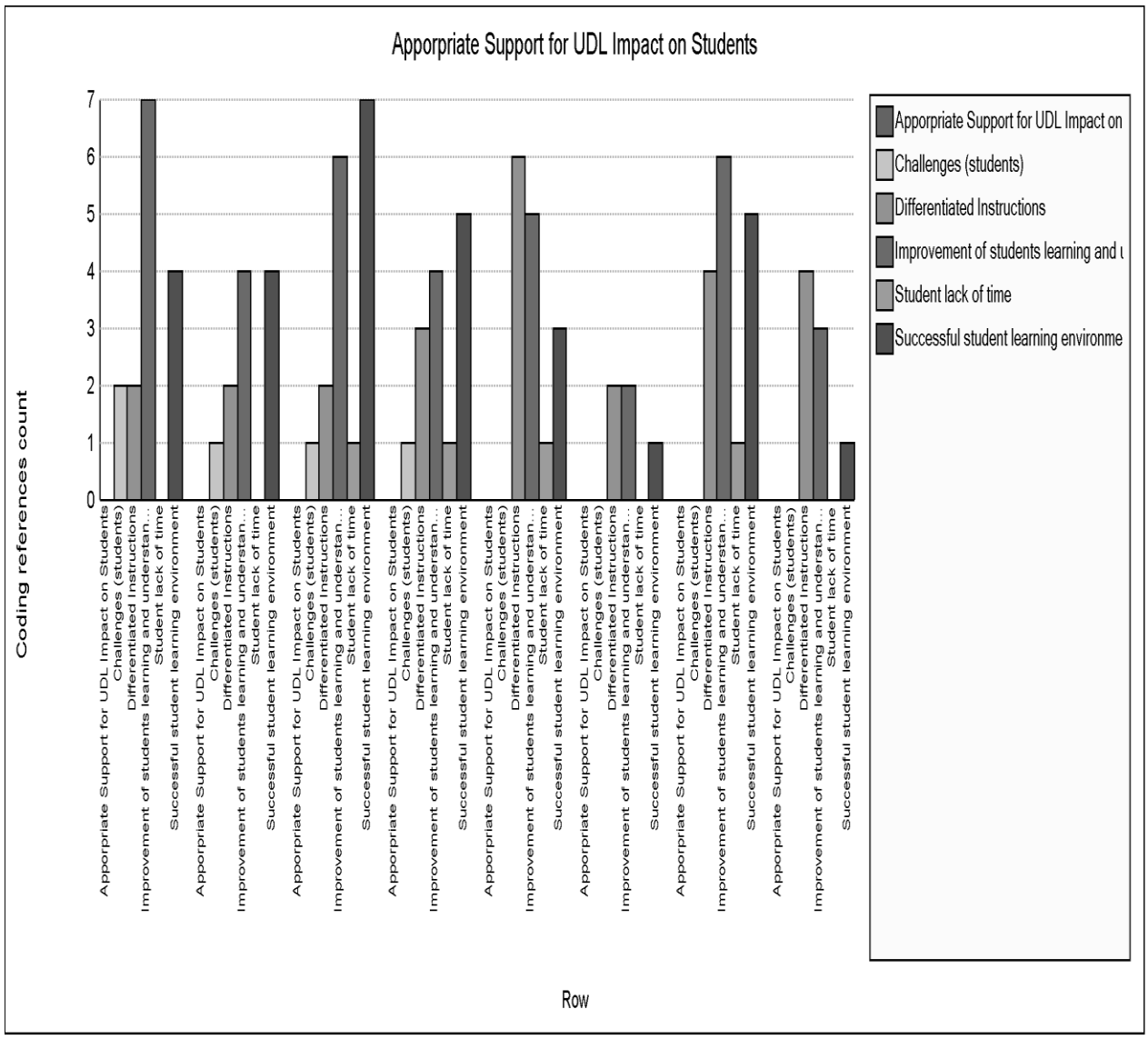
Apporpriate Support for UDL Impact on Students
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Apporpriate Support for UDL Impact on Students
Challenges (students)
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Improvement of students learning and understan...
Student lack of time
Successful student learning environment
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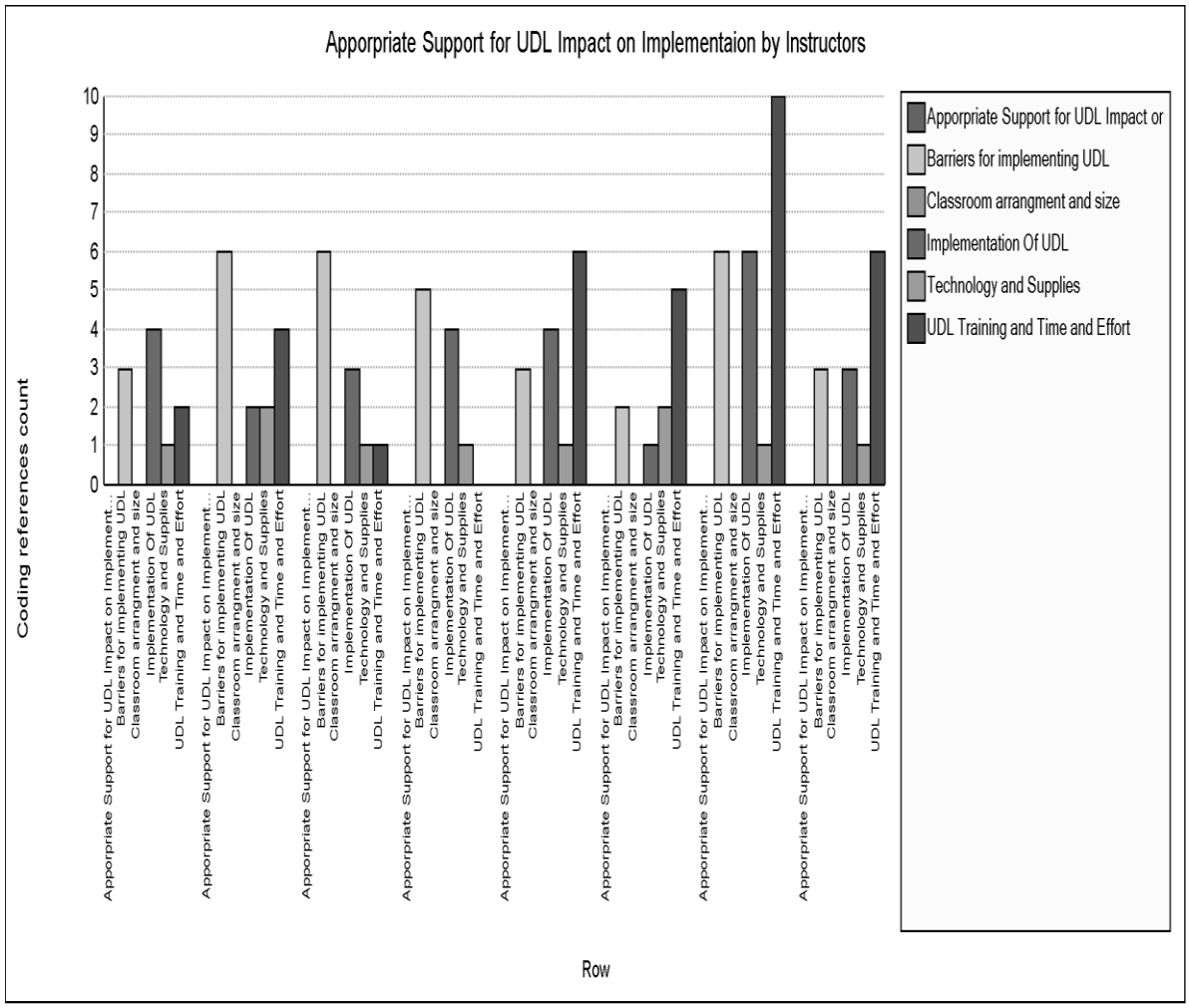
Apporpriate Support for UDL Impact on Implementaion by Instructors
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Barriers for implementing UDL
Classroom arrangment and size
Implementation Of UDL
Technology and Supplies
UDL Training and Time and Effort