THE DIFFERENCES BETWEEN EARLY CHILDHOOD OUTCOMES IN THE STATE OF MISSOURI AND USE OF UNIVERSAL DESIGN FOR LEARNING IN EARLY CHILDHOOD SPECIAL EDUCATION PROGRAMS

AMANDA M. BOYER

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The undersigned, approved by the Department Chair of Graduate Studies in Education, have examined a dissertation entitled:

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Presented by Amanda Boyer, a candidate for the degree of Doctor of Education and hereby certify that in their opinion it is worthy of acceptance.

Julie B Bryant

Dr. Julie Bryant, Advisor/Chair
Professor, Graduate Studies in Education

Jim Truelove

Dr. Jim Truelove, Committee Member
Department Chair, Graduate Studies in Education

Pam Hedgepeth

Dr. Pam Hedgepeth, Committee Member
Professor, Graduate Studies in Education

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By

Amanda Boyer, B.S., M.S.

Dr. Julie Bryant, Dissertation Advisor

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ABSTRACT

Students with disabilities often start their school career in an Early Childhood Special Education program. The Individuals with Disabilities Act (IDEA) of 2004 mandates school districts to allow students with disabilities as much access to the general education environment as possible. Research has shown Universal Design for Learning (UDL) an imperative framework to ensure this occurs.

In the state of Missouri, 253 school districts serving students with special needs in the ECSE setting were surveyed on their usage of UDL guidelines. Teachers and administrators from these programs were surveyed using the Universal Design for Learning Inventory tool developed through research specifically for this study. The sample included teachers of low incidence, self-contained and integrated ECSE classrooms, process coordinators, principals, and special education directors. These teachers and administrators were certified in areas including special education, early childhood, and early childhood special education and also served students with special needs and non-disabled peers.

CHAPTER I

INTRODUCTION

Nearly sixty-one years after the landmark court case, Brown v. Board of Education, educators continue to concur "in these days, it is doubtful that any child may reasonably be expected to succeed in life if he is denied the opportunity of an education" (Brown v. Board of Education, 1954, p.10). Brown v. the Board of Education, in which the U.S. Supreme Court ruled in favor of African-American children, stated that segregated schools, "have no place in the field of public education" (1954, p.10). Although this case refers to the denial of a fair and appropriate education for African-American students, it is similar to the segregation many students with disabilities have experienced throughout history. Students with disabilities were often denied access to the general education setting until the 1970's when similar court cases ruled in favor of these students. Finally in 1975, Public Law 94-142, also known as The Education for All Handicapped Children Act of 1975, enacted that children with disabilities had the right to an education (Wright & Wright, 2012).

Thirty years of legislation has been passed encouraging access for students with disabilities into the general education setting; however, little has been done to allow teachers flexibility within the curriculum materials in order to meet the needs of all students (Meo, 2008; Meyer, Rose, & Gordon, 2014). The Individuals with Disabilities Act (IDEA) of 2004, clearly states students with disabilities, ages 3-21, have access to the general education curriculum at the maximum extent possible. This is considered the "least restrictive environment" or LRE. Least Restrictive Environment is defined by the law as the setting in which students with disabilities receive special education services

and have the largest progress towards identified goals (Jimenez, Graf & Rose, 2007). However, often times, the student with the disability is expected to adapt to the curriculum rather than the curriculum adapt to the student (Rose, Meyer, Strangman, 2002; Meyer, Rose, & Gordon, 2014).

Students with disabilities are often identified between the ages of 3-5 as eligible for Early Childhood Special Education (ECSE) services. In the state of Missouri, there were 11,944 students, ages 3-5 receiving special education services during the 2014-2015 school year ("Missouri department of," 2015). Among these students, 33.20% received their services in a separate classroom or school, therefore having little exposure to non-disabled peers or the general education setting ("Missouri department of," 2015). The state goal is 31% according to this report.

Although during the 2014-2015 school year, Early Childhood Special Education (ECSE) programs as a whole met state targets, many programs were not meeting state targets in all areas. Upon entrance and exit of an Early Childhood Special Education program in the state of Missouri, the skills of students with disabilities are rated given an Early Childhood Outcome (ECO) rating 1-5, 5 being the closest to functioning like same-age peers. These ratings are based on three indicators: a student's social-emotional skills, acquisition and use of knowledge, and whether or not the student is using appropriate behaviors to meet their needs ("Missouri department of," 2015). A student displays social emotional skills by having appropriate relationships with peers and adults and being able to follow group rules. A student may exhibit the acquisition and use of knowledge by understanding their world, using symbols and language, and applying what they have learned. Lastly, students exhibit the use of appropriate behaviors by using the

toilet appropriately and using utensils. These are just a few examples of how students are assessed in order to assign an ECO rating.

As required by IDEA 2004, state departments of education must have a State Performance Plan in place with targets for students with disabilities. In August of 2005, the Missouri's Special Education Advisory Panel (SEAP), staff from the Office of Special Education of Department of Elementary and Secondary Education (DESE), and personnel from the North Central Regional Resource Center (NCRRC) presented Early Childhood Outcome (ECO) ratings as the new state requirements for this age group. In proposing state targets for the upcoming years, the Office of Special Education gathered data on the three indicators requiring targets and looked at three to five years of historical data for students with disabilities compared to all other students. Other information was considered such as compliance requirements, evidence-based practices that have been utilized at the state and local levels, and information gathered from a panel of 63 Local Education Agencies (LEA). An Early Childhood Outcome is not an assessment; it is a synthesis of information related to the child's present level of abilities. The exit rating, given when the child exits an Early Childhood Special Education program, is completed using existing information from parent input, professional observations, and both formal and/or informal assessment results. Generally, students receive an exit rating when transitioning to Kindergarten from an Early Childhood Special Education program. The students are given a rating of 1-5 in the area of social-emotional skills, a rating of 1-5 in their acquisition and use of knowledge, and a rating of 1-5 in the area of using their behaviors to meet their needs. These three ratings are provided to the Department of Elementary and Secondary Education through the data collection system called Missouri

Student Information System (MOSIS) from each school district in Missouri. Once the state receives these ratings, among other special education information, percentages are calculated for each rating compared to the state target.

Theoretical Framework

There are many major contributors to the best practices in the field of early childhood. Among these contributors are John Dewey, Jean Piaget, Erik Erickson and Lev Vkgotsky (Mooney, 2013). The ideas and theories of these individuals are generalized in the goals, methods, materials, and assessments used in Early Childhood Special Education programs.

John Dewey contributed to the field of early childhood stating that children learn best when educators encourage social interaction, help students make sense of the world through observation and modeling, plan lessons that are an extension of the home life, and teach students how to live in society (Mooney, 2013). Jean Piaget's theories encourage play, specifically imaginative play in order to develop language and knowledge of surroundings (Gray & MacBlain, 2015). Piaget's theories about egocentrism are commonly criticized; however, his stages and theories about play are emulated in early childhood classrooms in addition to the awareness of stages he brought to the field.

Lev Vygotsky provided a great emphasis on language in the early years. The development of language and thought were the key components to early childhood development, according to Vygotsky (Conkbayir & Pascal, 2014). Vygotsky's theories about language stages coincide with the later work of Erik Erickson. Erickson contributed to the field of early childhood with the introduction of eight universal stages,

four of which occur in a young child's life. These include trust vs. mistrust, autonomy vs. shame and doubt, intuitive vs. guilt, and industry vs. inferiority (Essa, 2014). Children enrolled in early childhood special education programs are experiencing many of these stages, and it is important for educators to encourage students to flourish throughout the stages with the nurturing support of adults.

Universal Design for Learning (UDL) is a theoretical framework based on the notion that students with disabilities have an equal opportunity to learn in the same environment as their non-disabled peers. Many of the early childhood theories, such as Piaget's stages, align with the idea of Universal Design for Learning. Supporting the premise of giving each individual equal access, the Center of Applied Science and Technology (CAST) developed UDL for schools, allowing teachers more flexibility in lesson development by giving students multiple means of receiving information, multiple means of expression, and multiple means of engagement. Developers of UDL believe "barriers to learning are not, in fact, inherent in the capacities of learners, but instead arise in learners' interactions with inflexible educational goals, materials, methods, and assessments" (Rose, Meyer, Strangman, 2002; pg. iv).

Supporters of UDL also believe the curriculum is often what is *disabled* rather than students (Rose & Meyers, 2000; Meyer, Rose, & Gordon, 2014). Students with disabilities, and those without an identified disability enter classrooms with different needs. Often times, students are unable to adjust to the rigid, inflexible curricula. UDL, in turn, allows the educator to develop curricula with UDL principles in mind to better meet the diverse needs of all students.

Universal Design for Learning (UDL) is a framework designed to use a set of three principles in order to aid in the curriculum development and meet the unique needs of all students. The three principles include offering multiple means of representation, multiple means of expression, and multiple means of student engagement (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). For example, a teacher can represent the same information visually and orally (multiple means of representation), allow a student to verbalize answers rather than through written expression (multiple means of expression) and offer choices (multiple means of engagement). Using these guidelines, the teacher is able to plan lessons, materials, and assessments with *all* students' ability levels in mind, rather than adapting the curriculum at a later time for the student with the disability. The UDL blueprint was developed using three primary brain networks. These networks include the recognition networks, the strategic networks, and the affective networks, otherwise known as the what, how, and why of learning (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). Furthermore, the recognition network gathers facts and organizes them, the strategic network plans and performs tasks, and the affective network explains how a child is motivated.

Problem Statement

According to the Special Education Profile, one issue Missouri Early Childhood Special Education (ECSE) programs are facing is not meeting state targets. As earlier reported, 33.20% of students receiving early childhood special education services received their services in a separate classroom or school, therefore having little exposure to non-disabled peers or the general education setting. In other words, as a state, ECSE

programs are not fully meeting the needs of students ages 3-5 with disabilities in their least restrictive environment.

Although in the most recent reauthorization of Individuals with Disabilities Education Act (IDEA), 2004, Universal Design for Learning concepts in curricula, assessment and standard development is strongly suggested in order to provide the Least Restrictive Environment (LRE) for students with disabilities, it is unknown if Early Childhood Special Education (ECSE) programs in MO are using UDL principles. Without knowing the depth of UDL usage in ECSE programs, it is difficult to determine if this has an impact on Early Childhood Outcome ratings and the determination to serve students in a "separate" class or school.

Rationale for Study

In addition to IDEA (2004) suggesting Universal Design for Learning (UDL) principles to support students with disabilities, the U.S. Department of Education included references to UDL in the National Educational Technology Plan in 2010 (US DOE, 2010). UDL is also included in the *application to students with disabilities* section of the Common Core State Standards (CCSS) (Casbarro, 2013). The National Center on Universal Design for Learning describes the Common Core as the "what" to education and UDL as the "how" ("National Center On Universal Design for Learning," n.d.). In other words, the Common Core State Standards (CCSS) gives teachers the standards to address and UDL provides the platform for students to meet those standards. Furthermore, in 2001, No Child Left Behind (NCLB) was enacted to ensure "all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging state academic achievement standards

and state academic assessments" by the U.S. Congress. Although, Universal Design for Learning (UDL) is not stated in the No Child Left Behind (NCLB) Act, UDL allows greater accountability, greater flexibility, and greater use of high-quality curriculum by measuring student progress frequently, allowing choices, and including research-based techniques for students with disabilities (Jackson, 2005). More recently, the Every Student Succeeds Act (ESSA) signed into law in December 2015, replaces No Child Left Behind (NCLB). The ESSA will hold students to high academic standards and offer resources for low-performing districts, while reducing the burden of frequent testing. UDL is referenced throughout the ESSA bill encouraging states to design assessments using UDL principles and will award grants to Local Education Agencies using UDL.

In the state of Missouri, Universal Design for Learning (UDL) is also being integrated into the Missouri Model Curriculum ("Integrating universal," 2013). The Missouri Model Curriculum, in the draft phase, organized by educators, is based on UDL principles and the Ohio Department of Education guidelines for working with students with disabilities ("Strategies for diverse," 2013). UDL has been referenced in public policy and the Missouri Model Curriculum, therefore gaining the attention of many special education departments. It is imperative that the ideas of UDL be implemented in order to test its effectiveness on special education students, including those in Early Childhood Special Education programs.

Research Questions

This study will determine if there is any difference between implementation of UDL principles and Early Childhood Outcome ratings. With this information, programs will be able to move forward to better serve our students with disabilities. In order to

offer information to advance the field, the researcher sought answers to the following questions:

1. Is there any difference between Early Childhood Outcome (ECO) ratings reported by Early Childhood Special Education (ECSE) teachers and administrators in the state of Missouri and their perceptions of implementation of Universal Design for Learning (UDL) guidelines?
2. Is there any difference between the perception of Early Childhood Special Education (ECSE) teachers and administrators on their level of implementation of Universal Design for Learning (UDL) concepts compared to their position, certification, and number of students they serve?

Assumptions

The purposes, methods, and procedures of this study were based on the following assumptions:

1. Early intervention is important for later success.
2. Universal Design for Learning (UDL) is a program supported by Common Core State Standards (CCSS).

Limitations/Delimitations

The limitations that cannot be controlled for and delimitations of this study are as follows:

1. Population is delimited to Early Childhood Special Education programs in the state of MO.
2. This study is limited to the surveys that are returned by participants.

3. This study is limited to the perceptions of the participants and the integrity of their responses.
4. Early Childhood Outcome ratings are reported per district, therefore averaged among students being served.

Design Controls

This study was based upon a quantitative research design through the use of a survey in order to determine if there were any differences between the use of Universal Design for Learning (UDL) guidelines in Early Childhood Special Education (ECSE) programs and reported Early Childhood Outcome (ECO) ratings. The survey was sent to ECSE administrators and teachers in the state of Missouri to identify their use of UDL principles in ECSE classrooms.

Definition of Key Terms

The following terms are defined to clarify the study:

Universal Design (UD): is a set of principles for designing products and spaces in order to be used by the widest range of people possible, including people with disabilities (universaldesign.com).

Universal Design for Learning (UDL): based on UD, but specifically for schools, and is a set of principles for curriculum development that give all individuals equal opportunities to learn (cast.org, 2013).

Early Childhood Outcomes (ECO): performance data for young children receiving services through Parts B and C of the Individuals with Disabilities Education Act (dese.mo.gov, 2013).

Summary

Universal Design for Learning (UDL) is gaining national attention as Common Core State Standard (CCSS) becomes more integrated in everyday practices along with the new ESSA bill encouraging the use of UDL ("UDL and the common core state standards", 2014). Preschool education is also gaining a great deal of attention in the United States (Jones, 2014). Investing in early child development from prenatal care through preschool offers a solution to develop better economic and social outcomes (Karoly, Kilburn, & Cannon, 2005; Clothier, S. & Poppe, J., 2007; Johnson, Showalter, Klein, & Lester, 2014).

Many students with disabilities begin their educational journey at the early childhood level. Universal Design for Learning (UDL) is a way for Early Childhood Special Education teachers to design a curriculum that fits the needs of all students. In this study, the researcher examined UDL specifically in the Early Childhood Special Education setting across the state of Missouri to better understand how UDL is being used. In addition, Early Childhood Outcome (ECO) ratings were examined. In Chapter two, a literature review was completed to better describe the history of special education, Early Childhood Special Education (ECSE), Least Restrictive Environment (LRE), the use of UDL in schools, the use of UDL specifically in ECSE classrooms, and similar studies conducted in the field of education. In Chapter three, a description of the methodology will be discussed and Chapter four and five includes the results of the study and a discussion of the findings.

CHAPTER II

REVIEW OF RELATED LITERATURE

This study examined the relationship between the use of Universal Design for Learning (UDL) principles in Early Childhood Special Education (ECSE) programs and annual Early Childhood Outcome (ECO) ratings reported by each district in the state of Missouri. Chapter 1 introduced the problem and importance of assuring that all children, regardless of ability are able to access the general education curriculum in the early childhood setting. This chapter reviewed relevant literature in the history of special education along with important court cases and legislation related to the field of special education, including the Individuals with Disabilities Act (IDEA) and landmark court case Mills v. Board of Education District of Columbia in 1972. In addition, the Least Restrictive Environment (LRE) for students with disabilities was defined and reviewed. Early Childhood Special Education literature relevant to this study was also examined along with theories in early childhood. There are several theorists, such as Vygotsky and Piaget, who have contributed to the field of early childhood. Lastly, the use of Universal Design of Learning (UDL) in schools and the use of UDL specifically in Early Childhood Special Education (ECSE) classrooms were explored.

History of Special Education

The term *special education* was first used publically by Alexander Graham Bell at a National Education Association meeting in 1884 (Rotatori, Obiakor, & Bakkan, 2011). However, philosophical underpinnings of the field began long before. In the early 1700's, persons with disabilities were treated inhumanely and at times even put to death (Rotatori, Obiakor, & Bakkan, 2011). By the end of the 18th century, special education

was considered a branch of education; however, charity was often the reason for providing services rather than true education (Winger, 1993). Fortunately, special education advocates began designing ways for people with disabilities to function more easily, such as Hauy who opened a school for the blind in Paris in 1784 and Braille, who developed a system in 1829 of writing for persons with visual impairments (Rotatori, Obiakor, & Bakkan, 2011). In the early 1800's, Jean-Marc-Gaspard developed a specially designed pedagogy that allowed a boy, also referred to as the wild boy of Aveyron, to communicate and learn; therefore, exhibiting that people with disabilities are able to learn (Rotatori, Obiakor, & Bakkan, 2011). This became a springboard for European educators to begin developing practices for working with these unique individuals. Later, in 1841, the first public school for "mentally retarded people" opened in Paris (Winger, 1993, p.11).

The first special education programs in the United States were those for "at-risk" children who lived in impoverished, urban slums (Wright & Wright, 2012). By 1890, many of these students were learning cooking, sewing, metal work, carpentry and social values in these "manual" classes designed by urban school districts aside from their general education classrooms (Wright & Wright, 2012). There were also special schools for children with deafness, blindness, and mental retardation at this time; however, they were residential or private, limiting access for most children with disabilities (Wright & Wright, 2012). Special programs for children with learning disabilities became more common in the 1940's. However, the students were referred to as having a brain injury or minimal brain function and were still excluded from the general education classroom (Wright & Wright, 2012).

Related Legislation

In 1956, Congress enacted the Elementary and Secondary Education Act (ESEA) to address the inequality in education for students with disabilities (Wright & Wright, 2012). Educators were later obligated to better serve students with disabilities with the passage of Section 504 of the Rehabilitation Act in 1973 and Public Law 94-142, also known as The Education for All Handicapped Children in 1975. Public Law 94-142 intended that all children with disabilities have "the right to education, and to establish a process by which state and local educational agencies may be held accountable for providing educational services for handicapped children" (Wright & Wright, 2008, p. 7). This started the movement of educating students in general education classrooms "as much as appropriate" (Hehir, 2009, p.3). This definition has expanded over time as educators became better at including students with disabilities into the general education setting. In 1986, an amendment was added to the Education for all Handicapped Children Act to include preschool and infant/toddler programs (Trohanis, P.L., 1988).

The Individuals with Disabilities Act (IDEA) 1997, followed by its reauthorization in 2004, shifted the focus from *access* to the general education setting to *progress within* the general education setting (Wyndham, 2010). Therefore, students were not just expected to be *present* in general education classrooms, but they were expected to make educational *gains* in that particular general education setting. This placed more pressure on the general education teacher to ensure appropriate accommodations and/or modifications were in place to allow for students' success. Also, IDEA of 1997 stipulated that a need for a modified curriculum did not justify an alternative setting, and therefore, general educators became more responsible for meeting

the needs of students with disabilities (Hehir, 2009). Individuals with Disabilities Education Act (IDEA) of 2004 required that the state education agencies:

> (1) As part of any print instructional materials adoption process, procurement contract, or other practice or instrument used for purchase of print instructional materials, must enter into a written contract with the publisher of the print instructional materials to (i) Require the publisher to prepare and, on or before delivery of the print instructional materials, provide to National Instructional Materials Access Center (NIMAC) electronic files containing the contents of the print instructional materials using the National Instructional Materials Accessibility Standards (NIMAS); or (ii) Purchase instructional materials from the publisher that are produced in, or may be rendered in, specialized formats (Hehir, 2009, p.5).

Through NIMAS provisions, this IDEA 2004 legislation became a movement towards more UDL-infused classrooms by providing classroom materials that could be accessed by all students regardless of their disability and allowed for a variety of ways to represent the information to the student.

In addition, the No Child Left Behind Act (NCLB) legislation was passed four years after the reauthorization of IDEA (2004). The purpose of this legislation was "to ensure that *all* children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging State academic achievement standards and State academic assessments" (No Child Left Behind Act, 2001). Although No Child Left Behind (NCLB) applied to all students, including students with disabilities, and IDEA (2004) applied only to students with disabilities, both statutes

share the goal of raising expectations for the educational performance of students with disabilities and increasing accountability (Karger, 2005).

As of December 10, 2015, a new bill was signed into law to replace NCLB. Every Student Succeeds Act will allow states more control by allowing them to set their own goals addressing proficiency on tests, graduation rates, and how to show progress among subgroups. There will also be caps on how many students with disabilities are allowed to take an alternative test, thus ensuring they are accessing the general education curriculum ("Every student succeeds," 2015).

Related Court Cases

In addition to legislation, the courts have built a strong foundation for integrating students as well. In the 1970's, there were also two landmark court cases that occurred to further push fair and appropriate education for children with disabilities. In 1971, the Pennsylvania Association for Retarded Children (PARC) sued the Commonwealth of Pennsylvania for a state law that allowed public schools to deny education to certain children, mostly those who had not attained a mental age of 5 years (Li, 2013). This law had been consistently used by the state to deny education to students considered too difficult to integrate into school. The case was settled before the District Court of the Eastern District of Pennsylvania, and it was decided that educational placement decisions must include parental participation and a way to resolve disputes (Wright & Wright, 2012). The second landmark case, *Mills v. Board of Education of District of Columbia* occurred in 1972 on behalf of seven students with disabilities who had been identified as having behavioral or mental problems and were excluded from school. The federal district court in the District of Columbia first determined that the children's right to a

public school education was violated under the laws of the District of Columbia and the court ordered remedial plans for the students (Mead, 2012).

In 1981, *Campbell v. Talladega* questioned segregation and low expectations by ruling a requirement that students with disabilities have contact with nondisabled peers (Hehir, 2009). *The Board of Education v. Rowley*, in 1982 clarified that children with disabilities were entitled access to an education that was educationally beneficial, yet not an education that would maximize their potential nor were they entitled to the best education (Wright & Wright, 2012). In other words, they were given access, but not a maximized experience. In this particular case, Amy Rowley was a child with a hearing impairment. Her parents requested she have a qualified sign-language interpreter in first grade with her during class. The school refused this service. The U.S. District Court found that the child was well-adjusted and performing better than average, yet was understanding considerably less of what was going on in class and, therefore, was not performing as well as she would without her disability (Wright & Wright, 2012). Therefore, the court concluded that she was not receiving "an opportunity to achieve her full potential commensurate with the opportunity provided to other children" (Wright & Wright, 2012, p. 335). In other words, even though she was passing, she was still missing out on valuable information and, therefore, not given the opportunity to meet her potential.

Later, in 1983, *Roncher v. Walter* introduced the portability standard, which acknowledged that if services could be provided in a general education setting, a segregated placement was inappropriate (Hehir, 2009). In 1989, *Daniel RR v. State Board of Education* further explored this decision by establishing two basic questions to

determine whether an inclusive setting was the appropriate placement: 1) With the use of aids and services, could the child be educated in the regular education classroom and 2) If the child was removed from the general education classroom, was the child participating with nondisabled peers to the maximum extent appropriate? (Hehir, 2009).

Finally, in *Sacramento City School District v. Holland* in 1994, it was ruled that inclusion in a regular class was the Least Restrictive Environment (Hehir, 2009). In this particular case, Rachel Holland was an eleven year old with an IQ of 44, which is considered moderately mentally retarded. Her parents requested she have full-time access to the general education setting and the school district determined her academic needs be met in a special education setting with access to general education during music, physical education and art (Hehir, 2009). Rachel's parents appealed the district's decision, and after a hearing officer determined that the district had failed to make adequate effort to educate Rachel in the general education setting, the case went to district court. In considering whether the district proposed an appropriate placement for Rachel, the district court examined the following factors: "(1) the educational benefits available to Rachel in a regular classroom, supplemented with appropriate aids and services, as compared with the educational benefits of a special education classroom; (2) the non-academic benefits of interaction with children who were not disabled; (3) the effect of Rachel's presence on the teacher and other children in the classroom; and (4) the cost of mainstreaming Rachel in a regular classroom" (Hehir, 2009, p.3). The court ruled that the appropriate placement for Rachel was in a regular education classroom with supplementary aides. This was also known as Rachel's least restrictive environment, or

the environment within which she was educated as close to her non-disabled peers as possible.

Least Restrictive Environment (LRE)

Least Restrictive Environment (LRE) is the setting in which students with disabilities receive special education services (Jimenez, Graf & Rose, 2007). Specifically, the law states: "to the maximum extent appropriate, children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are not disabled, and that special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only when the nature or severity of the disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily" (Individuals with Disabilities Act, 2004).

Educators are therefore required to educate children with disabilities with children who do not have disabilities "to the maximum extent possible" (Wright & Wright, 2012, p.8). In the 2004–2005 school year, approximately 96% of students with disabilities received their education in the general public schools, and half the students with disabilities spent their day in the general classrooms (US Department of Education, 2005). In the 2012-2103 school year, 95% of students with disabilities were served in a regular public school, 61% in the general education setting for more than 80% of their day ("Children and Youth with Disabilities," 2015). Therefore, students with disabilities must be able to make progress as close to their non-disabled peers as possible. This practice is referred to by many as "inclusion" and is defined as the educational practice of

educating children with disabilities in classrooms with children without disabilities (Webster, 2015).

Overall, inclusion has proven to be beneficial. Students with disabilities in inclusive settings have shown improvement in standardized tests, social and communication skills, increased interaction with peers, progress on IEP goals, and are better prepared when they exit high school (Manset & Semmel, 1997; Cortiella, 2007;Dillion, 2007). Students with disabilities educated in the general education setting receive higher grades, and achieve higher scores on standardized tests than students with disabilities who are in a separate classroom setting (Rea, McLaughlin, & Walter-Thomas, 2002). Research also indicates that students with severe disabilities have increased academic success through interaction with non-disabled peers (Westling & Fox, 2009). In addition, Foreman, Arthur-Kelly, Pascoe, and Smyth King indicated in 2004 that students with significant disabilities experience more opportunities to communicate and develop their communication skills through interaction with non-disabled peers in a general education setting. However, although research indicates more opportunities and even higher academic scores, some students still do not do well in a general education setting.

The general education setting is considered the Least Restrictive Environment (LRE), but some students do not succeed in this setting. One reason for the potential failure of students with disabilities in general education settings may be due to lesson planning (Rose & Meyer, 2000; Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). For example, Schumm and Vaughn (1995) found that although teachers viewed accommodations as helpful for all students, they were unable to modify their instruction due to time constraints, classroom management, and differing achievement levels of

students. It was also suggested that many general education teachers are uncertain of what inclusion entails and doubt their ability to teach students with disabilities (Schumm & Vaughn, 1995). In the area of severe disabilities, Smith (2000) found that teachers did not feel they had the proper training or preparation to include all learners. Universal Design for Learning is one way to help teachers with lesson planning with all students in mind (Savage, 2007). Savage conducted a study with 72 graduate and undergraduate students by giving them a 1-hour Universal Design of Learning (UDL) presentation on how to modify lesson plans to fit the needs of all students. A three- factor analysis of variance with repeated measures for each of the dependent variables on the lesson plan pretest and posttest scores for the control and experimental groups found that the teachers in the experimental group improved in their lesson plan development after the 1-hour intervention (Savage, 2007).

Students with disabilities are often identified before entering Kindergarten. It is the public school's responsibility to make efforts toward finding students ages 3-5 that may have a disability. This is referred to as child find activities. Parents, Parents as Teachers programs, Early Intervention programs, and local daycares are common ways children are referred for special education services. If these entities, among others, suspect a disability, the public school is required to evaluate the child. If found eligible for special education services, the child is served in an Early Childhood Special Education program.

Early Childhood Special Education

The Individuals with Disabilities Education Act (IDEA 2004) mandated a free and appropriate public education for eligible children ages 3–21. Early Childhood

Special Education refers to special education services provided to children ages 3-5 who are not yet eligible for enrollment in Kindergarten. A child can be found eligible in the area of Young Child with a Developmental Delay (YCDD) in the areas of social/emotional, cognitive, communication, adaptive, and/or physical development. The child's development must be at or below 1.5 standard deviations or equivalent levels of the mean in any two areas of development, or at or below 2.0 standard deviations or equivalent levels in one area of development, and the child must need special education and related services ("Missouri Department of Elementary and Secondary Education," 2015).

With sufficient information, a district can also determine a student ages 3-5 as eligible for one of the following disability categories: Autism, Deaf/Blind, Emotional Disturbance, Hearing Impairment, Intellectual Disability, Multiple Disabilities, Orthopedic Impairment, Other Health Impairment, Learning Disability, Language Impairment, Sound System Disorder, Speech/Fluency, Speech/Voice, Traumatic Brain Injury, Vision Impairment ("Missouri Department of Elementary and Secondary Education," 2015). The State Performance Plan, required by the U.S. Department of Education, Office of Special Education Programs (OSEP), includes an indicator addressing early childhood outcomes (ECO) ("Missouri Department of Elementary and Secondary Education," 2015). This requirement was designed to gather performance data for young children receiving special education services. Missouri districts give each child an ECO rating when entering and exiting ECSE programs.

Early childhood special educators recognize that young children with disabilities face challenges that set them apart from their non-disabled peers; therefore, the field

blends knowledge and information about early childhood education, child development and special education in order to meet the needs of the students (Kaderavek, 2009). Additionally, ECSE teachers work with a variety of professionals, including Speech Language Pathologists, Occupational Therapists, and Physical Therapists and value partnerships with parents as well (Kaderavek, 2009). These professionals have the expertise to work on specific deficits in a small group or one-on-one basis in order to further assist the progress of the student. These professionals, along with theories in best practices for early childhood, combined, allows staff working with students a variety of knowledge to better serve the unique needs of this population.

Theories in Early Childhood Special Education

Current Early Childhood Special Education practice is deeply embedded in traditional theories with major contributions from practices, such as, incidental teaching, functional assessment, positive behavior supports and systematic instruction (Odom & Wolery, 2003). ECSE practice is also highly influenced from the writings of Vygotsky, Erickson, and Piaget and the educational philosophy of John Dewey (Odom & Wolery, 2003). Constructivist theory is a philosophy of learning founded on the premise of reflecting on our experiences, and constructing our own understanding of our environment, largely due to theories from Vygotsky and Piaget. Putting all of this together, Early Childhood Special Education has moved to a unified theory of early intervention practice (Odom & Wolery, 2003). This unified theory has several tenets including the following: families and homes are primary nurturing contexts, strengthening relationships, children learn through acting out and observing their environment, adults mediate children's experiences to promote learning, participation in

more developmentally advanced settings is essential, practice is individual and goal-orientated, program transitions are enhanced by the adult, and ecological contexts influence families (Odom & Wolery, 2003).

Families and homes are the primary nurturing context, except when there is abuse or neglect in the home. The assumption is that children with disabilities who live with their families and participate in their natural environment, similar to children without disabilities, are more likely to be similar to their non-disabled siblings than if they were placed in residential care (Odom & Wolery, 2011). Early intervention programs and Early Childhood Special Education programs can help families by providing them access to resources in the community, giving them information about their child's disability, and coaching parents to foster their child's development.

The second tenet of the unified theory of early childhood states that strengthening relationships with adults and other children is an essential feature of ECSE. Positive relationships between parents and their children, children with disabilities and their peers, and among professionals working with children and their families are vital to the child's success (Odom & Wolery, 2011). Lieber et.al., described a program feature in which relationships are enhanced between adults over a 2-year period and found that positive changes occurred when there is joint participation among staff in program development, shared philosophy, and administrative support (2001). These positive relationships between staff can allow for a better working environment for those staff members, and allows for a better culture in the classroom that in turn enhances a sense of safety.

The third tenet describes the benefits from a child learning through acting on and observing their environment. The social and physical interactions students have with

their environment are where they gain their opportunities to learn. Children are naturally active beings, and engagement leads to competence, mastery and additional interests (Odom & Wolery, 2011). Therefore, responsive toys, motion and movement activities, and social interactions promote learning for young children.

The next tenet of the unified theory states that adults mediate children's experiences to promote learning. Teachers can do this by interpreting the world for the child through modeling, thinking aloud, and role-playing situations. Mediation requires planning, goal setting, and practice. For young children, interventions should be used during play, be embedded in activities across the curriculum, and occur when it is relevant (Odom & Wolery, 2011). Some strategies include rotating materials in and out of play areas, providing choices, and changing the structure of the classroom (Odom & Wolery, 2011).

The next tenet claims that participation in more developmentally advanced settings is essential. This tenet implies that students need to participate in advanced settings, rather than inclusive settings with the guidance of an adult or competent peer. In the ECSE setting, peer models are integrated to be a language and social model for students with disabilities (Odom & Wolery, 2011).

The next two tenets suggest that educators individualize goals for students with disabilities and allow students to transition through the developmental process (Odom & Wolery, 2011). ECSE students have an individual plan and goals set by the Individual Education Program (IEP) team to ensure progress in deficit areas. Individualizing goals allows the educator to focus on specific skills, and he/she is held accountable for assessing and changing instruction as the child progresses. As ECSE students progress,

they transition through programs, educators, and settings. Preparing students for transitions is vital in their development as they will transition throughout their life. Teachers change, buildings change, and students change as they grow. Educators need to recognize the importance of teaching skills that can be generalized in several situations and always be thinking of the next transition for which the student is preparing.

The last tenet, pushed by Ecological Systems Theory, recognized that outside factors also influence a child's development and learning. Factors such as family issues, culture, and social policy can affect the interventions that educators choose for their students. Using the eight tenets of the unified theory in ECSE can serve as a guide for educators when developing interventions for students with disabilities (Odom & Wolery, 2003).

Current Methods of Interventions in ECSE

There is a requirement that the IEP must state how the student's disability affects involvement and progress in the general curriculum. In order to accomplish this, educators must not only use the theories of early childhood discussed above, but also interventions known to aid in advancing special education students.

The term "general curriculum" is defined as the same curriculum as established for students without disabilities (IDEA 1997). Therefore, in describing how the student's disability affects his or her participation in the general curriculum, educators must consider all aspects of the curriculum. The degree of intervention needed to coordinate support for students with disabilities into the general education classroom differs depending on the child's needs. All accommodations and modifications for students must be outlined in the child's Individual Education Plan (IEP) (IDEA, 2004).

Curriculum modifications require the teacher to make adjustments to what is expected or what is being taught in the general education setting (Moores-Abdool, 2010). Instructional accommodations, on the other hand, are changes in the methods used for the student to participate in the general education setting (Moores-Abdool, 2010). A modification, for example, may be giving a student a shorter assignment, whereas an accommodation may be a student giving a verbal response rather than a written response. Therefore, accommodations do not inherently change content.

There are many research findings on the effectiveness of techniques based on Applied Behavior Analysis (ABA). ABA is a systematic approach to interventions based on functional analysis. Examples include pivotal response training, discrete trial training, and direct instruction for teaching students with disabilities (Ozen & Ergenekon, 2011). Pivotal response training is play based and child initiated. The goal is to elicit responses from students through motivation, self-management, and social interactions so that skills are generalized across many settings (Koegel, 2006). Discrete trial training can be defined as a method of teaching in simplified and structured steps; the skill is broken down and built-up using discrete trials that teach each step one at a time (Smith, 2001). Direct instruction can be defined as "(1) instructional approaches that are structured, sequenced, and led by teachers, and/or (2) the presentation of academic content to students by teachers, such as in a lecture or demonstration" (Abbott, n.d., p.13). However, most of the ABA techniques begin to work during the acquisition phase of learning, rather than the application phase. This is most likely due to the skills being adult-guided and taught in a highly structured environment and students, therefore, may struggle to generalize these skills. In order to overcome this limitation, additional

techniques have been suggested, such as skills being taught in the natural setting (Ozen & Ergenekon, 2011). One technique, often used in preschool settings with students with disabilities, is referred to as activity-based intervention (ABI) (Ozen & Ergenekon, 2011). ABI can be defined as: choosing activities according to the child's interests, setting goals embedded in routines, teaching functional and generalizable skills, and using before and after behavior stimuli which have natural and meaningful relations with behaviors and environment (Ozen & Ergenekon, 2011). In the preschool setting, ABI may be used through imitating, social skills, dressing and undressing, and teaching transitional skills (Ozen & Ergenekon, 2011). These skills, taught in a natural setting, allow students to better access the general education setting by allowing them to practice new skills, such as social skills, with their non-disabled peers.

Rakap and Par-lak-Rakap conducted a review of literature to evaluate the effectiveness of embedded instruction as an intervention strategy for teaching young children with disabilities in inclusive preschool classrooms (2011). Embedded instruction is an approach used to promote engagement, learning, and independence in everyday routines by identifying times that naturally occur. The researchers looked at 10 studies to determine if young children in inclusive settings acquired skills and generalized these skills (Rakap & Par-lak-Rakap, 2011). The researchers found that the included empirical studies revealed that embedded instruction is an effective practice to teach a range of skills to children with various disabilities in inclusive preschool classrooms (Rakap & Par-lak-Rakap, 2011). Based on the reporting generalization and maintenance data of this study, it was concluded that young children with disabilities

learning skills through embedded instruction could generalize skills over time (Rakap & Par-lak-Rakap, 2011).

Acquiring pre-writing skills is important for kindergarten students and is considered an important early literacy skill (Grisham, Hemmeter, & Pretti-Frontezak, 2005). Grisham et.al., used a multiple baseline across students in a preliminary study to investigate the effects of embedding learning opportunities in pre-writing skills in 3 preschool-aged children of varying abilities enrolled in inclusive preschool programs (2005). Instruction was distributed across the school day within developmentally appropriate activities. Results showed that 2 of the 3 children acquired the target skill, while the third made progress (Grisham, Hemmeter, & Pretti-Frontezak, 2005). Inclusive settings allowed for students to make progress towards their goals, while participating with non-disabled peers. These 3 students were able to make progress in an inclusive setting.

The Division of Early Childhood (DEC) of the Council for Exceptional Children in 2007, recommended early childhood curricula to be integrated, developmentally appropriate, universally designed with flexibility and linked to assessment, and is a key intervention strategy. This type of curriculum framework helped to ensure successful access to curriculum and facilitated participation and learning of all children regardless of their disability. A truly assessable curriculum meant every aspect of the curriculum invited participation. The practice of making adaptations to an existing curriculum framework is like adding a wheelchair ramp to an existing building rather than planning for the ramp ahead of time (Rous & Hyson, 2007). The Department of Early Childhood recommends using the same concept in curriculum development so that planning is done

ahead of time. A universally designed curriculum ensures meaningful participation and increases the likelihood that all children will achieve positive outcomes (Rous & Hyson, 2007). The contributors made it clear that they recommend all learners have access to and participate in the curriculum through multiple means of representation, engagement, and expression (Rouse & Hyson, 2007). In other words, students should have multiple ways to gain the information, multiple ways to express their knowledge of the content, and multiple ways to engage in the content.

In an article published by the National Association of Educating Young Children, Universal Design for Learning (UDL) was again recommended in the early childhood setting. The physical environment enhanced by UDL concepts allows all children to have access and equitable opportunities to participate (Conn-Powers, Cross, Traub, Hutter-Pishghahi, 2007). UDL also promotes health and safety by minimizing the risk of hazards and allows all children, regardless of their disability, full access to the environment, giving students an equal opportunity to have access to the social-emotional life of the group (Conn-Powers, Cross, Traub, Hutter-Pishghahi, 2007).

Universal Design for Learning

Universal Design for Learning (UDL) is a concept introduced by the Center for Applied Science and Technology (CAST). Rose and Meyers co-founded CAST in 1984 and began to extend the principles of Universal Design (UD) into the learning environment (Rose & Meyer, 2000; Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). The term, "Universal Design," was coined by Ronald Mace, founder of The Center for Accessible Housing, now known as the Center for Universal Design, at North Carolina State University. The idea was to make things more convenient and safe for all

people, including those with disabilities. Some examples of Universal Design include wheelchair-accessible ramps, closed captioning, and curb cuts at sidewalks. Although these examples were first intended for people with disabilities, they actually help many individuals.

Universal Design for Learning (UDL) is based on a set of three principles designed to aid in curriculum development in order to meet the unique needs of all students. The three principles include: offering multiple means of representation, such as lecture and visual representation of material; multiple means of expression, which includes allowing the student to answer questions orally or in writing and multiple means of student engagement; represented by hands-on projects or use of technology to enhance participation (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). Teachers are encouraged to use these principles to ensure that all learners receive the information, are engaged in the information, and are able to express what they know about the information. The UDL framework was developed using three primary brain networks. These networks include: the recognition networks, the strategic networks and the affective networks, otherwise known as the "what, how, and "why" of learning (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014).

The recognition network, located in the cerebellum of the brain, allows individuals to identify and interpret sound, touch, taste, light and smell (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). This is the "what" of learning, referring to what students learn as they gather facts and categorize what they see, hear, touch, taste, and smell. This is the part of the brain that helps students recognize letters and numbers.

The strategic network is considered the "how" of learning. Which refers to how a student plans and organizes his/her ideas and performs tasks. The strategic networks are located in the frontal lobe of the brain. Solving a math problem or writing an essay are strategic tasks (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014).

The affective network, located at the core of the brain, is considered the "why" of learning (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). This part of the brain has to do with emotions, how a student becomes engaged, stays engaged and becomes motivated, or in other words, how a child learns. This part does not recognize patterns, for example, but evaluates what is important and what kind of action should take place (Hall, Meyer & Rose, 2012; Meyer, Rose, & Gordon, 2014). Together, the three networks lay the groundwork for the three UDL principles.

The first UDL principle is to give students multiple means of representation. Students differ in the way they perceive and comprehend information that is presented to them. For example, those with sensory disabilities (e.g., blindness or deafness); learning disabilities (e.g., dyslexia); language or even cultural differences, may require different ways of understanding the information presented (CAST, 2011; Meyer, Rose, & Gordon, 2014). A student with a disability in the area of language, may not understand a question being asked or be able to answer a "why" question although they may know the answer. Other students may grasp information quickly through visual or auditory representation instead of printed text (CAST, 2011; Meyer, Rose, & Gordon, 2014). Furthermore, learning is difficult if it is not understandable to the learner and even more difficult if the information is presented in ways requiring intense effort or assistance (CAST, 2011; Meyer, Rose, & Gordon, 2014). To reduce barriers to learning, this UDL principle clearly

states to provide information equally to all types of learners by: "1) providing the same information through different modalities (e.g., through vision, hearing, or touch); and 2) providing information in a format that will allow for adjustability by the user (e.g., text that can be enlarged, sounds that can be amplified)" (Meyer, Rose, & Gordon, 2014, p.2). When multiple representations are used, learning is transferred more easily because the student can make more of a connection with and between the content presented (CAST, 2011; Meyer, Rose, & Gordon, 2014).

The next principle, multiple means of expression, allows students to respond in different ways. For example, individuals with significant movement impairments (e.g., cerebral palsy), those who struggle with organizational abilities, and those with language barriers all approach tasks differently (CAST, 2011; Meyer, Rose, & Gordon, 2014). Some students may be able to express what they know in written text but not speech, or may be able to express themselves in speech, but struggle to do so in writing. Students may also need to demonstrate what they know by using manipulatives, for example. It is important for educators to allow students different ways to express what they know when they are in a testing situation for true assessment of the child's abilities.

The last principle is multiple means of engagement. Information that does not engage a learner's cognition, is inaccessible to that learner, not only in the moment, but also in the future (CAST, 2011; Meyer, Rose, & Gordon, 2014). This is because relevant information goes unnoticed and unprocessed if the learner is not engaged. There are a variety of reasons influencing individual variation in engagement, including neurology, culture, personal relevance, subjectivity, and background knowledge (CAST, 2011; Meyer, Rose, & Gordon, 2014). Some learners are highly engaged by spontaneity and

novelty while others are disengaged, even frightened, by those aspects, preferring strict routine, such as a student on the autism spectrum (CAST, 2011;Meyer, Rose, & Gordon, 2014). There are also learners that like to work alone, while others prefer to work in groups. Overall, there is not one means of engagement that will always be suitable for all learners in all areas; therefore, providing multiple options for engagement is crucial.

In addition to the UDL guidelines, there are four interrelated components in the UDL curriculum: goals, methods, materials, and assessments. A student's goals are often described as learning expectations or what the student needs to know. They represent the concepts and skills a student should know. These goals for most students are aligned to the grade-level standards, and for students with disabilities, these goals are based on skills they need to access the standards. Within the UDL framework, goals themselves are designed to acknowledge learner variability and differentiate goals. This enables teachers of UDL curricula to offer more options and alternatives to reaching mastery. Whereas traditional curricula focus on content or performance goals, a UDL curriculum focuses on developing learners and actually sets higher expectations (CAST, 2011).

The methods, or strategies**,** are defined as the instructional decisions, approaches, procedures, or routines that teachers use to accelerate or enhance learning (CAST, 2011). Teachers using UDL curricula facilitate more differentiation of methods, based on the learner needs. The materials that are used are flexible, such as hyperlinked glossaries, background information, and on-screen coaching. In addition, UDL materials offer alternative pathways to success including choice of content where appropriate and varied levels of support (CAST, 2011).

Lastly, assessment is the process of gathering information about what a learner knows by using a variety of methods and materials. Within the UDL framework, the goal is to improve the accuracy and timeliness of assessments to ensure that they truly gather information that the student has learned. This is achieved in part by a focus on the goal and by broadening the means to accommodate the learner (CAST, 2011). UDL assessments should reduce or remove barriers, so that the teacher gets an accurate picture of the learner's knowledge.

In an article by Jimenez, Graf, and Rose, the guidelines of UDL were included with examples. To explain the principle, "multiple means of representation" the authors detailed a history teacher bringing in guest speakers, showing footage, and discussing relevant current issues to ensure all students retrieve the information (Jimenez, Graf, & Rose, 2007). In order to provide students multiple means of expression the authors described a teacher assessing solar system knowledge individually, in small groups creating a video or poster, or students building a model (Jimenez, Graf, & Rose, 2007). The authors also described a teacher who created multiple means of engagement by using popular hip-hop songs in order to introduce concepts of genres (Jimenez, Graf, & Rose, 2007). By planning with diverse students in mind, a teacher can enhance the process of learning for students with disabilities.

In 2008, Grace Meo described a high school readiness program incorporating UDL principles. In 2004, CAST developed "planning of all learners" (PAL) in order to meet the challenge of developing curricula that addressed the diversity within today's classroom (Meo, 2008). This process provided teachers four steps in planning curricula designed to increase learning outcomes for students. First, a team of special educators,

general educators and curriculum specialists is formed. This team sets a goal for all students that either establishes a context or is aligned to state standards (Meo, 2008). Secondly, the team collects baseline data about currently used instructional methods, assessments, and materials in order to understand the diversity of learning within the classroom. This baseline data also helps identify barriers in the current curriculum that may prevent access, participation, and progress. The third step is to apply UDL to the lesson. The application step is based on the goals of the student, the students' needs and how the student can better access the information. In step four, the lesson is taught. It is recommended that a team of regular and special educators teach the lesson, and if the lesson needs revising, the team meets to make necessary changes (Meo, 2008).

Trivette, Dunst, Hamby, and O'Herin looked at nineteen studies to determine the effectiveness of adaptations to the environment, materials, and activities among young children with disabilities (2010). Results showed that all three areas in which adaptations were made resulted in changes in the child's behavior and that communication and cognitive skills were most effected (Trivette, Dunst, Hamby, & O'Herin, 2010).

In addition, research was conducted in 2011 in 9 classrooms with approximately 30 teachers and administrators in order to explore the perceptions of teachers about the implementation of UDL and what changes should be made (Hatley). The results of this study showed that some teachers felt that UDL had no influence on their teaching while others felt it was just "good teaching." There were also participants that knew what it was but not how to apply it. The researcher also found that the more experienced in UDL, the less the teacher used it in the classroom (Hatley, 2011). The researcher discussed the reasoning for this being the lack of "buy-in" from the teacher and not

seeing the purpose of UDL. Many administrators interviewed did not feel the teachers were "bought-in" to the idea, and therefore, the training did not matter (Hatley, 2011).

UDL and Technology

Technology is often at the forefront of implementing UDL principles due to the diversity and capabilities for technology. Technology, when blended with other pedagogical practices, can provide teachers a variety of ways to meet the needs of individual students. However, it is important to note that these technologies should not be considered to be the only way to implement UDL (CAST, 2011). Teachers should be creative and resourceful in designing flexible learning environments that address the needs of all learners using a range of high-tech and low-tech materials (CAST, 2011).

When the use of technology is applied using the UDL principles, it can enable easier access for learners. Advances in technology have made individualization of curricula possible in practical ways, and many of these technologies have built in supports, scaffolds, and challenges to help learners understand, navigate, and engage with the learning environment (CAST, 2011). Technology can actually contribute to a better quality of life for students with disabilities, so it is extremely important to access these tools (Alnahdi, 2014).

Cullan, Richards, and Frank (2008) conducted a study to determine whether computer software would assist students with disabilities in their writing skills. A multiple baseline design was used to look at seven students with mild disabilities in the fifth grade. There were three phases to the study including baseline, intervention using a talking word processor (Write: Outloud), and intervention using word prediction software (Co; Writer) with the talking word processor. The group mean showed an improvement

in the number of words produced and fewer words were misspelled among the group (Cullan, Richards, Frank, 2008).

Bouck, Doughty, Szwed, Flanagan and Bassette (2010) also conducted a study determining whether a tool, FLYPen and its cooperating writing software, would improve the writing of three high school students. These high school students were receiving special education services and were considered learning disabled in writing or mildly intellectually disabled. When using the pen with special paper, the pentop computer produced voice output to provide prompts, directions, and hints for different activities. Results showed significant gains in the students' written expression by helping the students to plan their writing and complete the task more independently (Bouck, Doughty, Szwed, Flanagan & Bassette, 2010).

In 2014, Kennedy, Thomas, Newman, Meyer, Alves, and Lloyd conducted a study to determine if a multimedia-based tool used by students with and without disabilities, would increase vocabulary knowledge on curriculum-based measures (CBM). The tool was called content acquisition podcasts (CAPs) and delivered vocabulary instruction to students. CAPs was created by the authors using UDL principles and vocabulary instruction. After listening to the podcasts, results revealed that students made significant growth on the CBM probes than with traditional vocabulary instruction.

In a similar study, Coyne, Pisha, Dalton, Zeph, and Smith (2012) examined the effect of a technology-based UDL approach to literacy instruction on the reading achievement of students grades K-2 with significant intellectual disabilities. With UDL-scaffolded e-books and letter and word recognition software, students received lessons

four times per week. Results showed significant progress in these 16 students' reading comprehension when given the "Woodcock Johnson Test of Achievement III" Passage Comprehension subtest.

Scott Wyndham also conducted a study in 2010 about the perceptions of teachers on the use of technology to accommodate diverse learners. Technology, as previously described, can be an integral part of UDL. Wyndham looked at faculty perceptions of UDL, with and without technology, and his findings revealed that perceptions of including students with special needs in general education classrooms were significantly different between teachers trained in UDL and those who were not. Also different were the perceptions of UDL's benefits to non-disabled students as well as the perceptions between general and special education teachers. The perceptions of who is responsible for accommodating students with special needs also differed among teachers with and without UDL training. Wyndham discovered that teachers trained in UDL were using technology more extensively, believed it was both the general education and special education teachers' responsibility to accommodate students with special needs, and reported UDL as beneficial. Wyndham further concluded that training was essential for the success of UDL.

UDL in Early Childhood

Universal Design for Learning is being used more and more everyday across the nation in schools and preschools (Brand, 2009). Dinnebeil, Boat, and Bae in 2013 discuss the importance of UDL in the early childhood setting by stating that although it is possible to adapt the curriculum afterwards to meet the needs of diverse learners, it is much easier to design curriculum upfront that is flexible so that all learners can benefit

from it. According to these authors, although meeting all the developmental and academic needs of all students is no easy task by using the UDL principles, early childhood educators can accomplish this. Educators in the early childhood setting can represent learning differences as a continuum rather than in categories, anticipate learning differences and design the curriculum accordingly, and choose diverse and varied materials so that there is more than one way to learn (Dinnebeil, Boat, & Bae, 2013).

In a forum for public policy, Dalton and Brand discussed key principles of early childhood education and how UDL supports these principles. The principles are based on work by Piaget, Erikson and Vygotsky and include the following: children learn best when their physiological and physical needs are met and they feel safe, children construct knowledge, children learn through interactions with other children and adults, children learn through play, children are motivated to learn based on their interests and relevance, and individual variation is important for human development and learning (Dalton & Brand, 2012). The authors discussed the logical connections between these principles and the UDL framework such as the variation in format and assessment that address varied sensory needs and choice, allowing for diverse responses from students, therefore meeting their individual needs and encouraging play (Dalton & Brand, 2012). In the early childhood setting, educators can encourage multiple means of representation in the form of word walls, auditory books, concrete objects, and text-to-speech technologies (Dalton & Brand, 2012). Multiple means of expression can be encouraged through sensory activities, taping responses, concept maps, and "turn and talk" options (Dalton & Brand, 2012). Lastly, early childhood educators can encourage multiple means of

engagement through novel activities, developmentally appropriate problem-solving activities, goal setting, and peer collaboration (Dalton & Brand, 2012).

The same authors, Dalton and Brand, discussed the importance of using the UDL framework in early childhood literacy programs in their forum on public policy in 2012. They described a child's literacy potential as being reached when teachers plan lessons around individual needs through multi-sensory activities. They gave examples of ways teachers can reach each learner through debate, walking/talking book covers created by students, literature circles, classroom visitors, student-created timelines, expressive art projects, pen pals, and field trips. All of these examples raise the level of engagement and representation, therefore meeting the UDL principles of offering multiple means of engagement and multiple means of representation. In addition, when students work in groups, create, and debate, they are expressing what they know in a meaningful way, thus fulfilling the last UDL principle.

Stone, in 2013, conducted research in a Texas preschool program to see how preschool teachers planned to implement UDL. A case study was conducted in one district using one early childhood and one special education teacher. The teachers were both trained by a CAST trainer in UDL. The results of the study indicated that UDL principles were not necessarily planned for, but appeared in the classroom, and as teachers became more familiar with UDL, they felt their natural teaching was similar (Stone, 2013). Therefore, the researcher felt that the UDL training did little to change the teachers' behaviors and further research should be conducted to explore UDL specifically in the early childhood setting. The training may not have been specific enough for this setting and the teachers may have needed more time for planning of full implementation

(Stone, 2013).

McPherson (2009), conducted a study based on a web-based collaborative program called "A Dance with the Butterflies" that applied the concepts of the three UDL principles to Pre-K through 4th grade science curriculum. Instruction was based on science content standards that all students should develop an understanding of the characteristics, life cycles, and environments of living organisms (McPherson, 2009). Teachers designed group projects for students using the metamorphosis of the butterfly as the theme. Learning experiences were designed for students in order to appeal to the recognition, strategic, and affective networks for learning identified in the CAST research. To appeal to the recognition networks, teachers used QuickTime Movies to introduce the life cycle of the butterfly, visual representation of different species of butterflies, and websites with maps for habitats. Teachers invoked the strategic network by using text-to-speech and the use of PowerPoint for students' writings and drawings to be imported into the slides. The affective network was also appealed to with the use of visual artwork such as puppet shows and skits to convey the butterflies' metamorphosis. Participants from nine states and four countries learned how using the UDL principles could provide examples of how students' knowledge and understanding can be demonstrated in different ways (McPherson, 2009).

The Individuals with Disabilities Education Act of 2004 (IDEA) requires Early Childhood Special Education (ECSE) programs to ensure all students with disabilities have equal access to the general education setting. By using the UDL principles, early childhood educators can plan a curriculum that allows all learners, regardless of their disability to gain meaningful participation in all settings. However, although there is

research on the use of UDL in the K-12 setting, there is not a great deal of research on the topic in the early childhood and/or early childhood special education setting. Therefore, the researcher aims to gain insight on the use of UDL principles in ECSE programs in Missouri to add knowledge to this evidence-based practice.

Summary

The field of special education and early childhood has gained a lot of attention in the past few decades and continues to be a controversial debate as to the best way to serve students with disabilities in the public school sector. A child's disability can be identified as affecting them educationally as early as 3 years old, therefore placing a great deal of importance on Early Childhood Special Education teachers and staff. Using UDL principles, ECSE educators can give students with disabilities better access to the general education setting with their non-disabled peers. In Chapter 3, the research process was described including information about the development of the survey instrument.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

In Chapter 2, the literature was reviewed to reveal information about the history of special education, court cases and relevant legislature supporting inclusion for students with disabilities, including those in early childhood special education programs. The Individuals with Disabilities Act (IDEA) and the Every Student Succeeds Act (ESSA), recognize the right for all students to have access to the general education curriculum. In addition, literature about current intervention methods used in Early Childhood Special Education (ECSE) settings including Universal Design for Learning (UDL) was reviewed. UDL supports teachers' efforts to design a flexible curriculum by offering materials and strategies that present information in a variety of ways, differentiate the way a student displays what he or she knows, and stimulates interest in learning. This chapter describes the research process including the Universal Design for Learning (UDL) survey instrument developed by the researcher.

Research Questions

This study examined the differences between utilization of the UDL principles and the Early Childhood Outcome scores reported to DESE each year.

Specifically, the following questions were addressed:

1. Is there any difference between Early Childhood Outcome (ECO) ratings reported by Early Childhood Special Education (ECSE) teachers and administrators in the state of Missouri and their perceptions of implementation of Universal Design for Learning (UDL) guidelines?

2. Is there any difference between the perception of Early Childhood Special Education (ECSE) teachers and administrators on their level of implementation of Universal Design for Learning (UDL) concepts compared to their position, certification, and number of students they serve?

Participants

The participants chosen for this research study consisted of Early Childhood Special Education (ECSE) teachers and administrators for ECSE programs in the state of Missouri. There are 523 school districts in the state of Missouri. The researcher determined that 253 districts report Early Childhood Outcome (ECO) ratings to the Department of Elementary and Secondary Education (DESE), and therefore served ECSE students. This was determined by utilizing the Missouri Comprehensive Data System on the DESE website and conducting a comprehensive review of each school district's Special Education Profile located under the Summary Reports section. The Special Education Profile reports on each State Performance Plan (SPP) target and district status for all students identified for special education. Under Early Childhood Special Education data, each Early Childhood Outcome indicator is listed with a percentage for the specific district and for the state as a whole. In addition to the percentage, each indicator is labeled as *met* or *not met* allowing the researcher to identify what districts did not meet their Early Childhood Outcome state target.

Once the districts serving Early Childhood Special Education (ECSE) students were identified, participants were selected. Educators included in the study are certified in the area of Early Childhood Special Education and serving students, ages 3-5, in an integrated, center-based or low incidence classroom for at least a half-day session 2-5

days per week. On their website, the Department of Elementary and Secondary Education defined low incidence as a classroom setting serving students ages 3-5 receiving ECSE services and having one or more of the following disabilities: orthopedic impairment, visual impairment, hearing impairment, deaf and blind, multiple disabilities, traumatic brain injury, autism, or identified as emotionally disturbed. In addition, if a child is identified as a Young Child with a Developmental Delay, but would meet eligibility criteria for one of the above disabilities, that particular child may also be served in a low incidence setting. The Department of Elementary and Secondary Education defined an integrated classroom setting as a classroom with at least half of the student population having an Individual Education Plan under IDEA, with the remaining students being typical peers and not having an Individual Education Plan. Lastly, the Department of Elementary and Secondary Education defined a center-based classroom setting as a classroom serving only students with an Individual Education Plan, without serving any typical peers. ECSE teachers in all three settings serve students with disabilities, and therefore, report Early Childhood Outcome ratings to the Department of Elementary and Secondary Education when children enter and exit an ECSE program.

In addition, principals, directors, and process coordinators for ECSE programs also participated in the study. ECSE administrators are defined as building-level administrators who evaluate ECSE teachers and the overall progress of the ECSE program. ECSE process coordinators are defined as individuals who ensure compliance is being followed within the program. Depending on the size of the district, Special Education Directors may also serve the role of an ECSE administrator, and therefore, were asked to participate.

Research and Ethical Protocols

In accordance with the guidelines of Southwest Baptist University regarding the protection of human participants, a request for review was submitted to the Research Review Board for approval to survey approximately 700 participants for this study. After receiving RRB approval, data collection began. Potential risks associated with participation in this study were limited. No personally identifiable information was collected from respondents that would make tracing an individual possible unless the teacher was the only teacher in the district serving Early Childhood Special Education (ECSE) students. All data was collected and maintained through Question Pro, a secure system, and included an informed consent as part of the participation. In addition, data collected from this study was deleted from the Question Pro site upon completion of the project.

Instrumentation

In order to collect data for this study, the Universal Design for Learning Inventory was designed. The researcher developed 10-12 statements for each of the three UDL guidelines, including multiple means of representation, multiple means of expression, and multiple means of engagement. The purpose of presenting multiple means of representation to a student is to ensure the student, regardless of their disability, can access the information being taught by the teacher. Providing multiple means of expression, in response to the information provided, ensures the student can express what they know in a variety of ways. Furthermore, providing multiple means of engagement assures the student is engaged in his/her learning in order to fully benefit. In order to develop these statements, the researcher reviewed the literature on UDL and read

examples of each guideline from several websites such as the Center for Applied Science and Technology (cast.org) and the National Center on Universal Design for Learning (udlcenter.org). There were several examples of mini-surveys allowing educators to self-evaluate their use of UDL. Statements were developed from these examples and from reading more information about each guideline. In addition to the survey statements about UDL usage, 4 additional questions were added including certification, position, and the number of disabled and non-disabled students the participant was serving. Once the expert panel scored the statements, the statements were updated and the survey was sent to a group of elementary special education teachers and elementary principals for further review during the pilot process. The purpose of the instrument was to determine how frequently participants were using UDL guidelines and if there were any differences found among them.

Research Design and Process

In this quantitative study, the researcher used a survey sent electronically via Question Pro Survey software to Early Childhood Special Education (ECSE) teachers and administrators in the state of MO. The process began by obtaining approval to conduct research from the Research Review Board of Southwest Baptist University. Once permission was obtained, the researcher began a pilot phase of the Universal Design for Learning Inventory, an instrument developed by the researcher to identify which of the UDL guidelines ECSE teachers were using. Upon completion of the pilot phase, the final survey was developed electronically through Question Pro and distributed through email. The final survey included an informed consent, demographic questions, and the Universal Design for Learning Inventory.

Pilot Survey Process

Face Validity. The Universal Design for Learning survey was developed based on information gathered from the literature review, researcher's expertise in the area of UDL, and examples from the Center for Applied Science and Technology website. The statements were defined in three sections including multiple means of representation, multiple means of expression and multiple means of engagement. Table 1 illustrates each survey statement and to which UDL guideline the question is categorized.

Table 1: Table of Specifications for the UDL survey

Question	Multiple Means of Representation	Multiple Means of Expression	Multiple Means of Engagement
I provide multiple means of representation in the classroom.	X		
I use visuals to represent information to students.	**X**		
I explain new concepts to my students verbally and non-verbally.	**X**		
I use technology, such as the iPad or Smart Board, to explain new information.	**X**		
I use different modalities, such as hearing, touch, vision to present key information.	**X**		
I provide information to my students in a way that can be adjusted, such as enlarged print or volume control.	**X**		
I display information in my classroom in a flexible way, such as with color and contrast.	**X**		
I use other devices such as captions, pictures or voice to text when representing spoken language.	**X**		
I provide auditory, combined with visual cues for transitioning students from one activity to the next.	**X**		
I allow students to respond to questions in a variety of ways.		**X**	
I use alternatives to students writing their answers, such as giving answers orally.		**X**	
I provide alternatives in the requirements for rate, timing, speed, and range of motor action required to interact with instructional materials, physical manipulatives, and technologies.		**X**	
I vary the method I use for students to respond to questions.		**X**	
I offer students an alternative way to answer rather than verbally.		**X**	
I encourage students to solve problems using a variety of strategies, such as modeling "think-aloud" and using pictures.		**X**	
I provide multiple exam1ples of solutions to authentic problems.		**X**	
I provide differentiated feedback.		**X**	
I provide different models to demonstrate different approaches to get the same outcome.		**X**	
I post schedules for students to refer to as well as refer to the schedule verbally.		**X**	
I ask questions to guide a student to reflect on their answers.		**X**	
I use assessment checklists, rubrics, and multiple examples of student work to show their performance.			**X**

I offer choices of rewards to my students.			**X**
I offer students choices on the tools they use to gather information.			**X**
I involve students in setting their own goals whenever possible.			**X**
I use information that is relevant to my students' interests and learning goals.			**X**
I provide tasks that allow for active participation from students.			**X**
I include activities that foster the use of imagination to solve novel problems.			**X**
I encourage students to self-evaluate.			**X**
I allow students to work in cooperative learning groups.			**X**
I provide prompts for students to interact with peers.			**X**
I provide feedback that is frequent, timely and specific.			**X**
I use real life situations to model coping skills.			**X**
I offer devices that allow students to monitor their own behavior.			**X**

Content Validity. Content validity was determined using the index of item objective congruence developed by Rovinelli and Hamnleton (1977). The purpose was to elicit feedback from experts to ensure each statement aligned to the correct UDL guideline. A panel of seven educators with experience in UDL was asked to review the instrument and provide feedback on clarity and alignment of the statements to the intended purpose. The panel included UDL experienced special education teachers, elementary principals, special education process coordinators, and special education directors. Above each set of questions a short description of the UDL guideline was given. Each question was then given a score of 1, 0 or -1. A score of 1 indicated the question matched the explanation of the UDL guideline. A score of 0 indicated the question was close to matching the explanation and a score of -1 indicated it did not match. The highest possible value is a 1, with each of the seven experts indicating a 1, the statement highly matches the intended UDL guideline. However, the experts gave a score of 0 to the statements "I give differentiated feedback" and "I use assessment checklists, rubrics, and multiple examples of student work to show their performance." Therefore, those particular statements were omitted. In addition, the experts scored three

statements with a -1 indicating the statements did not match the intent. These three statements, "I provide multiple examples of solutions to authentic problems," "I post schedules for students to refer to as well as refer to the schedule verbally," and "I ask questions to guide a student to reflect" were changed before the final survey was conducted. This feedback allowed the researcher to revise the instrument to ensure validity. Table 2 includes the average value given by the experts on each question.

Table 2: Content Validity of the UDL survey:

Question	**Expert Value**
I provide multiple means of representation in the classroom.	**1**
I use visuals to represent information to students.	**1**
I explain new concepts to my students verbally and non-verbally.	**1**
I use technology, such as the iPad or Smart Board, to explain new information.	**1**
I use different modalities, such as hearing, touch, vision to present key information.	**1**
I provide information to my students in a way that can be adjusted, such as enlarged print or volume control.	**1**
I display information in my classroom in a flexible way, such as with color and contrast.	**1**
I use other devices such as captions, pictures or voice to text when representing spoken language.	**1**
I provide auditory, combined with visual cues for transitions students from one activity to the next.	**1**
I allow students to respond to questions in a variety of ways.	**1**
I use alternatives to students writing their answers, such as giving answers orally.	**1**
I provide alternatives in the requirements for rate, timing, speed, and range of motor action required to interact with instructional materials, physical manipulatives, and technologies.	**1**
I vary the method I use for students to respond to questions.	**1**
I offer students an alternative way to answer rather than verbally.	**1**
I encourage students to solve problems using a variety of strategies, such as modeling "think-aloud" and using pictures.	**1**
I provide multiple examples of solutions to authentic problems.	**-1**
I provide differentiated feedback.	**0**
I provide different models to demonstrate different approaches to get the same outcome.	**1**
I post schedules for students to refer to as well as refer to the schedule verbally.	**-1**
I ask questions to guide a student to reflect.	**-1**
I use assessment checklists, rubrics, and multiple examples of student work to show their performance.	**0**
I offer choices of rewards to my students.	**1**
I offer students choices on the tools they use to gather information.	**1**
I involve students in setting their own goals whenever possible.	**1**
I use information that is relevant to my students' interests and learning goals.	**1**
I provide tasks that allow for active participation from students.	**1**
I include activities that foster the use of imagination to solve novel problems.	**1**

I encourage students to self-evaluate.	**1**
I allow students to work in cooperative learning groups.	**1**
I provide prompts for students to interact with peers.	**1**
I provide feedback that is frequent, timely and specific.	**1**
I use real life situations to model coping skills.	**1**
I offer devices that allow students to monitor their own behavior.	**1**

Construct Validity. Next, the revised instrument was given to 34 early childhood Title I teachers, lower elementary special education teachers and elementary principals. Each pilot participant was asked to read each statement and rate their frequency of implementation on a scale of 1-5; 1=Always, 2=Most of the time, 3=About half the time, 4=Once in a while, and 5=Never. Once the pilot surveys were returned, a factor analysis was performed through SPSS. Using a baseline of .300 (+ and -), questions in each section were determined to either be measuring the same idea or not. Questions that did not seem to be measuring the same idea were re-worded to elicit the correct response by adding "I engage my students by" or "I represent information by" in order to attempt a more accurate response. The results are represented in the following table:

Table 3: Exploratory Factor Analysis for Universal Design for Learning

	Component		
	Expression	Representation	Engagement
I provide multiple examples to problems	.217	.220	**.780**
I offer students an alternative way to answer rather than verbally	.805	**.316**	.142
I encourage students to solve problems using a variety	.443	.152	**.734**
I provide multiple means of representation	**.709**	.441	.296
I vary the method I use for students to respond	**.780**	.225	-.009
I provide alternatives in the requirements	**.796**	.232	.182
I use alternatives to students writing their	**.761**	.331	-.042

answers			
I allow students to respond to questions	**.768**	.373	.071
I provide auditory combined with	.233	**.679**	.150
I use other devices such as captions	**.547**	.446	-.101
I display information in my classroom	.101	.515	**.595**
I provide information to my students	.**784**	.238	.095
I use different modalities such as	**.837**	.188	-.019
I use technology	.236	**.701**	-.054
I use real life situations to model	.199	**.595**	.162
I offer devices that allow	.447	.027	**.472**
I provide feedback that is specific	.311	.320	.046
I provide prompts for students to interact with peers	.347	.270	-.085
I allow students to work in cooperative learning	-.153	.020	**.712**
I encourage students to self-evaluate	-.021	-.251	**.765**
I include activities that foster the use of imagination	.355	.377	**.644**
I provide tasks that allow for active participation	.264	**.617**	.137
I use information that is relevant	.253	**.689**	.262
I involve students in setting their own goals	-.216	.259	**.711**
I offer students choices on the tools	-.010	.508	**.627**
I offer choices of rewards to my students	.509	.513	.131
I ask questions to guide a student to reflect on	.050	.053	**.808**
I post schedules for students to reflect	.122	**.564**	**.396**
I provide different models to demonstrate	.323	.418	.437
I explain new concepts to my students	**.731**	-.050	.115
I use visuals	.269	**.789**	.045

*Principal Components Factor Analysis

Reliability of Pilot Survey

The next step was to measure the reliability of the instrument by using Cronbach's alpha. Cronbach's alpha is a measure of internal consistency and helps the researcher determine if the statements were worded to convey the same meaning and therefore draw a similar answer. The statements regarding multiple means of representation were found to be consistent among pilot participants with a .905 score. Statements regarding multiple means of expression deemed a .871 score and multiple means of engagement a .799. Therefore, the preliminary results indicate this pilot instrument was considered a reliable instrument.

However, based on the results of the factor analysis, a few statements were changed and one statement was eliminated. Statements were re-worded if pilot survey participants did not appear to answer in a similar manner, according to the factor analysis. In addition, examples were added to a couple of statements in order to clarify to the participant what was being asked.

Final Survey Process

Once the Universal Design for Learning Inventory instrument was tested, demographic information was added, including the participants' certification, position, number of students with disabilities they serve and number of typical peers they serve. In addition, a few statements were changed and the survey was sent electronically through Question Pro (see appendix C). The data entry was completed by the individual participants and stored electronically through the Question Pro site.

The researcher developed a cover letter explaining the purpose of the research and how the survey would be used. The letter, including a link to the survey, was then

emailed to the special education directors and Early Childhood Special Education (ECSE) directors of each school providing ECSE services in Missouri. Additional emails of ECSE teachers were obtained by visiting each school district website. Approximately 700 people were sent a link to the survey. Surveys were distributed in February 2016. After an open collection period of two weeks, 254 responses were collected.

Construct Validity:

A factor analysis was conducted once again in order to confirm the validity of the final instrument. The items loaded according to the theorized scales and therefore confirmed each group of statements measured the same idea. The results are represented in the following table:

Table 4: Confirmatory Factor Analysis for Universal Design for Learning Inventory

	Component		
	Representation	Expression	Engagement
I engage my students by using real life situations	.057	**.505**	.102
I offer devices that allow students to monitor their own behavior	.197	**.463**	-.339
I engage my students by providing feedback that is frequent, timely and specific	.080	.033	**.589**
I provide prompts for students to interact with their peers in order to engage them in the learning	.196	.014	**.382**
I allow students to work in cooperative learning groups	.041	**.501**	.032
I encourage students to self-evaluate	.004	**.714**	.053
I include activities that foster the use of imagination to solve novel problems	.196	**.567**	.425
I engage my students by providing tasks that allow for active participation	.211	.182	**.632**
I engage my students by using information that is relevant to their interests and learning goals	.241	.251	**.604**
I involve my students in setting their own goals whenever possible	.056	**.692**	-.122
I offer students choices on the tools they use to gather information in order to engage them in the learning activity	.199	**.626**	.142

I offer choices of rewards to my students	.309	**.460**	-.020
I ask questions to guide a student to reflect on their answers	.077	**.622**	.337
I post schedules for students to refer to	**.372**	.064	-.253
I provide multiple examples of solutions to problems	.228	**.577**	.338
I offer students an alternative way to answer rather than verbally	**.628**	.128	.178
I encourage students to solve problems using a variety of strategies, such as modeling "think-aloud" and using pictures	.387	**.578**	.275
I provide multiple means of representation in the classroom	**.555**	.282	.350
I vary the method I use for students to respond to questions	**.643**	.110	.273
I provide alternatives in the requirements for rate, timing, speed, and range of motor action required to interact with	**.560**	.009	.233
I use alternatives to students writing their answers, such as giving answers orally	**.348**	.033	.206
I allow students to respond to questions in a variety of ways	**.648**	.031	.233
I provide auditory, combined with visual cues for transitioning students from one activity to another	**.672**	.018	.135
I use devices such as captions, pictures, or voice to text when representing spoken language	**.640**	.199	-.132
I display information in my classroom in a flexible way, such as with color and contrast	**.471**	.380	.141
I represent information to my students in a way that can be adjusted, such as enlarged print or volume control	**.592**	.298	-.063
I represent information by offering different modalities, such as hearing, touch, vision, to present key information	**.626**	.232	.086
I use technology such as iPad, Smartboard, to explain new concepts	**.320**	.316	-.176
I represent new information by explaining concepts to my students verbally and non-verbally with pictures	**.647**	.189	.292
I use visuals to represent information to students.	**.644**	.137	.137

*Principal Components Factor Analysis

Reliability of Final Survey

The reliability of the instrument was also tested once again using Cronbach's alpha to determine consistency across each section of statements. Statements regarding multiple means of representation deemed a .659 score, multiple means of expression, .735 and multiple means of engagement a .808 score. Results indicated this instrument was found to be a reliable instrument.

Summary

This quantitative study looked for any differences between reported Early Childhood Outcome scores and use of UDL guidelines in Early Childhood Special Education (ECSE) programs in Missouri. A valid and reliable survey instrument was developed. This instrument describing UDL guidelines was administered to teachers and administrators in 253 school districts in Missouri. Participants took the UDL survey designed for this study by the researcher. The resulting data was then analyzed to determine the differences, if any, between the use of UDL guidelines in the classroom and the Early Childhood Outcome scores reported to the state.

Results and the researcher's analysis are presented in Chapter 4. Conclusions based on the results and recommendations for further research are presented in Chapter 5.

CHAPTER IV

ANALYSIS OF THE DATA

Results of the survey were analyzed to provide insight to the research questions. A total of 254 surveys were completed, representing a return rate of 35% of the sample population. Each participant answered questions about their usage of the three UDL guidelines, including multiple means of representation, multiple means of expression and multiple means of engagement. Each survey question fell into the category of multiple means of representation, multiple means of expression, or multiple means of engagement; therefore, each participant received a representation, expression, and engagement score in order to examine any differences in their perceptions among these guidelines. In addition, each participant also identified the district with which they were affiliated. From this information, the researcher was able to retrieve information from the Department of Elementary and Secondary website to determine if the district met or did not meet the state target on the reported Early Childhood Outcome score. Therefore each participant also received a "met" or "not met" score.

Descriptive Statistics

Table 5 shows the means and standard deviations for responses to the survey in each category including representation, expression and engagement.

Table 5: Means, Standard Deviation and Variance of Scales

Scale	Mean	Standard Deviation	Variance
Representation	17.65	5.308	28.175
Expression	16.17	4.513	20.363
Engagement	17.63	3.874	15.006

Representation

Each question related to multiple means of representation was rated by each participant using a 1-5 scale with 1 being "always" and 5 being "never." Nine questions were added together giving each participant a score ranging from 9 to 45. Therefore the lower the score indicated a greater use of the UDL guideline using multiple means of representation. The mean score of 17.65 indicated most participants in this study report using this guideline more frequently than not. However, the standard deviation of 5.308 indicated dispersion from the mean. Therefore, although a majority of participants indicated using the UDL guideline, there were extreme scores also reported.

Expression

Each question related to multiple means of expression was also rated by each participant on a 1-5 scale. Nine questions were added together giving each participant a score between 9 and 45. Therefore the lower score indicated a greater use of the UDL guideline using multiple means of expression. The mean score of 16.17 indicated most participants were using this guideline. However, the standard deviation of 4.513 indicated dispersion from the mean. Therefore, although a majority of participants indicated using the UDL guideline, there were extreme scores reported.

Engagement

Each question related to multiple means of engagement was also rated by each participant on a 1-5 scale. Nine questions were added together giving each participant a score between 9 and 45. Again, the lower the score indicated greater use of the UDL guideline using multiple means of engagement. The mean score of 17.63 indicates most participants are using this guideline. However, the standard deviation of 3.874 indicated

dispersion from the mean. Therefore, although a majority of participants indicated using the UDL guideline, there were again extreme scores reported.

Inferential Statistics

Next, the researcher conducted a one-way analysis of variance (ANOVA) to determine if there were any differences in reported scores and the participants' areas of certification, position, number of students with special needs they serve, and the number of non-disabled peers they serve.

Certification

Representation and Certification

Each participant was given the following list of certification to choose from: Early Childhood, Early Childhood Special Education, Special Education (other), and Other. An analysis of variance was conducted and there was no statistical significance between the participants' certification and how they answered questions about using multiple means of representation, $F(3,221)=2.616$, $p=.052$.

Expression and Certification

An analysis of variance was also conducted in order to determine if there were any differences in participants' certification and how they answered questions about their usage of the UDL guideline multiple means of expression. Results indicated significant differences between multiple means of expression and certification, $F(3, 228)=3.218$, $p=.024$. Results from a Tukey's HSD post-hoc test indicates participants certified in Early Childhood answered more favorably as using multiple means of expression than participants certified in other special education fields, ($M=4$, $p=.023$) and participants certified in *other* fields, ($M=3.04$, $p=.042$). This indicated teachers certified in the area of

early childhood are allowing students to express themselves in multiple ways, more often than those certified in another field or in special education. Table 6 represents these findings.

Table 6: Expression and Certification:

Expression	Sum of Squares	Df	Mean Square	F	Sig.
Between groups	191.153	3	63.718	3.218	**.024**
Within groups	4514.502	228	19.800		
TOTAL	4705.655	231			

Engagement and Certification

A one-way analysis of variance was conducted to determine any statistical significance between participants' certification and how participants answered questions based on multiple means of engagement. There was no statistical significance between the participants' certification and how they answered questions about using multiple means of engagement or $F(3,231)=1.118$, $p=.343$.

Position

Representation and Position

Each participant was given a choice of the following positions to choose from: Early Childhood Special Education (ECSE) teacher for a center-based (self-contained) classroom, ECSE teacher for a low incidence classroom, ECSE teacher for an integrated classroom (with non-disabled peers), Process Coordinator for an ECSE program, Principal or Director for an ECSE program, or other. Table 7 represents the findings:

Table 7: Representation and Position:

Representation	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	446.121	5	89.224	3.330	**.006**
Within Groups	5921.385	221	26.794		
TOTAL	6367.507	226			

Results indicated significant differences between participants' representation score and their position, F (5, 226)=3.33, *p*=.006. Results of Tukey's HSD post-hoc test showed participants listed as *other* were more favorable towards the use of multiple means of representation in the classroom than process coordinators (*M*=6.15, *p*=.004). Participants were not asked to identify why they classified themselves as other, so it is difficult to examine the reasoning behind this particular difference found. However, it can be assumed that these participants include Special Education Directors or Elementary principals supervising an ECSE classroom in their building. If this is the case, it can also be inferred that participants at this level would have less exposure to ECSE classrooms than Process Coordinators for ECSE programs. Therefore, Special Education Directors may be favorable towards the use of offering multiple means of representation, but Process Coordinators are not observing it as often.

Expression and Position

There was also a statistical significance found between participants' position and how they answered questions about the implementation of multiple means of expression F(5,228)=3.85, *p*=.002. Table 8 represents this finding:

Table 8: Expression and Position:

Expression	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	369.908	5	73.982	3.856	.**002**
Within Groups	4374.592	228	19.187		
TOTAL	4744.500	233			

According to results of Tukey's HSD post-hoc test, Early Childhood Special Education (ECSE) teachers in integrated classrooms answered questions about multiple means of expression in a more favorable manner than process coordinators (*M*=4.58, *p*=.006). Principals, Directors and participants listed as other also answered questions more favorably than process coordinators, (*M*=4.28, *p*=.006, *M*=5.82, *p*=.001). ECSE teachers of integrated classrooms serve students with special needs and those without special needs. This finding indicates these teachers' perception and the perception of Directors/Principals reveals they are allowing students to express themselves in multiple ways, but process coordinators, are not observing this or are not favorable to this concept. It is possible that teachers perceive themselves as using this UDL concept more often than they actually do or process coordinators are not observing this due to the nature of the concept.

Engagement and Position

A statistical significance was found between participants' positions and their responses on questions about multiple means of engagement as well, F(5,231)=2.569. In addition, results from Tukey's HSD post-hoc test showed ECSE teachers of integrated classrooms and participants listed as *other* as answering more favorably in this area than

process coordinators (*M*=3.34, p=.035, *M*=3.96, *p*=.014). Table 9 illustrates these differences found:

Table 9: Engagement and Position:

Engagement	Sum of Squares	Df	Mean Squares	F	Sig.
Between Groups	186.556	5	37.311	2.569	**.028**
Within Groups	3354.769	231	14.523		
TOTAL	3541.325	236			

It appears that in all three areas of the UDL framework, process coordinators responded less favorably than teachers in an integrated classroom. Teachers in an integrated classroom serve students with special needs and students without special needs. It is interesting that no other ECSE teacher group, including low incidence or center-based showed any differences with process coordinators. The biggest difference is low incidence and center-based classroom teachers do not serve non-disabled peers. The data suggests process coordinators do not understand the frequency of UDL concepts happening in the classrooms.

Students with Special Needs

Representation and Students with Special Needs

Each participant was asked how many students with special needs they serve. They chose between the following: 20 or more, 10-20, 1-10 or I do not serve students with special needs. Results of an ANOVA indicate a significance difference among questions consisting of multiple means of representation and the number of students with disabilities served F(3, 222)=.013) Results of Tukey's HSD post-hoc test found a difference between participants who do not serve students with special needs and

participants who serve more than 20 students with special needs (*M*=4.21, *p*=.032). Participants who do not serve students with special needs answered more favorably. Most likely, these participants were supervisors of the classroom and may assume more multiple means of representation strategies are being used than teachers in the classroom are reporting or have the expectation that more multiple means of representation strategies should be used. Table 10 represents this finding:

Table 10: Representation and Students with Special Needs:

Representation	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	299.574	3	99.858	3.680	**.013**
Within Groups	6023.488	222	27.133		
TOTAL	6323.062	225			

Expression and Students with Special Needs

Next, how participants answered questions pertaining to multiple means of expression and how many students they serve with disabilities were examined for differences. According to an ANOVA test, there was statistical significance found between people not serving students with special needs and participants serving more than 20, 1-10 versus those serving 10-20, and participants serving 1-10 versus those serving 20 or more F(3, 229)=9.162. Results of Tukey's HSD post-hoc test showed participants serving more than 20 students with disabilities (*M*=4.72, *p*=,003) and participants serving 10-20 students (*M*=3.92, *p*=.016) differed significantly from those who do not serve students with disabilities. Results of Tukey's HSD post-hoc test also showed participants serving 1-10 students with disabilities (*M*=2.43, *p*=.002) and more than 20 students (*M*=3.23, *p*=.000) differed significantly from participants serving 10-20

students. Therefore, it was found that participants answering more favorably were either not serving students with special needs at all or were serving fewer students with special needs. These participants were likely ECSE integrated teachers and principals/directors and process coordinators. Integrated teachers serve a mixture of students with special needs and typical peers, therefore serving less students with special needs, or less than 10. Once again, the significance was found among these teachers and therefore infers that integrated teachers are using multiple means of expression more often than other groups. Table 11 illustrates these findings:

Table 11: Expression and Students with Special Needs:

Expression	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	504.362	3	168.121	9.162	**.001**
Within Groups	4201.947	229	18.349		
TOTAL	4706.309	232			

Engagement and Students with Special Needs

Multiple means of engagement questions were also compared to how many students with special needs the participants served. Results of an ANOVA indicated a significance among participants who serve 1-10 students with disabilities and those serving more than 20 students, $F(3,232)=3.93$. Results of Tukey's HSD post-hoc test showed participants who served 1-10 students with disabilities answered more favorably than participants serving 20 or more students with special needs ($M=2.27$, $p=.006$). This indicates those with fewer students more often allow for multiple means of engaging their students than those with more than 20 students. Most likely participants serving fewer students with special need are integrated teachers. Integrated teachers have a more

diverse group of students, and therefore must ensure all students, at all levels, are engaged. Table 12 represents these findings:

Table 12: Engagement and Students with Special Needs:

Engagement	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	171.013	3	57.004	3.932	**.009**
Within Groups	3363.373	232	14.497		
TOTAL	3534.386	235			

Representation, Expression and Engagement Compared to Non-Disabled Peers

Participants were also asked how many non-disabled peers they serve. They were able to choose from the following: I do not serve non-disabled peers, 1-10, 10-20 and 20 or more. A one-way ANOVA was conducted to determine any statistical significance with how participants answered this question and how they responded to questions about multiple means of representation, multiple means of expression and multiple means of engagement. There was no statistical significance found in any of the three groups. Integrated teachers serve non-disabled peers, but no significance was found between groups in this area. It is inferred that because they are the only group serving non-disabled peers, there was not another group to compare them to, therefore, no significance was found.

Representation, Expression and Engagement and State Targets

Each participant identified on the survey the district with which they are affiliated. The researcher looked at each district's Early Childhood Outcome (ECO) scores to determine if they met the state targets. Once this was determined, a t-test was conducted to determine any statistical significance between participants' responses on

questions about multiple means of representation, multiple means of expression and multiple means of engagement and whether or not the district they work for met or did not meet the state target. The mean indicates participants who met state targets and those who did not meet state targets answered similarly on all three sections of questions. Each survey question was linked to one of the three UDL guidelines. Each participant received three scores for each UDL guideline-related questions they answered. There was no difference found in how participants answered the questions and their district-reported ECO scores attempt to report growth and are measured in a number of ways. Therefore, there is an apparent disconnect between teachers' perceptions' and reported ECO scores. If teachers are using UDL concepts, research indicates growth would be made and therefore this would be apparent in reported ECO scores. Table 13 below illustrates these findings:

Table 13: Representation, Expression and Engagement and State Targets:

		N	Mean	Std. Deviation
Engagement	Met	163	17.2	3.9
	Not Met	67	18.5	3.7
Expression	Met	163	16.1	4.7
	Not Met	64	16.3	4.3
Representation	Met	157	17.4	5.4
	Not Met	64	18.2	5.2

Summary

Analyses of the differences in reported Early Childhood Outcome ratings and teachers' and administrators' perceptions about their usage of UDL concepts showed no statistical significance between the two factors. Further analysis revealed significant differences in a few areas. It appears teachers of integrated classrooms in which students with special needs are taught alongside their non-disabled peers perceive themselves as

using UDL guidelines more frequently than process coordinators supervising those classrooms. In addition, participants with fewer students also perceive themselves as using UDL guidelines more often than participants with a higher amount of students with special needs. These participants were most likely also integrated teachers. Overall, the UDL guideline, using multiple means of expression, was found to have significant differences in all areas tested; therefore, it can be inferred that teachers are using this concept more often. Conclusions based on these findings and recommendations for further research are presented in Chapter 5.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

UDL has strong research suggesting its benefits in assisting students to access their special education services in the general education setting. The UDL framework allows students multiple means of representation, engagement, and expression in order to participate in the general education setting successfully. In the Early Childhood Special Education setting, where students are ages 3-5, students are able to access the general education setting when they are placed in a classroom with non-disabled peers. The non-disabled peers offer language and social skill modeling that is incredibly beneficial to students with special needs. In addition, allowing students with special needs multiple ways to receive information, answer questions in multiple ways, and engage in activities encourages their participation in a general education setting. In the state of Missouri, districts take data on each student with special needs when they enter and exit an ECSE program. These ratings, referred to as Early Childhood Outcomes (ECO), are calculated to determine if each district meets or does not meet the state targets. The scores are based on how often a student is in the general education setting and how similar their functioning is to their same-age, non-disabled peers. Therefore, it seems possible that differences between UDL implementation in the ECSE setting and reported ECO could exist. Yet, results from a data analysis indicated no differences between the two. However, there were some differences found between teachers' perceptions and demographic information provided. Most importantly, data analysis indicated integrated teachers in the ECSE setting answered more favorably than other groups, therefore inferring students with disabilities are better served in a setting with non-disabled peers.

Conclusions

The primary research question in this study was to determine if there were any differences in UDL implementation in the ECSE setting and reported Early Childhood Outcomes. Results of a one-way ANOVA demonstrated no statistical significance between UDL implementation and the ECO ratings reported. The ratings each district received did not appear to have a relationship with the usage of UDL in those districts.

When districts report ECO, it is a synthesis of information gathered. Each district received a *met* or *not met* based on what is reported from each district. This is the only information the Department of Elementary and Secondary Education gathers from ECSE programs. It is not an assessment, and may not be the most accurate reflection of the child's functioning. Therefore, differences may not have been found due to the nature of how information is gathered to report ECO scores. In addition, this also may indicate that state targets are too low. If teachers, even those who are in districts meeting state targets, are not using UDL guidelines frequently, it is possible the state targets are not high enough.

The second question in this study was to determine any differences in teacher perceptions based on their certification, position, number of students with special needs and number of non-disabled students. There were differences found. Each participant received a score for how they responded on questions about multiple means of representation, expression, and engagement. There were differences found in participants' certification, position and number of students with special needs, and how they answered the questions.

Certification

Differences were found between participants certified in early childhood and those participants certified in special education or certified in another area, listed as *other* $F(3, 228)=3.218$, $p = .024$. This was only found in the area of multiple means of expression. Giving students multiple ways to express what they know include allowing written or verbal answers, as well as using an assistive technology device to respond to questions. This difference found indicates those certified in early childhood were more likely to allow this than those certified in other areas. It can be speculated that this difference is due to more specific training in early childhood, but there is no obvious assumption that can be drawn from this. Generally, those persons certified in special education would be more likely to allow for multiple ways to respond due to the nature of special education. In addition, teachers in ECSE programs serving ECSE students must be certified in ECSE. It is the assumption of the researcher that participants certified in EC only are teachers not yet certified in ECSE, but working towards the certification through coursework.

Position

Differences were also found among process coordinators and ECSE teachers of integrated classrooms. A process coordinator generally coordinates the special education process and ensures compliance is being followed. Process coordinators in larger districts may also serve as the supervisor of ECSE teachers. In smaller districts, the process coordinator may also teach a special education class. In all areas of questions, multiple means of representation, expression, and engagement, a difference was found in perception among teachers and process coordinators. Specifically, the difference was

among integrated ECSE teachers and process coordinators. Teachers for an integrated ECSE classroom serve both students with special needs and students without special needs. The data analysis suggests teachers answered more favorably than process coordinators. In addition, participants listed as *other* also answered more favorably than process coordinators on questions about representation and engagement. It can be speculated that process coordinators may not be fully aware of how often UDL concepts are being used in the classrooms. Another speculation can be made that teachers' perceptions of their usage may be more favorable than actual implementation. It can be inferred, however, that integrated teachers are using UDL guidelines more often than other participant groups. This is likely due to having non-disabled students who are participating in a typical manner, therefore forcing the teacher to be creative in establishing participation from disabled peers. Often times, in the elementary setting, the curriculum is adapted afterwards to meet the needs of the disabled peer, however, in an integrated ECSE setting, the teacher must plan ahead of time to ensure all students can learn. As noted earlier, Dinnebeil, Boat, and Bae state that it is much easier to design curriculum upfront that is flexible so that all learners can benefit from it (2013).

Students with Special Needs

The final difference found was among participants serving students with special needs. On the questions concerning multiple means of representation, differences were found among participants that do not serve any students with special needs and those who serve more than 20 students with special needs ($F(3, 222) = 3.68$, $p = .013$). It can be inferred that those who are not serving any students with special needs, most likely process coordinators and principals or directors, are more favorable to the idea of offering

multiple ways of representing information than those with more than 20 students. Although having more than 20 students with disabilities may make it difficult to offer multiple means of representation, it seems it would be imperative in order to reach a variety of learners. On questions participants answered about multiple means of expression, differences were found between people not serving students with special needs and those serving more than 20, (M=4.72, p=,003), participants serving 1-10 students with special needs and those serving 10-20, (M=3.23, p=.000), and participants serving 1-10 and those serving more than 20 (M=2.43, p=.002). In other words, participants serving less students answered more favorably than those serving more students with disabilities. Lastly, on questions about engagement, participants serving between 1-10 students answered more favorably than those serving more than 20 (M=2.27, p=.006). This data analysis indicates participants with fewer students with special needs are more likely to use multiple means of representation, expression, and engagement. This may simply be due to a lower class size. With fewer students, teachers may be able to take more time to allow for a variation in how students respond and how teachers represent information. However, it is important to note that integrated ECSE teachers serve fewer students with disabilities because they are also serving non-disabled students. If in fact, integrated teachers are using the UDL framework more often, it can also be inferred that those with a larger number of students with disabilities may not be using UDL as often. Self-contained ECSE teachers and low incidence ECSE teachers appear to see UDL as non-essential. This could be due to a difference in belief or a lack of training. Using the integrated model in the ECSE setting allows students with disabilities access to their same-age, non-disabled peers, which clearly is the federal

law that students with disabilities "are educated with children who are not disabled, and that special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only when the nature or severity of the disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily" (IDEA, 20 U.S.C. § 1412). In addition, this would allow Missouri as a state to decrease the number of students with disabilities in separate classes or separate schools and therefore meet state targets.

Lastly, one overall conclusion was found in the area of multiple means of expression. Significant differences were found in all demographic areas, including position, certification and number of students with disabilities when an analysis of variance was conducted. Using multiple means of expression allows students to express what they know in a variety of ways, including through writing, verbally, or with pictures. Among the three guidelines, this guideline is dependent on the teacher being flexible in regards to how the students respond when prompted. The other two guidelines, multiple means of representation and multiple means of engagement, are dependent on the teacher planning ahead. It can be assumed that the significance found in the area of expression is due to the ease of implementation.

Recommendations

It is recommended that districts in Missouri offer training on UDL guidelines for special education and Early Childhood Special Education teachers. With the wealth of research in UDL implementation and research suggesting student's progress more in an integrated setting, district special education departments would benefit from this model of care. Planning for how students with disabilities will participate in the general education

setting can be taxing on both general education and special education teachers. Having specific training on how to ensure the general education setting is designed for any student to participate could alleviate this concern and allow students to enter the classroom with fewer accommodations.

In addition, it is imperative that ECSE programs in Missouri embrace the integrated model for students with disabilities. Districts only serving students with disabilities are placing kids with special needs with other kids with special needs and without true models. Typical students can offer modeling of language and social skills that are much more meaningful than the model of the adults in the classroom. This type of classroom also looks more like a Kindergarten classroom and therefore benefits transition efforts. This study found significant findings among integrated ECSE teachers and other groups of participants, supporting the argument that UDL concepts are being used more often in classes with a mixture of students. It is odd, and somewhat alarming to not see more UDL concepts being used in the self-contained or low incidence ECSE settings. These settings, in which all students have a disability, are designed to be individualized based on each students need and therefore would appear to be rich in the UDL framework.

Further Research

It is also recommended that further research be conducted in Early Childhood Special Education classrooms on UDL usage. This research project relied solely on teacher and administrator perception without observation. It is recommended that observations of the classrooms be included to illustrate a more realistic picture of how often UDL guidelines are being used. This would also allow more consistency across the

list of questions and ensure the observer is looking for the same implementation. The survey is also an important tool in order to gather perception. It is recommended, however, that additional examples be added to the survey tool.

Differences were found among teachers of integrated ECSE classrooms. Therefore, it is recommended to target this group of teachers in further research. The integrated teacher group is the only group of teachers serving a mixture of disabled and non-disabled students. Further research on their specific use of UDL concepts may render a relationship with how students score on the Early Childhood Outcome ratings.

In addition, when surveying participants, it is recommended to add a question about knowledge and training on UDL. Participants may be unfamiliar about the concepts of UDL or have limited experience with using the concepts. Contrasting, participants may indeed have formal training on UDL. Therefore, a question about level of knowledge would be helpful.

Adding survey questions about knowledge and training, conducting observations of classrooms, and targeting integrated ECSE settings may allow a researcher a better understanding of how UDL is being used in the classroom. The state of Missouri has discussed mandating one assessment to be used for reporting ECO scores. If this were required, a more accurate reflection of the students' functioning could be examined in relation to survey and observational data on UDL implementation.

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Appendix A: UDL Survey (draft questions)

Representation

1. I provide multiple means of representation in the classroom.
2. I use visuals to represent information to students.
3. I explain new concepts to my students verbally and non-verbally.
4. I use technology, such as the iPad or Smart Board, to explain new information.
5. I use different modalities, such as hearing, touch, vision to present key information.
6. I provide information to my students in a way that can be adjusted, such as enlarged print or volume control.
7. I display information in my classroom in a flexible way, such as with color and contrast.
8. I use other devices such as captions, pictures or voice to text when representing spoken language.
9. I provide auditory, combined with visual cues for transitions students from one activity to the next.

Expression

1. I allow students to respond to questions in a variety of ways.
2. I use alternatives to students writing their answers, such as giving answers orally.
3. I provide alternatives in the requirements for rate, timing, speed, and range of motor action required to interact with instructional materials, physical manipulatives, and technologies.
4. I vary the method I use for students to respond to questions.
5. I offer students an alternative way to answer rather than verbally.
6. I encourage students to solve problems using a variety of strategies, such as modeling "think-aloud" and using pictures.
7. I provide multiple examples of solutions to problems.
   .
8. I provide different models to demonstrate different approaches to get the same outcome.
9. I post schedules for students to refer to.
10. I ask questions to guide a student to reflect on their answers.

Engagement

1. I offer choices of rewards to my students.
2. I offer students choices on the tools they use to gather information
3. I involve students in setting their own goals whenever possible
4. I use information that is relevant to my students' interests and learning goals
5. I provide tasks that allow for active participation from students.
6. I include activities that foster the use of imagination to solve novel problems

7. I encourage students to self-evaluate
8. I allow students to work in cooperative learning groups
9. I provide prompts for students to interact with peers
10. I provide feedback that is frequent, timely and specific
11. I use real life situations to model coping skills
12. I offer devices that allow students to monitor their own behavior

Appendix B: UDL survey (expert survey)

Expert Panel Directions:
The researcher is trying to determine if the participant filling out the survey is providing their students with multiple means of representation, expression, and engagement. Please read the descriptions of each UDL principle and the statements below. Score each statement based on your opinion as to whether the statement is reaching the researchers goal. If the statement matches the UDL principle, score it as a 1, if the statement is close to matching the UDL principle, score it as a 0, and if it does not match the principle, give it a score of -1.

UDL 1:
Provide Multiple Means of Representation

The first UDL guideline is to give students multiple means of representation. Students differ in the way they perceive and comprehend information that is presented to them. For example, those with sensory disabilities (e.g., blindness or deafness); learning disabilities (e.g., dyslexia); language or even cultural differences, may require different ways of understanding the information presented (CAST, 2011). In other words, a student with a disability in the area of language, may not understand a question being asked or be able to answer a "why" question although they may know the answer. Other students may grasp information quickly through visual or auditory representation instead of printed text (CAST, 2011). Furthermore, learning is impossible if it is not understandable to the learner and even more difficult if the information is presented in ways requiring intense effort or assistance (CAST, 2011). To reduce barriers to learning, this UDL guideline clearly states to provide information equally to all types of learners by: "1) providing the same information through different modalities (e.g., through vision, hearing, or touch); 2) providing information in a format that will allow for adjustability by the user (e.g., text that can be enlarged, sounds that can be amplified)" (CAST, 2011). When multiple representations are used, learning is transferred more easily because the student can make more of a connection with and between the content presented (CAST, 2011).

10. I provide multiple means of representation in the classroom.
11. I use visuals to represent information to students.
12. I explain new concepts to my students verbally and non-verbally.
13. I use technology, such as the iPad or Smart Board, to explain new information.
14. I use different modalities, such as hearing, touch, vision to present key information.
15. I provide information to my students in a way that can be adjusted, such as enlarged print or volume control.
16. I display information in my classroom in a flexible way, such as with color and contrast.
17. I use other devices such as captions, pictures or voice to text when representing spoken language.
18. I provide auditory, combined with visual cues for transitions students from one activity to the next.

UDL 2:
Provide Multiple Means of Expression

"Multiple means of expression" allows students to respond in different ways. For example, individuals with significant movement impairments (e.g., cerebral palsy), those who struggle with organizational abilities, and those with language barriers all approach tasks differently (CAST, 2011). Some students may be able to express what they know in written text but not speech, or may be able to express themselves in speech, but struggle to do so in writing. It is important for educators to allow students different ways to express what they know when they are in a testing situation for true assessment of the child's abilities.

11. I allow students to respond to questions in a variety of ways.
12. I use alternatives to students writing their answers, such as giving answers orally.
13. I provide alternatives in the requirements for rate, timing, speed, and range of motor action required to interact with instructional materials, physical manipulatives, and technologies.
14. I vary the method I use for students to respond to questions.
15. I offer students an alternative way to answer rather than verbally.
16. I encourage students to solve problems using a variety of strategies, such as modeling "think-aloud" and using pictures.
17. I provide multiple examples of solutions to authentic problems.
18. I provide differentiated feedback.
19. I provide different models to demonstrate different approaches to get the same outcome.
20. I post schedules for students to refer to as well as refer to the schedule verbally.
21. I ask questions to guide a student to reflect on their answers.
22. I use assessment checklists, rubrics, and multiple examples of student work to show their performance.

UDL 3:
Provide Multiple Means of Engagement

Information that does not engage learners' cognition, is inaccessible to that learner, not only in the moment, but also in the future (CAST, 2011). This is because relevant information goes unnoticed and unprocessed if the learner is not engaged. There are a variety of reasons influencing individual variation in engagement, including neurology, culture, personal relevance, subjectivity, and background knowledge (CAST, 2011). Some learners are highly engaged by spontaneity and novelty while other are disengaged, even frightened, by those aspects, preferring strict routine, such as a student on the autism spectrum (CAST, 2011). There are also learners that like to work alone, while others prefer to work in groups. Overall, there is not one means of engagement that will always be engaging for all learners in all areas; therefore providing multiple options for engagement is crucial.

13. I offer choices of rewards to my students.
14. I offer students choices on the tools they use to gather information
15. I involve students in setting their own goals whenever possible
16. I use information that is relevant to my students' interests and learning goals

17. I provide tasks that allow for active participation from students.
18. I include activities that foster the use of imagination to solve novel problems
19. I encourage students to self-evaluate
20. I allow students to work in cooperative learning groups
21. I provide prompts for students to interact with peers
22. I provide feedback that is frequent, timely and specific
23. I use real life situations to model coping skills
24. I offer devices that allow students to monitor their own behavior

Appendix C: UDL Inventory (Final)

Universal Design for Learning Inventory
Informed Consent

My name is Amanda Boyer and I am currently the Director of Early Childhood for Joplin Schools in Joplin, Missouri. As a doctoral student at Southwest Baptist University, I am conducting research examining the nature of the relationship between Early Childhood Outcomes (ECO) reported to the Department of Elementary and Secondary Education annually and the Universal Design for Learning (UDL) framework in the Early Childhood Special Education (ECSE) setting. This study seeks to include ECSE teachers and administrators in Missouri who are responsible for serving students ages 3-5 with disabilities in an ECSE program. The survey will ask questions regarding how you use the three guidelines of UDL in order to ensure students are accessing the general education setting as well as a few demographic questions to assist in compiling and analyzing data. The survey should take no longer than 10 minutes to complete. Your participation is voluntary. You may choose to withdraw at any time. There is no penalty for not participating or choosing to not answer all of the survey questions. All responses are anonymous. No information identifying you individually will be collected, only demographic information used to aggregate results. Responses will be compiled and reported in aggregate only. Your completion and submission of the survey will indicate your consent to participate and for your responses to be included in the study. This project has been reviewed and approved by the Research Review Board of Southwest Baptist University. The committee believes the research procedures adequately safeguard the subject's privacy, welfare, civil liberties and rights. For questions about your participation or to receive a copy of the results, please contact me at amandaboyer@joplinschools.org. Thank you in advance for your consideration and time. Thank you very much for your time and support. Please start with the survey now by clicking on the C button below.

Please indicate your position

1. ECSE teacher for a center-based (self-contained) ECSE classroom
2. ECSE teacher for a low incidence ECSE classroom
3. ECSE teacher for an integrated ECSE classroom
4. Process coordinator for an ECSE classroom
5. Principal or Director for an ECSE classroom
6. Other:

Please indicate your certification:

1. Early Childhood
2. Early Childhood Special Education
3. Special Education (other)
4. Other

Approximately how many students with special needs do you serve?

1. I do not serve any students with special needs at this time
2. 1-10
3. 10-20

4. 20+

How many non-disabled or typical peers do you serve?

1. I do not serve non-disabled or typical peers at this time
2. 1-10
3. 10-20
4. 20+

I engage my students by using real life situations to model coping skills

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I offer devices that allow students to monitor their own behavior

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I engage my students by providing feedback that is frequent, timely and specific

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I provide prompts for students to interact with their peers in order to engage them in the learning

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I allow students to work in cooperative learning groups

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I encourage students to self-evaluate

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I include activities that foster the use of imagination to solve novel problems

1. Always
2. Most of the time
3. About half the time

4. Once in a while
5. Never

I engage my students by providing tasks that allow for active participation.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I engage my students by using information that is relevant to their interests and learning goals

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I involve students in setting their own goals whenever possible

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I offer students choices on the tools they use to gather information in order to engage them in the learn activity.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I offer choices of rewards to my students.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I ask questions to guide a student to reflect on their answers.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I post schedules for students to refer to

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I provide multiple examples of solutions to problems.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I offer students an alternative way to answer rather than verbally.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I encourage students to solve problems using a variety of strategies, such as modeling "think-aloud" ar pictures.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I provide multiple means of representation in the classroom.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I vary the method I use for students to respond to questions.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I provide alternatives in the requirements for rate, timing, speed, and range of motor action required to with instructional materials, physical manipulatives, and technologies.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I use alternatives to students writing their answers, such as giving answers orally.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I allow students to respond to questions in a variety of ways.

1. Always
2. Most of the time

3. About half the time
4. Once in a while
5. Never

I provide auditory, combined with visual cues for transitions students from one activity to the next

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I use other devices such as captions, pictures or voice to text when representing spoken language

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I display information in my classroom in a flexible way, such as with color and contrast.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I represent information to my students in a way that can be adjusted, such as enlarged print or volume

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I represent information by offering different modalities, such as hearing, touch, vision to present key information

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I use technology, such as the iPad or Smart Board, to explain new information.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I represent new information by explaining concepts to my students verbally and non-verbally with pict

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never

I use visuals to represent information to students.

1. Always
2. Most of the time
3. About half the time
4. Once in a while
5. Never