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Increasing Reading Skills for Students With Intellectual Disabilities Through Lively Letters

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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Walden University
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Abstract

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MA, California State University, Long Beach, 1992

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

All students can learn how to read, but students with intellectual disabilities (ID) often learn at a slower rate than their peers without disabilities. The purpose of this quantitative, pretest-posttest study design was to analyze whether Lively Letters (LL), a researched-based program, was a useful tool for teaching students with ID to read by using a multisensory approach. The two main theories used were Bandura's social cognitive theory, also known as social learning theory, and Mayer's cognitive theory of multimedia learning. Sixty-eight students participated in a self-contained program. The students' phonological skills (PA) skills were measured before and after the LL implementation, including differences based on (a) student's language ability (i.e., monolingual or bilingual), (b) the severity of the student's ID (i.e., mild, moderate, or severe), and (c) their grade. Data were analyzed using *z* test and paired *t* test. The results indicated significant differences between pre and post scores for 6 of the 9 PA skills and grades, but no statistically significant differences were found based on primary language and severity of ID, and statistically significant differences were found for some, but not all, grades. The implication for a positive social change is that LL can meet the needs of monolingual and bilingual students with ID in learning how to read novel words for both academic and community-based subjects.

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Dedication

I want to dedicate this study to the following individuals:

- All students who have special needs and to their instructors who capitalized on their students' strengths to teach them how to read. I hope all students will be able to gain a genuine love of reading.
- To my husband, Mark Misuraca, who was my biggest fan for me to finish this journey and was always asking how he could assist me in this journey.
- To Elizabeth and Michael Misuraca, who were so patient to have their mom always in school.
- To my mom, who spent countless hours with me in reviewing flashcards to assist me in learning how to read. I would not have the love for reading that I have today if it wasn't for my mom.
- To my dad, who always instilled in us the importance of education and provided for us, so all eight children could have 12 years of parochial schooling.

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There is the saying that it takes a village to raise a child. In my case, it takes a whole country for me to get my doctorate. It has been a long journey, and I have so many people that I need to thank. I apologize in advance if I have left anyone out in my acknowledgments. The groups I have listed are all equally important.

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The second group is my Walden family. My committee members, Dr. Barry Birnbaum, Dr. Gerald Giraud, and Dr. Jennifer Lapin, who were always there to answer any questions that I may have had. My colleagues, who each quarter encouraged me to continue. I also want to thank the library staff who would find articles for me when I was unable to locate them. I especially want to thank the Writing Center for their excellent webinars and reviews of my papers.

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parents, Gene and Lee Forney, and my brothers and sisters, David, Mark, Kathey, Tim, Melinda, Karen, and Jeff. Additionally, I wish to thank all of my in-laws (mother, brothers, and sisters), nieces, and nephews. A huge thank you goes to my dear friends, Michelle Ashton, Dr. Tanya Dodge, and Rose Henderson, who were there to assist me anytime that I needed them. I also want to say a huge thank you to Dr. Candace Bright and Dr. Chela Willey, who were always so patient with me in all the questions I asked and assisted me in so many ways.

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Chapter 1: Introduction to the Study

Introduction

Reading, writing, and arithmetic are fundamental skills in elementary education. These skills, however, have historically not been a priority among parents and educators for students with mental retardation, herein known as intellectual disabilities (ID; Katims, 2000; Ratz & Lenhard, 2013). Furthermore, children with ID may have medical, physical, and behavioral issues, which take precedence over language and literacy skills (van der Schuit, Segers, van Balkom, & Verhoeven, 2011). Students with ID have deficits in both intellectual and adaptive behaviors that first occurred during their developmental stage (American Psychiatric Association [APA], 2013; American Association on Intellectual and Developmental Disabilities [AAIDD], 2018). This stage is defined as the period before the child reaches his or her 18th birthday (AAIDD, 2018). Traditionally, the curriculum for these students focused more on social, personal, and vocational skills (Katims, 2000). Reading, before the No Child Left Behind Act (NCLB) in 2001, was more of a byproduct to enhance the learning for their students' activities of daily living (ADLs). The approach that instructors used was sight-word recognition, in which students would match the words with the corresponding pictures and the use of objects (Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012; Coyne, Pisha, Dalton, Zeph, & Cook-Smith, 2012; Naess, Melby-Lervåg, Hulme, & Lyster, 2012). However, in only teaching students the sight-word recognition approach, students did not learn the sounds of the letters, and they were unable to decode novel or new words (Burgoyne, Duff,

Snowling, Buckley, & Hulme, 2013). Therefore, instructors had to change the reading curriculum they used for their students with ID to meet the new mandates of NCLB.

The significance of the problem of students with ID not being able to read *novel words* (i.e., words a student has never seen before) with the sight-word recognition approach became apparent for two reasons. First, with the establishment of NCLB, all students, including students with disabilities, were now accounted for and required to take mandated testing (Ahlgrim-Delzell & Rivera, 2015). Second, from the mandates from NCLB, instructors had to use scientific, research-based instruction in teaching reading skills. However, according to Allor, Gifford, Al Otaiba, Miller, and Cheatham (2013), students with ID were not included within this category for the scientific, research-based instruction.

The passing of NCLB presented new problems for English language learners (ELLs). Before NCLB, there was the Bilingual Education Act (1968, with the last reauthorization in 1988) for ELL students to receive native language support (Menken, 2010, 2013). Within the NCLB, the specific section for ELLs is Title III, which is also known as the English Language Acquisition, Language Enhancement, and Academic Achievement Act. Title III replaced the Bilingual Education Act (Menken, 2010, 2013). Therefore, ELL students would not receive native language support and had to take the state-mandated assessments in English. In the area of second language acquisition, for ELL students, there is a difference between social and academic language. To achieve the skills of a native speaker, it can take two to three years for basic interpersonal communication skills, which consists of the social language and five to seven years to be

at the cognitive academic language proficiency level (Cummins, 2000). Therefore, even though ELLs may be proficient in their social language, which includes using their second language in social greetings and engaging in reciprocal conversation, they may not have the skills for academic subjects. The academic subjects include the language skills to understand, use, and apply the cognitive language involved in doing these subjects. Understanding the concepts of basic interpersonal communication skills and cognitive academic language proficiency level is important because the replacement of the Bilingual Education Act with Title III meant that more ELLs qualified for special education services (Artiles, Rueda, Salazar, & Higrareda, 2005; Cartledge, Kea, Watson, & Oif, 2016). Finally, with this mandate, students were supposed to be reading by the third grade.

Additionally, in December 2015, President Obama passed the Every Student Succeeds Act (ESSA) to replace NCLB directives. However, even with this new mandate, instructors are required to continue to provide evidence-based programs to teach reading, and students with ID need to take the statewide testing. Therefore, with the passage of NCLB and the ESSA, instructors have the task of teaching monolingual and bilingual students with ID to enhance their reading skills to decode new words by using a scientific research-based program.

This introduction will address the following two key areas. The first area consists of the historical background of the curriculum for students with ID and theoretical foundations of Bandura (1986) and Mayer (1997). Bandura's social cognitive theory, also known as social learning theory, and Mayer's cognitive theory of multimedia learning

(CTML) are pertinent for this study to provide a lens for how instructors assist their students with ID in learning how to read.

The second emphasis of this introduction is the research study, including the problem statement, the purpose of the study, research questions and associated hypotheses, the nature of the study, definitions, assumptions, scope and delimitations, and the significance this study will have for students with ID who are in a self-contained classroom. The implication for positive social change from this study is that the results can assist students with ID in becoming more independent in their reading skills. The results could promote success not only in academic subjects and statewide testing but also in reading material they encounter in the community once they leave high school.

Historical Background of the Curriculum for Students with ID

Before the passing of NCLB in 2001, educators and parents did not focus on teaching reading to students who ID. The curriculum focused instead on teaching skills that assisted students with ID with their ADLs, such as dressing, cooking simple meals, attending to hygiene, doing laundry, and obtaining vocations (Katims, 2000). Therefore, when instructors did teach reading skills, they used an approach that focused on sight-word recognition for which some researchers have used the term *functional reading,* which involved students matching the words to corresponding pictures and the use of objects (Browder et al., 2012; Coyne et al., 2012; Naess et al., 2012). For example, for cooking, there could be a picture of the stove and the word *stove* on the same card. Students with ID used this sight-word recognition approach because they had difficulty with their phonological and working memory skills (Channell, Loveall, & Conners,

2013), and they had trouble with their short-term verbal memory skills (Naess, 2016). Additionally, the sight-word recognition approach focused on the strengths of students with ID in being better with their visual processing skills (Lemons et al., 2017, 2018). Furthermore, the sight-word recognition approach was important specifically for students' safety, such as knowing safety signs (Roberts, Leko, & Wilkerson, 2013).

Likewise, in teaching students with ID to read, there was a greater emphasis on drill and practice in learning the words (Coyne et al., 2012; Lemons et al., 2018). As a result, by using the sight-word recognition approach, students with ID obtained some reading skills to assist them with their ADLs, social, and vocational skills.

However, there are some disadvantages to the sight-word recognition approach. The first disadvantage was that by using the sight-word recognition approach, students did not learn the sounds of the letters (Browder et al., 2012). Additionally, there was a concern that students did not comprehend what they read (Browder et al., 2012). Likewise, according to Browder et al. (2012) and Burgoyne et al. (2013), even if students did learn sight-words, it did not mean that students with ID will necessarily learn how to read. Another disadvantage was that by just learning sight-words, it did not expose students to different types of texts (Roberts et al., 2013). From these disadvantages, instructors realized the need for a better system in teaching their students with ID to learn how to read to meet the mandates of NCLB. Furthermore, before 2001, instructors did not receive specific training at the university level to teach literacy skills to students with ID.

In the past, many of the textbooks at the university level did not state how to teach literacy skills to students with ID. Katims (2000) reviewed the introduction to special education university textbooks with publication dates from 1994-2000 on the chapters that pertained to ID. These textbooks were explicitly for students who wanted to become a special education or general education teacher. Katims found that only one out of the six textbooks had a chapter about ID, but there was no description on how to do an assessment or how to teach literacy to students with ID. Katims then looked at textbooks that dealt explicitly with the topic of ID and found five textbooks with publication dates from 1995-2000. In Katims's review of these books, only two had extensive descriptions of how to assess and teach literacy to students with ID. Furthermore, two out of these five textbooks did not even address these topics (Katims, 2000).

Additionally, there were differences from the results of the research and what the instructors were teaching in the classroom. The National Institute of Child Health and Human Development (2000) published the National Reading Panel, which indicated that to teach reading effectively, an instructor needs to focus on five skills: vocabulary, comprehension, phonemic awareness, phonics, and fluency. In a longitudinal study comparing the teaching styles for literacy in 2004 and 2010, Ahlgrim-Delzell and Rivera (2015) observed how instructors (with no direction from the researchers) taught literacy lessons to students with ID. Overall, they found that instructors in 2004 were not incorporating phonological awareness and phonics into their literacy lessons for their students with ID. However, in 2010, the instructors did include phonological awareness and phonics skills but dropped alphabet knowledge (Ahlgrim-Delzell & Rivera, 2015).

The researchers did not focus on fluency because fluency deals with how fast students can read, and it is common for students with moderate-to-severe ID, who were the focus of this study, to have difficulty with their processing and motoric skills (Ahlgrim-Delzell & Rivera, 2015). The results indicated that there was a lag between when instructors get the information and when they implemented it into their classrooms.

Presently, instructors do not have to depend only on sight-word recognition; it is now possible for instructors to teach the foundational skills of reading, including phonics and phonemic and phonological awareness, to their students with ID. Through multiple studies, researchers have found that students with ID can learn phonics and phonemic and phonological awareness (Adlof, Klusek, Shinkareva, Robinson, & Roberts, 2015; Allor et al., 2013; Allor, Mathes, Roberts, Cheatham, & Al Otaiba 2014). However, it takes an extended amount of time to learn these skills (Allor et al., 2013; Allor et al., 2014; Barker, Sevcik, Morris, & Romski, 2013). Therefore, through the support of the current research mentioned above, it is now possible for teachers to incorporate the skills of phonics and phonemic and phonological awareness to teach their students with ID to read.

An evidence-based program that instructors can implement to teach monolingual and bilingual students to learn how to read is the Lively Letters (LL) program. Given that students with ID have weaknesses with their phonological and working memory, this program augments their memory skills through the multisensory approach. This multisensory approach incorporates physical movement, imagery, music, and mnemonics (Telian & Castagnozzi, 2007, 2020). Furthermore, the imagery component of this

program includes the strengths of visual processing skills that students with ID have (Lemons et al., 2018). Overall, this program capitalizes on the strategies of visual processing along with phonemic and phonological awareness.

The gap in the research is that the LL program has not been analyzed for students with ID, specifically in a self-contained LIF self-contained classroom. This study addressed this issue by analyzing the effectiveness of the LL program as a tool for teaching monolingual and bilingual students with ID the ability to read. The significance of this study is that all students, even students with ID, have the right to learn the foundational skills of reading with evidence-based research, such as the LL program.

Problem Statement

NCLB changed the way that students with ID learned vital reading skills. Since this mandate, students must be able to read by third grade (U. S. Department of Education, 2002). Furthermore, with the passing of ESSA, which replaced NCLB, instructors continue to have to provide evidence-based programs to teach reading, and students with ID continue to take the statewide testing.

Before NCLB, instructors taught students using the sight-word recognition approach, which did not focus on students' learning the letter sounds and being able to read novel words. The reasoning behind this sight-word recognition approach was that students did better with their visual memory than their auditory memory (Lemons et al., 2017). Presently, students with ID can learn phonics and phonological and phonemic awareness, but it takes an extended amount of time to do so (Allor et al., 2013; Allor et al., 2014; Barker et al., 2013). The problem that occurs with this increased time in

learning the foundational skills of reading is that at times students with ID can exhibit challenging behaviors that are abnormal in their intensity, duration, and frequency (Alevriadou & Pavlidou, 2016; Emerson, 2011; Stoesz et al., 2016). There is also the possibility that these challenging behaviors ultimately interfere with the physical safety and learning for students with ID and their peers (Emerson, 2011; Alevriadou & Pavlidou, 2016; Stoesz et al., 2016). However, according to Hastings, Remington, and Hopper (as cited in Alevriadou & Pavlidou, 2016), some students with ID have difficulty in expressing their needs and wants, as well as, showing their frustration appropriately and thus display challenging behaviors. Therefore, instructors need to (a) be aware of these possible behavioral issues, (b) know why their students are displaying them while they are teaching reading, and (c) know strategies on how to keep the students engaged in learning these skills.

There is a shortage of literature analyzing the effectiveness of using a multisensory approach to reading novel words for students with ID in a self-contained classroom. The problem addressed by this quantitative study is that we do not know how effective the LL program is for monolingual and bilingual students with ID, specifically in a self-contained classroom. This research-based program provides the foundational skills to learn how to read. The precursors to learning how to read new words independently consist of phonics and phonemic and phonological awareness skills. The multisensory approach is the best way to learn these skills (Telian & Castagnozzi, 2007, 2020).

Purpose of the Study

The purpose of this quantitative, pre-experimental, pretest-posttest study design was to analyze whether LL, a researched-based program, was a useful tool for teaching students with ID to read (Telian & Castagnozzi, 2007, 2020) through a multisensory approach. The students with ID involved in this study were in a self-contained program. Telian first developed the LL program in 1990 to focus on the foundational skills of reading by using a phonemic awareness and phonics approach. From the research, LL was successful for students who had a variety of eligibilities, such as students who were "cognitively delayed, visually impaired, bilingual, [or] language impaired," and students with dyslexia (Telian & Castagnozzi, 2007, p. 91).

This study was unique because it focused primarily on students with ID in a self-contained LIF self-contained classroom to teach them the ability to learn how to read at an elementary school. The inclusion criterion is the participation in the LL program. Therefore, all of the students in the self-contained LIF self-contained classroom received the LL program. The independent variables were (a) the language ability (monolingual or bilingual), (b) the students' severity of their ID (i.e., mild, moderate, or severe), and (c) the students' grade. The dependent variable was the phonemic awareness skills assessed through the results of the Consortium on Reading Excellence (CORE) Phonics Survey assessments (Diamond & Thorsnes, 2008).

Research Questions and Hypotheses

For this study, I used the term *phonological awareness* because it encompasses the concepts of blending and phonemic awareness. The reason for using this term is that

the LL program works on phonemic awareness and phonics. Secondly, the CORE Phonics Survey assesses the sounds and the reading because the students must use their skills in blending the sounds to read the words.

To analyze whether the LL program was a valid tool to teach monolingual and bilingual students with ID to read, the four questions guiding this study were as follows:

RQ1: Does the LL program improve Phonological Awareness (PA) skills for students with ID in a self-contained classroom?

H_o1: The LL program does not improve PA skills for students with ID in a self-contained classroom.

H_A1: The LL program significantly improves PA skills for students with ID in a self-contained classroom.

RQ2: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who received instruction in the LL program based on the student's language ability (monolingual or bilingual)?

H_o2: There is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's language ability (monolingual or bilingual).

H_A2: There is a significant difference statistically in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's language ability (monolingual or bilingual).

RQ3: Is there a difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe)?

H_o3: There is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe).

H_A3: There is a significant difference statistically in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL based on the student's severity of his or her intellectual disability (mild, moderate, or severe).

RQ4: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade?

H_o4: There is no difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade.

H_A4: There is a significant difference statistically in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade.

Theoretical Foundations

Two theoretical perspectives, Bandura's (1977) social cognitive theory, also known as social learning theory, and Mayer's CTML (2005 a) guided this research. A brief discussion of each theory follows.

The social cognitive theory describes the process by which individuals learn through observations and modeling. There are two main categories of this theory. The first one involves the five capabilities that humans possess: symbolization, self-reflection, self-regulation, forethought, and vicarious learning (Bandura, 1986). The second category is the triadic reciprocality. According to Bandura (1977), the five capabilities play a vital role in the reciprocal interaction in *triadic reciprocality*. Triadic reciprocality, according to Bandura (1986, 2018), consists of behavior, cognition with additional personal factors, and environmental events, in which all three are interacting with each other.

The second theory used in this study, Mayer's (1997, 2005) theory of CTML, complements Bandura's theory. CTML presents that to learn, individuals require both pictures and words. CTML includes "cognitive science principles of learning," three types of memory, and the five processes of the CTML (Mayer, 2005, p.31). Further discussion of these specific components is below.

There are different ways that humans can learn. According to Mayer (2005), the cognitive science principles of learning include human processing, limited capacity, and active learning. The first principle is how humans process information through visual and auditory stimuli (Mayer, 2005a). The second principle involves limited capacity, meaning that humans can only remember a limited amount of information (Mayer, 2005).

Therefore, to account for this limited capacity, humans can recall information by using strategies to augment their memory. One such approach is to chunk the information, which is by grouping the information. For example, a person's social security number, a person groups the first three numbers, then two and the last four numbers. The final principle, active learning, according to Mayer, is that humans need to be active when they are learning material. In other words, students do not learn through passive means but need to be engaged to strengthen their learning. Mayer also explained the importance of the different types of memory, which consist of sensory, working, and long-term memory. Overall, these principles and knowing the different kinds of memory are essential to understand how to serve students with ID best. For example, if students are not attending to the task or do not know what to focus on, then they will not recall the vital information.

The third major component of this theory consists of the five processes of CTML (Mayer 2005). The first two processes, according to Mayer, consist of the selection of words or images, and the third and fourth processes consist of the organization of these words and images. The fifth process involves integrating these words and images and with prior knowledge. Finally, Mayer's theory includes the importance of preventing cognitive overload for students while using multimedia devices.

The rationale for using these two theoretical concepts for this study is the following. First, for Bandura's theory, the major ideas are observation and motivation. By using the LL program, the students with ID can observe and model the actions of the songs and physical movements to learn the phonemes. Additionally, there is the

possibility that when the students do the activities and incorporate the music, they will increase their motivation, which ultimately can eliminate any boredom that the students may experience in learning how to read. Secondly, Mayer's theory is appropriate for this study because LL utilizes a multisensory approach, which incorporates physical movement, imagery, music, and mnemonics to teach phonemic awareness and phonics (Telian & Castagnozzi, 2007, 2020).

Furthermore, by using the LL program, the students are active in learning the consonants and vowels through physical movements, such as doing the hand cues for the sounds, and participate in singing the songs. Students also have visual cues to assist with their memory. Finally, Mayer's theory stressed the importance that instructors need to be aware of not causing a cognitive overload for their students when they use multimedia learning. Chapter 2 will include further detail about these two theories.

Nature of the Study

For this quantitative research, I used a pre-experimental, pretest-posttest design. The significance of doing this type of design was that there was no random assignment since all of the students with ID in the self-contained program were in the study (Creswell, 2014). The pre- and posttest consisted of the CORE Phonics Survey (Diamond & Thorsnes, 2008) as a measure of the validity of the LL program. The CORE Phonics Survey evaluated students' knowledge of their skills of knowing the alphabet, the letter sounds, along with their reading, and decoding skills. The instructors gave the survey to each student at the beginning and the end of the study. The inclusion criterion is the participation in the LL program. Therefore, all of the students in the self-contained LIF

self-contained classroom received the LL program. The independent variables were (a) the language ability (i.e., monolingual or bilingual), (b) the students' severity of their ID (i.e., mild, moderate, or severe), and (c) the student's grade. The dependent variable was the results of the post-assessments from the CORE Phonics Survey.

Operational Definitions

Intellectual disabilities refer to a diagnosis given to an individual who has received an intelligence quotient (IQ) lower than or "around 70 or as high as an IQ of 75." The individual who obtained this score has difficulty with both intellectual and adaptive behaviors (AAIDD, 2018, para. 3). Furthermore, the disability needs to occur before 18 years of age (AAIDD, 2018). In 2010, President Obama signed Rosa's Law (Pub L. no: 111-256), which replaced the term *mental retardation* with *intellectual disabilities*. For the different criteria of the severities of ID, for the school district (SD)in which this study is taking place, see Table 1.

Table 1

Severities of Intellectual Disability

Severity	Definition	Approximate IQ (based on the standard deviations)
Mild	Two standard deviations below the mean score for the specific cognitive assessments	70
Moderate	Three standard deviations below the mean for the specific cognitive assessments	55
Severe	Four standard deviations below the results of the cognitive assessments	40
Profound	Five standard deviations below the results of the cognitive assessments	25

Source: Nevada Administrative Code (NAC; 2016, June)

Infinite Campus (2017) is a web-based student information system in which staff and parents can view the student's progress with real-time information. The parents and staff have different log-in portals to see the progress of the students. Depending on the staff's security clearance, there may be access to the student's demographics, grades, attendance, assessment results, special education information, and behavior.

Orthography is the spelling of words that utilize the alphabetic letters in which the letters signify a speech sound (Caravolas, Lervåg, Defior, Seidlová-Málkova, & Hulme, 2013).

Phoneme is "the smallest unit of sound that distinguishes one word from another" (Telian & Castagnozzi, 2007, p.193). An example would be /s/- /a/- /t/ and /m/ -/a/- /t/. The difference is the /s/ and /m/ phonemes that change the meaning of the word.

Phonemic awareness is the knowledge that one can manipulate the sounds (phonemes) to create new words or to break up the words into the specific sounds (Owens, 2016).

Phonological awareness encompasses the components of phonemic awareness, syllabication, blending, and rhyme (Owens, 2016).

Phonics is the "study and use of letter-sound relationships" (Telian & Castagnozzi, 2007, p.193). Students need to understand that when they see letters, the letters have specific sounds that go with that letter. By understanding this relationship between the letters and sounds, it will assist students in reading and spelling.

Unique Learning System (ULS) is specifically for students who have ID and is a standard-based online curriculum program. According to the developers (News2You Inc.

2016), the program provides age-appropriate material in thematic units. The instructor can choose from leveled resources in which the instructors can decide how much information is on the page. Each month, the instructor receives standard-based differentiated material. Along with the lesson plans, instructors receive pretests, posttests, and rubrics.

World-class Instructional Design Assessment (WIDA) – Alternate ACCESS – is an assessment for students who have a dual status of being an English language learner (ELL) and have significant cognitive impairments.

Assumptions

The focus of this study is a quantitative one using a pre-experimental, pretest-posttest design. The primary significance of using this type of design is that there is no random assignment for the individuals involved in the study (Creswell, 2014).

The best methodology for this study was to utilize a pre-experimental, pretest-posttest design because the primary objective was to see if the LL program is a useful tool for instructors to teach their students with ID the ability to read. Additionally, the individuals involved in this study are students with ID. Therefore, it is best to have all the students in the self-contained classroom participate in the study and not have a control group. Using the LL program will meet the needs of students with ID because this program has the flexibility in meeting the students' needs and not the students meeting the needs of the program. Additionally, I will be able to assess the students' progress by using the CORE Phonics Survey.

Scope and Delimitations

The scope of this study is a group of elementary school students with the eligibility of ID. Their placement is in a self-contained LIF self-contained classroom. I chose the self-contained LIF self-contained classroom to evaluate whether students with ID, regardless of their severity (mild, moderate, or severe), can learn to read using the LL program. I chose the LL program because students with ID take additional time to learn how to read (Allor et al., 2013; Allor et al., 2014). The LL program complements the theoretical concepts of Bandura (1977) and Mayer (2005). This study was to assess if the LL program was appropriate for teaching students with ID to read. Additionally, instructors can meet the mandates of NCLB, which is now ESSA, to provide an evidence-based program to teach students with ID to read.

By using the LL program, instructors can meet the needs of their students regardless of the severity of their disability. The implication of this study is that the findings can provide a foundation for other educators who teach in a self-contained LIF self-contained classroom of using this program in their classrooms. The delimitation of this study was that the results pertain to elementary school students with ID within the self-contained LIF self-contained classroom.

Limitations

One limitation of the study includes students transferring to a new school or even new students transferring into the self-contained classroom during the study. Another limitation is the type of design for this study, which is a pre-experimental, pretest-posttest design in which there is the possibility of maturation. However, from the results of this

study maturation did not occur. The reason is that students with ID can learn the skills of phonics, phonemic and phonological awareness but takes an extended amount of time to learn them (Allor et al., 2013; Allor et al., 2014). Another limitation was the number of students involved in the study. Finally, there is the time constraint of consistency in doing the LL program. This consistency depends on the start of the study within the school year. Additionally, there may be holidays that need to be accounted for while doing the study.

Significance

The significance of this study can be viewed on two levels: the academic level and nonacademic level for students with ID. At the academic level, students will benefit from a multisensory approach to read new words. Even though it takes time to learn how to read (Allor et al., 2013; Allor et al., 2014), students with ID will be able to use their strengths of visual processing (Lemons et al., 2017) and not only depend upon sight-word recognition. This ability to read new words will assist students with ID not only in academic areas but also in the community. Additionally, the Individuals with Disabilities Education Act (IDEA; U.S. Department of Education, 2017), stressed the importance that students with disabilities have an equal opportunity to learn the skills to live independently and with “economic self-sufficiency” (1400.c). Alnahdi (2015) stressed the importance of students with ID learning how to read to be successful in finding jobs. In summary, the implication for a positive social change from doing this study is that the results regarding the effectiveness of using a multisensory approach can assist students with ID in becoming more independent in their reading skills. These skills include

advancing their ability to decode novel words for their academic subjects and statewide testing, but also be successful in reading material out in the community once they leave high school.

Summary and Transition

In this chapter, I examined the historical background of students with ID in learning how to read with different types of instruction. Before the passing of NCLB (2001), students with ID used the sight-word recognition approach, which took advantage of the strong visual processing skills of students with ID (Lemons et al., 2018). However, with the passing of NCLB, students are now required to take the mandated testing. The problem with the sight-word recognition approach was that students did not learn novel words and the individual sounds of each letter for them to become independent readers, and these students would not do well on the mandated testing. To meet the directives of NCLB, researchers have found that students with ID can learn the skills of phonemic and phonological awareness and even phonics but need an extended amount of time to learn them. Even with the passing of ESSA (2015), which replaced the NCLB directive, instructors continue to have to provide evidence-based programs to teach reading, and students with ID continue to take the statewide testing.

Therefore, the LL program can meet the needs of students with ID in teaching them how to read. LL is an evidenced-based program and takes advantage of the strong visual processing skills that students with ID already have (Lemons et al., 2018). Instructors will have the tools in providing the foundational skills for reading, which consist of phonological and phonemic awareness and phonics. Furthermore, this program

uses a multisensory approach that incorporates physical movement such as “hand and body cues,” imagery, music, and mnemonics (Telian & Castagnozzi, 2007, p.4). An added benefit of using LL is that it has the flexibility to meet the students’ needs, as opposed to the students meeting the needs of the specific program. In addition, through the multisensory approach, the LL program will help address the weaknesses students with ID have with their memory and phonological working memory.

The theories used for this study were Bandura’s social cognitive theory and Mayer’s theory of CTML. These two theories are pertinent for this study to act as guidelines for the instructors to assist their students with ID in learning how to read.

In Chapter 2, the literature review is presented, including how the theories relate to teaching students with ID to learn how to read using the LL program. Chapter 3 discusses the methodology; Chapter 4 gives the results of the study, and Chapter 5 discusses these results.

Chapter 2: Literature Review

Before the passing of NCLB (2001), students with ID used the sight-word recognition approach. The reasoning behind this approach is that students with ID have good visual processing skills (Lemon et al., 2017). However, with the passage of NCLB (2001) and ESSA (2015), instructors have to provide evidence-based programs to teach reading and students with ID continue to take the statewide testing. The problem with the sight-word recognition approach was that students did not learn novel words (i.e., words they have not seen before) or the sounds of each letter so they could become independent readers. Additionally, the sight-word recognition approach did not allow monolingual and bilingual students to become independent readers for community-based reading activities. This literature review will address five areas to understand the process of teaching monolingual and bilingual elementary students with ID to learn how to read. These areas consist of an overview of: (a) the theoretical foundations of Bandura and Mayer, (b) anatomy of the brain that deals with memory and reading, (c) the foundations of reading, (d) factors influential to read, (e) and learning to read among ELLs.

By presenting the current state of literature and using some historical documents in these areas, I aim to demonstrate the need to further investigate the research-based LL program as a useful tool for teaching monolingual and bilingual elementary students with ID in learning how to read in a self-contained classroom. The hypothesis for social change that will occur is, through the use of the LL program, students with ID will be become independent readers in academic subjects and successful in reading community-based information as well.

Literature Review Strategy

The articles for this literature review were peer-reviewed articles from Walden University's Library. I used a peer-reviewed database, specifically, SAGE Journals (formally called SAGE Premier). Some of the topics within this database consist of education, psychology, and political science. The keywords used to find these articles were *behavioral phenotypes; intellectual disabilities, mental retardation, or mentally challenged; phonological awareness or phonemic awareness; phonics, reading, memory, phonological memory and working memory, Lively Letters,* and *multi-sensory approach + phonological awareness*

There were no articles published about the LL program in peer-reviewed articles even after I expanded the search to *multisensory approach + phonological awareness*. However, the developers of LL published studies on their own website that showed the effectiveness of using this program with students with a variety of disabilities and grade levels. I also received an unpublished thesis from one of the professors supervising the students doing the thesis on using the LL program in a kindergarten classroom. Furthermore, I found a published dissertation on the LL program used with students who had autism.

Theoretical Foundations

Bandura's Social Cognitive Theory

Bandura's social cognitive theory, also known as social learning theory, deals specifically with people learning through modeling and observation. According to Bandura (1977), learning new skills would be labor-intensive and even hazardous if

individuals relied primarily on their actions. For example, for pilots first learning to fly, they would first use simulators to practice taking off and landing before they flew an airplane. The simulators also allow the pilots to practice what to do in different weather conditions and mechanical malfunctions. To explain this theory, this section of the literature review has two main categories: the five capabilities that humans possess and the triadic reciprocality (Bandura, 1986, p.18).

Five capabilities that humans possess. These five capabilities consist of symbolization, self-reflection, self-regulation, forethought, and vicarious learning (Bandura, 1986, 2001). The first three capabilities allow a person to do the fourth and fifth capabilities more efficiently. The first capability, symbolization, deals with the person's ability to use symbols to change and to adapt to his or her environment by keeping the symbols that are important and discarding the ones that are not. The significance of having symbols is that people can communicate with each other, and secondly, people will know what to do in situations that occur in the future. In the second capability, self-reflection, a person evaluates their experiences. From this assessment, people gain knowledge about themselves and the world around them (Bandura, 1986). Furthermore, the knowledge that people gain from self-reflection allows them to change their thought processes about specific situations.

To do the third capability, self-regulation, effectively, a person needs to be efficient with their self-reflection. Self-regulation deals with the motivation and regulation of behaviors that are the results of people's actions based on their self-evaluation and their standards (Bandura, 1986, 2001). In other words, people will not just

follow the social norms of others but think for themselves. Furthermore, they will do things in future situations based on what they learned from previous circumstances. Therefore, when instructors assist their students with their self-regulation skills, this improves their students' ability to set goals, achieve these goals, and improve their behavior.

In one study on self-regulation, Nader-Grosbois (2014) evaluated how adolescents with ID (aged 11-16 years) and typically developing (TD) peers (aged 7-9 years) performed when matched by their mental age (MA) by filling out a questionnaire that involved their self-perception, self-regulation, and metacognition skills. They also had to solve spatial and temporal problem-solving tasks involving if they went to an amusement park. The self-regulated strategies included the following: identification of the objective, exploration of means and planning, socio-communicative self-regulatory strategies of joint attention, socio-communicative behavior regulation, self-evaluation, self-regulated attention, and self-motivation (p.1345). Nader-Grosbois found that there is a positive direct link between the students' self-regulation skills with their overall metacognition skills in both groups (students with ID and TD peers).

Even though the students were older in Nader-Grosbois's study, this study is significant because students with ID can develop the skills for self-regulation with a result of being able to set goals. An additional strength of the Nader-Grosbois's study is that it validates for the instructors within this study, that they can assist their students with ID in learning self-regulation skills through setting goals and ultimately improve their students' behavior if their behaviors are an issue.

Efficiently using the three capabilities of symbolization, self-reflection, and self-regulation will assist individuals with the fourth and fifth capabilities of forethought and vicarious learning. Forethought allows people to plan what to do next in situations (Bandura, 1986, 2001, 2018). They anticipate the consequences and not react to the environment. Another advantage of using forethought is that people can set goals for themselves (Bandura, 1986, 2018). The fifth capability, vicarious learning, is learning through observation, which allows a person to learn developmental and survival skills (Bandura, 1986). Therefore, to learn new skills, a person draws heavily on observations, and people can learn intricate skills through modeling.

To illustrate, the concept of vicarious learning from an academic perspective is the example of students who are ELLs. In the first stage of second language acquisition called *preproduction*, ELLs typically go through a silent period. Depending on how much English the ELLs know, they are quiet for the first few months and observe what is going on at their school or even in their community (Hill & Miller, 2013). For the first few months in a school environment, students observe the types of rules and procedures done in the classroom. The students are actively watching these behaviors to know what to do in specific situations. Furthermore, students observe not only the routine and procedures but also the consequences that may occur when students do not follow these procedures. By modeling, instructors can show how to do the routines involved in the school day.

Another example of learning through observation was shown in Chai's (2017) research. Chai's study analyzed whether students could improve their reading skills using an iPad in small-group instruction to increase their phonological awareness skills.

Students learned not only their target phonemes but also their peers' phonemes as well. In this study, there was a small sample size consisting of three children. The implications of this study are substantial. First, children can learn phonological awareness skills in a small-group setting, and secondly, they can learn through observation. By the end of the study, the students were able to learn nine phonemes, six of which were learned through observation. However, students need to have the following processes to be successful with their observational learning.

Processes to assist with observational learning. According to Bandura (1977), for people to learn from observational learning, they need to have these four vital processes of *attention, retention, motor production,* and *motivation*. The first process is attention. To learn, the person must pay attention to what a person sees or hears. Vicarious learning takes place when ELLs are observing and attending to what is going on within the school setting to learn the academic and social procedures. Doing the first process of attention allows the person to do the process of retention, also known as memory.

Through retention, a person can recall the procedure and the modeling and can therefore do it in future situations without the assistance of a model. One way of recalling the specific patterns from the modeled behavior is through symbols. According to Bandura (1977), observational learning needs two types of systems: "imaginal and verbal" (p. 25). The imaginal system occurs because people recall or retain the imagery of the behavior. According to Bandura, by using symbols, people can learn the skills through observation. Bandura reported that individuals use visual imagery when they do

not have the verbal skills to communicate effectively, and when the verbal explanation does not accurately explain the behavior. However, there are advantages of using verbal coding because it is faster and is more readily available than visual coding.

In motor production, the third process, people need to reproduce the observed behavior from the modeling in the correct sequential pattern. There are four processes that a person needs to do motor production correctly: organization, initiation, monitoring, and fine-tuning (Bandura, 1977). To complete the modeled behavior, a person needs to organize the steps to it and then initiate the behavior, monitor the behavior, and finally fine-tune the behavior based on the suggestions that the person receives. Gardner and Wolfe's (2015) study highlights the modeling process. They found that students with ID learn how to wash dishes from the perspective of a person washing dishes. In other words, the student with ID, when watching the video, just saw the arms of the person washing the dishes. Gardner and Wolfe found that video prompting, which are short segments of the task and error correction, assisted the four adolescent students with ID in learning the skills to wash dishes.

Motivation is the last process of learning from observations. Being motivated is a vital skill for individuals to learn. Bandura, Barbaranelli, Caprara, and Pastorelli (2001) explained that there is a direct link between students' perception of their ability to do academic subjects and their motivation. Many times, students may have different beliefs about certain situations, which may not be an accurate representation of the situation at hand (Aukerman & Schuldt, 2015). For example, in the area of reading, students may feel they cannot read but may, in reality, be good readers; or vice versa, the students may

actually be poor readers by academic standards but feel they are good readers (Aukerman & Schuldt, 2015). Likewise, Nader-Grosbois (2014) assessed self-perceived competencies and the importance of domains in the areas of math, reading, cognition, social acceptance, writing, appearance, and conduct. Nader-Grosbois found that self-perception and self-perceived competence for both groups were very similar in all areas except in reading, in which the reading score was lower for these two groups.

Bandura (1977) reported that the results of the modeled behavior needed to be of value to the person in learning the material. Bandura further explained that reinforcement is critical in motivating a person to do the behavior in future situations. For students to be motivated, they need to become active learners. Fernández-López, Rodríguez-Fórtiz, Rodríguez-Almendros, and Martínez-Segura (2013) reported that when students with disabilities are dependent upon others, they experience "self-neglect, disinterest, and isolation" (p.78). If students are dependent upon others, the result is an increase in social and economic costs because of this dependency (Fernández-López et al., 2013). Therefore, instructors must teach students autonomy and become active learners. If instructors do not do this, then their students are not motivated to learn, and will not learn the tasks.

The social cognitive theory has many processes (see Figure 1). In summary, humans are active learners with regards to acting in specific situations. Having these five capabilities will assist people in effectively doing the triadic reciprocality, a concept explained in the following section.

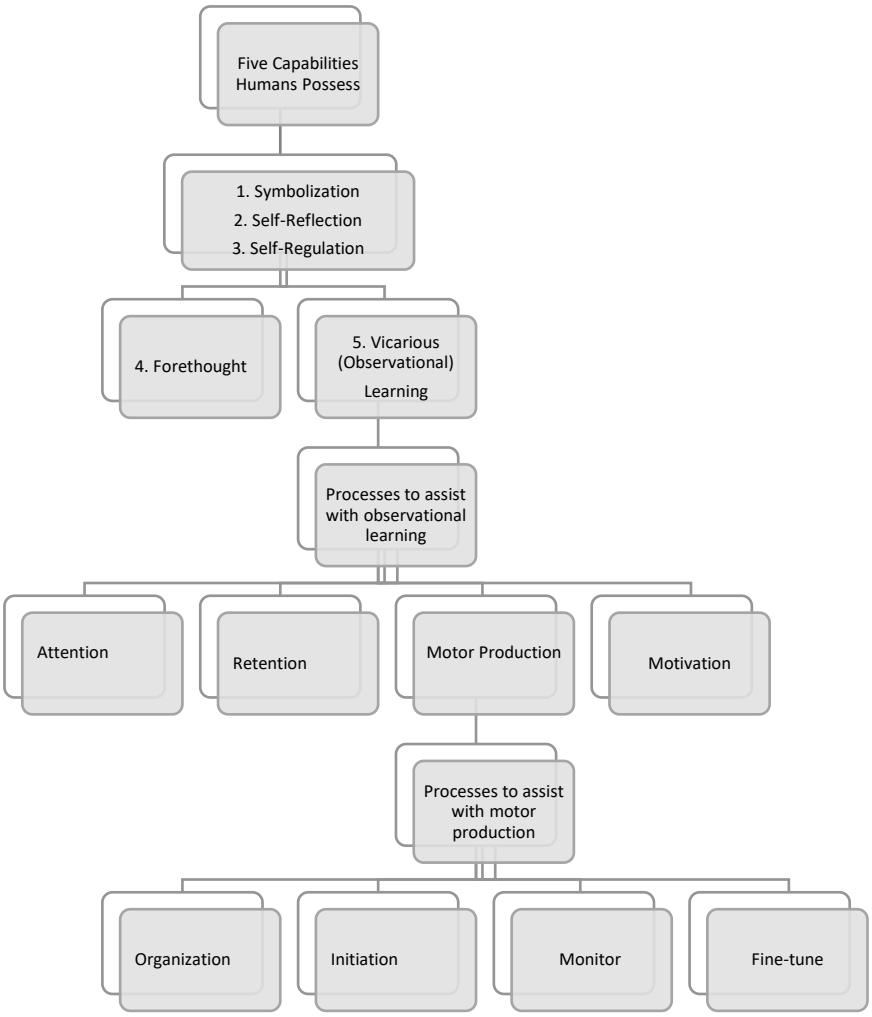

Figure 1. Bandura's social cognitive theory: the five capabilities humans possess. Information is from *Social foundations of thought and action: A social cognitive theory* by A. Bandura, 1986.

Triadic reciprocality. Bandura (1986) explained that people function according to a triadic reciprocality that consists of behavior, cognition with additional personal factors, and environmental events, in which all three interact with each other (p. 18). The five capabilities play a crucial role in the reciprocal interaction in the triadic reciprocality (Bandura, 1977). Bandura (1986) used the term *reciprocal* to show that there is a mutual action between cognition, behavior, and the environment along with its causal factors.

Causation occurs when purposeful dependent events act between each other (Bandura, 1997). In looking at Figure 2, the arrows are bi-directional that shows this mutual action. These factors consist of cognitive and behavior, behavior and cognitive, behavior and environment, environment and behavior, cognitive and environment, and environment and cognitive. Bandura (1997, 2018) stressed the importance that even though there is a link between behavior, cognition, and the environment, it does not mean that at one given time, all three are of equal importance. Figure 2 shows the concept of triadic reciprocality.

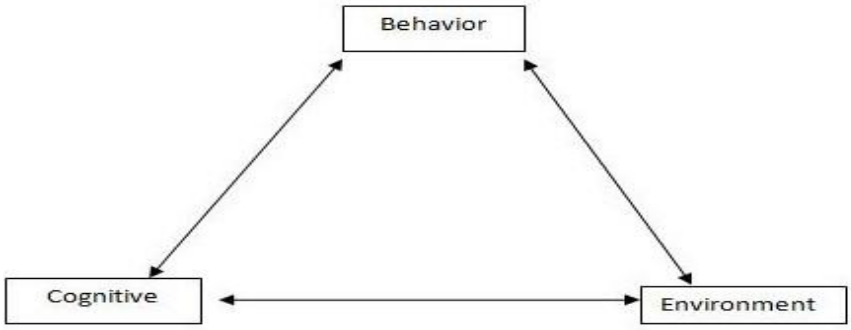

Figure 2. Bandura's triadic reciprocality. Adapted from *Social foundations of thought and action: A social cognitive theory* by A. Bandura, 1986, p. 24.

Instead of the term of triadic reciprocality that Bandura (1986) used, Ponton and Carr (2012) used the term triadic reciprocal causation (TRC). They explained that there could be six direct effects of TRC. Within this triangle, Ponton and Carr replaced Bandura's cognitive factor with "person." For example, the six different effects consist of "person and behavior, behavior and person, behavior and environment, environment and behavior, person and environment, and environment and person" (pp. 5-6). They stressed that the causation that occurs is a "mutual influence" and not "a certainty of outcome" (p. 2). In other words, the outcomes may be different for specific situations. Additionally,

Bandura (2018) described the triadic reciprocality as *triadic codetermination theory of causation*. This theory is a "three-way interplay human functioning is a product of intrapersonal influences, the behavior individuals engaged in, and the environmental forces that impinge on them" (Bandura, 2018, p. 130). Even though there are different names for the triadic reciprocality, it still shows that individuals can take an active role in how they conduct their lives.

To explain this concept of triadic reciprocality within a school setting, in using the LL program, instructors may use the environment as a critical role when teaching their students with ID the ability to learn how to read. They are making the environment inviting and motivating by using the music and hand movements in learning the sounds, so the students with ID will not have the behavioral problems that may occur in learning these new skills. By creating this type of environment, instructors will ultimately increase their students' cognitive abilities in learning the tasks involved in learning to read.

Mayer's Cognitive Theory of Multimedia Learning (CTML)

The rationale for using Mayer's (1997) CTML is that the LL program utilizes a multisensory approach that incorporates physical movement, imagery, music, and mnemonics to teach phonemic awareness and phonics (Telian & Castagnozzi, 2007, 2020). Additionally, Mayer's theory includes the importance of preventing cognitive overload for students while using multimedia devices. Furthermore, Mayer (1997, 2005) reported that to learn more effectively, people needed both pictures and words. Therefore, CTML includes the following components: "cognitive science principles of learning," three types of memory, and the five processes of the CTML (Mayer, 2005, p.31).

Cognitive science principles of learning. According to Mayer (2005), the cognitive science principles of learning consist of human processing, limited capacity, and active learning. Humans can process information through a dual channel system; specifically, auditory/verbal (hearing) channel in what the person hears, and visual/pictorial channel is what the person sees. Limited capacity involves how much a person can remember through the auditory pathway. In looking at the original reference by Miller (1956), he found that individuals could only recall up to seven items. The strategy of chunking, which entails grouping items together, assists humans in recalling more than seven details such a phone numbers and social security numbers. Active learning is essential for people to learn new material. This active learning also supports what Bandura (1986) reported that learners have to be active learners and not passive learners.

Memory. Mayer (2005) described three different types of memory associated with CTML: sensory, working, and long-term memory. Sensory memory is very brief, and it comes through a person's visual or auditory system. According to Mayer (2005), for CTML to be successful, a person needs a good working memory. Working memory is a two-fold process in which a person first holds the information temporally that is coming in via auditory or visual channel, and the second part is "active consciousness," which involves the person manipulating this information (Mayer, 2005, p. 38). Long-term memory is being able to store a large amount of information for a significantly long time and when the person needs to recall the specific information. To assist with these three different types of memory leads to the various processes involved with CTML.

Five processes of CTML. Mayer (2005) also provides five processes within his theory of CTML. These processes consist of the following: The first two processes consist of a selection of words or images, the third and fourth processes include the organization of these words and pictures, and the fifth process involves integrating these words and pictures and with prior knowledge. To understand these five processes and the role they have within CTML, I adapted Mayer's visual representation of CTML by adding four main categories: (A) selection of information, (B) organization, (C) integration, and (D) prior knowledge. *Figure 3* shows a visual representation of Mayer's CTML.

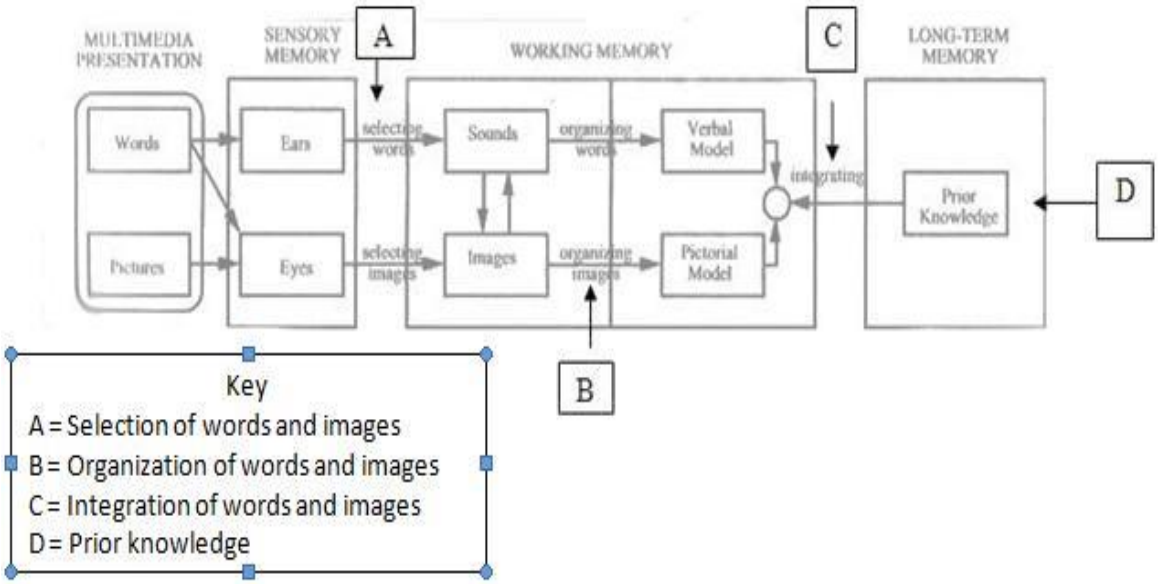

Figure 3. This figure represents the theory of the cognitive theory of multimedia learning (CTML). Adapted figure from "Introduction to Multimedia Learning," by R. E. Mayer, 2005, *The Cambridge handbook of multimedia learning*, p.37.

To ensure that learners utilize CTML effectively, instructors need to make sure that they are not causing a cognitive overload to their students when they use multimedia

learning. Mayer (2005) even cautioned that just providing pictures along with words does not cause learning. Students may be over-stimulated by the images along with the text. They may become distracted and not know where to focus their attention. A description of these nine suggestions to prevent cognitive overload is in Table 2.

Table 2

Summary of How to Prevent Cognitive Overload

Problem	Explanation	Solution	Explanation
Split attention effect	Splitting attention between the text and visual components	Off-loading	Can narrate the words in the animation
Increased demands on visual and auditory systems	Cognitive overload when both visual and auditory systems have increased demands.	Segmenting	To watch specific sections at a time and to allow for time in between the sections
		Pre-training	Let students know what to look for and learn about specific terms before the students watch the video.
Overload on both systems, along with the essential material, can be extraneous material	There is an overload on both the visual and auditory systems. Along with the specific content, there is external material as well.	Weeding	Eliminate the extraneous material. Narration must be concise and coherent.
		Signaling	This technique is appropriate when it is not possible to eliminate all the extraneous material.
Confusion in the presentation of the text and images	Confusion occurs when the on-screen text and images are not on the same page.	Proper alignment	Need correct alignment of the pictures with the words on the same screen
		Reduce Redundancy	Reduce the redundancy of the text on the screen, especially when there is narration involved.
Essential processing and representational holding	Trying to do the essential processing along with representational holding	Synchronizing	Combine the visual and auditory material within the presentation.
		Individualizing	Understand how each student holds the mental representations in the brain.

Note: Adapted table from "Nine Ways to Reduce Cognitive Load in Multimedia Learning," by R. E. Mayer and R. Moreno, 2003, *Educational Psychologist, 38*(1), p. 46

Techniques to prevent cognitive overload. Mayer and Moreno (2003) gave techniques on how to prevent cognitive overload while using multimedia learning. They gave nine suggestions of *offloading, segmenting, pre-training, weeding, signaling, proper alignment, reduce redundancy, synchronizing*, and *individualizing*. Many times, while a student is watching a video, they must split their attention between the visual and auditory stimuli. Therefore, the offloading strategy is for the students to concentrate on the images and listen to the video narration. The segmenting and pre-training strategies assist the student when there is too much information bombarding the auditory and visual systems while listening and watching a video. Segmenting involves only showing parts of the video at a time. After segmenting the videos, then pre-training occurs to indicate to the students what to look for while watching the video.

The strategies of weeding and signaling assist the learners in selecting the appropriate material to learn and, if possible, ignoring the extraneous noise. Weeding, according to Mayer and Moreno (2013), is the elimination of extraneous noise that involves the narration to be concise and clear so students can understand the narrative. For example, through a description, one would not have background music that causes problems for the student in understanding the material. However, if the instructor cannot edit the video, then the instructor uses the technique of signaling, where the instructor tells the students what to look for in the video. Mayer and Moreno suggested using arrows to show the students what to look at in the video.

Gardner and Wolfe's (2015) study gave an excellent example of the segmenting and weeding process when students watched the video on how to wash dishes. As the

students watched the 15 steps of the person doing dishes, they listened to the concise narration of what the person was doing. Then the students executed what the person did on the iPad. Furthermore, this concept of visual prompting supports the social learning theory (Bandura, 1977) in which students can learn things through observation.

At times, there may be confusion when students are watching a video in which the pictures do not correspond with narration or text or not on the same screen. To eliminate this confusion, Mayer and Moreno (2003) suggested the strategies of proper alignment and reducing the redundancy. Proper alignment involves the picture on the same screen, as in the text. If there are text and narration, one strategy of reducing the redundancy consists of eliminating the onscreen text and leaves the narrative with the images on the screen.

Finally, the last two strategies that Mayer and Moreno (2003) recommended in preventing cognitive overload are strategies of synchronizing and individualizing the information. These strategies are appropriate when students must process the data and hold this information within their working memory so they can recall what they saw in the video. Synchronizing combines the visual and auditory material within the presentation. Therefore, it is essential not to have the visual part of the display first followed by the auditory part of the presentation. Individualizing is the other strategy in which an instructor understands how each student can hold the mental representations in the brain. Therefore, the instructor utilizes differentiated instruction.

Dandashi et al. (2015) showed the importance of understanding children's capabilities in completing tasks and with their motivation. In this study, 77 children with

ID played interactive educational games to enhance their memory and math skills through physical activities by stepping on a mat on the floor, which corresponded to the tiles on the computer. Their study had three different levels of difficulty based on the child's eligibility status of mild, moderate, or severe intellectual disability. For example, if children had the eligibility of severe ID, they would play the games in Level 1, which only had four tiles. Level 3 was for children with mild ID and had 16 tiles. Dandashi et al. used two theoretical frameworks of Mayer's CTML and Skinner's behavioral operant conditioning model for their study. For the CTML, they focused their study on the audio and visual components in assisting the students with their selection, organization, and integration of what the children saw and heard in the games. When the children answered the questions correctly by stepping on the mat, the students received positive reinforcement by applause and words of encouragement (Skinner's theory). However, the students would hear a negative buzz when they had incorrect answers correct.

The results of Dandashi et al.'s (2015) study indicated that the children responded positively to the physical activity in doing the tasks by improving their cognitive skills and their motivational skills, as well. Dandashi et al. reported that 94% of the children had high motivational skills even though they may have done poorly on the games (p. 10). Additionally, 92% of the children had higher scores when they did the tasks a second time. Overall, their study showed that students did well in solving tasks by using a physical approach, which increased their cognitive skills. In looking at Bandura's triadic reciprocality (1986, 2018) or even, Ponton and Carr's (2012) version of triadic reciprocal causation (TRC), showed improved children's cognitive skills by manipulating the

environment and behavior. Furthermore, with an increase in the children's motivation to do the tasks, there will be a decrease in behavioral issues. Dandashi et al.'s study demonstrated how an instructor could individualize the program for students with ID.

The way that differentiated instruction can take place in the LL study is that through the LL app, the instructor can create a matching game with the letters and choose from four to eight matches. The instructor can also have the activities from matching Lively Letters to Lively Letters (visual representation of the letters) or matching Lively Letters to plain letters. Figure 4 shows a visual representation of the matching game for matching Lively Letters to plain letters.

Figure 4. A sample of the screenshot from the website of the matching game. Source: Reading with TLC http://readingwithtlc.com/livelylettersapp.html

Another way that the LL program prevents overloading the cognitive system is that the pictures of the letters are not overly distracting. For the letter "t," to show the production of the sound, the tongue is in pink and the teeth above it. Additionally, the mouth on the letter "t" shows the tongue placement behind the upper teeth. Figure 5 shows a visual representation of one of the LL cards.

Figure 5. A Sample of One of the Lively Letter Cards. Source: Basic Size Lively Letters: Lowercase Picture and Plain Letter Cards.

Anatomy of the Brain

Review of the Brain

It is essential to know the functions and anatomy of the brain to understand how students learn how to read. The cerebral cortex consists of the following lobes: frontal, temporal, parietal, and occipital. See Figure 6 for a visual representation of the areas of the brain. Even though there are many functions for each one of these lobes, the primary focus will be on reading. The features of the frontal lobe include attending to the tasks, memory that involves habits and motor activities (Lehr, 2015). For the temporal lobes, according to Lehr (2015), the functions include being able to hear, memory acquisition, and visual perception. Short-term memory loss occurs when there are problems involving the temporal lobes (Lehr, 2015). The functions of the parietal lobe include visual attention and incorporating the different senses in understanding concepts (Lehr, 2015).

According to Lehr, the problems that can occur involving the parietal lobes include reading difficulties and not attending to tasks visually.

Additionally, Pugh et al. (2013) analyzed the different parts of the brain used for phonological and auditory processing in the brain for students learning to read. The researchers found that various activities activate different parts of the brain. The areas of the brain activated while looking at printed words were the "left hemisphere temporoparietal and the occipitotemporal sites along with the inferior frontal, visual, visual attention, and subcortical areas" (Pugh et al., 2013, p. 173). Finally, vision is the primary function of the occipital lobe.

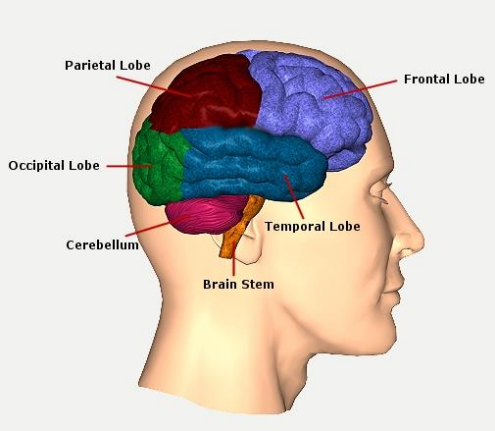

Figure 6. Visual representation of the areas of the brain. Source: Centre for Neuro Skills http://www.neuroskills.com/brain-injury/brain-function.php

Memory

One of the main components of being able to read is to have good phonological and working memory. Phonological memory is being able to recall the specific sounds that the letters represent. Therefore, phonological, short-term memory is being able to store within a short amount of time the distinctive phonological features for the sounds of

the letters (Soltani & Roslan, 2013). Working memory is when a person actively gets and processes the information (Owens, 2016).

Phonological memory. Phonological memory assists the reader in decoding (Channell et al., 2013). An example of decoding is when seeing the printed word for "bake," the person reading this word needs to know the sound the letters make and understands the letter pattern of "a"_"e" makes up the long vowel sound. In the LL program, this pattern of "a.."e" teaches this concept of the final "e" rule by telling the story of "King Ed." In the story, anytime "King Ed" sees a vowel that is in front of him within the word, for example, the /a/ in "bake," the king will ask the vowel its name and then becomes silent once the vowel states its name (Telian & Castagnozzi, 2020, p 50). Therefore, the students can recall what they need to do when they see this pattern of "a_e" as in the word "bake."

Additionally, Channell et al. (2013) found that when they compared students with ID to their TD peers matched on their verbal ability, the students with ID scored lower on word recognition and phonological decoding than the TD group. Furthermore, the students with ID scored lower in the areas of phonological awareness and phonological memory when compared to the TD group. Likewise, Soltani and Roslan (2013) found a significant correlation with decoding abilities for all three areas - phonological awareness, short-term phonological memory, and rapid automated naming (RAN). They found by using regression analysis and by controlling for IQ that the two primary skills for decoding are phonological awareness and RAN.

Phonological short-term memory does contribute to decoding under the realm of phonological awareness. Channell et al. (2013) also noted that phonological memory has a crucial role involved in reading acquisition. Furthermore, phonological memory deficits are just not limited to native English speakers. Researchers have conducted studies with students with ID speaking Persian (Soltani & Roslan, 2013), and German (Schuchardt, Maehler, & Hasselhorn, 2011). Like students who speak English, these students had a difficult time with their phonological memory skills when speaking their native language.

Working memory. Lemons, Allor, Al Otaiba, and LeJeune (2016) reported the importance of students needing a good working memory to read. According to Mayer (2005), working memory is a two-fold process. First, a person needs to temporally hold the information that is coming in via auditory or visually, and the second part of the process is what Mayer (2005) called "active consciousness," which involves the person manipulating the information or knowledge.

Foundations of Reading

Learning to read is a difficult process. A successful, independent reader integrates the orthography, phonological awareness, and semantics of the words (Kaefer, 2016). Additionally, a person must have RAN (Hulme & Snowling, 2014). For students with ID, they have cognitive challenges that interfere with their progress in learning to read (Connor, Alberto, Compton, & O'Connor, 2014). As a review, phonemic awareness is the understanding that when a person is speaking, the individual sounds also called phonemes to make up words (Owens, 2016). Phonological awareness encompasses the components of phonemic awareness, syllabication, and rhyme (Owens, 2016).

Orthography deals with the spelling of words that utilize alphabetic letters in which signify a speech sound (Caravolas et al., 2013). In summary, students need to take all these skills and be able to incorporate them into learning how to read.

An additional factor that hinders students in learning how to read in English is because English does not have a consistent orthography in which the standard rules do not always apply. For example, in English, when students read the word “raspberry” aloud, if they wanted to follow the rules, they would say the consonant blend (CB) of “sp.” However, this is not the case when pronouncing the word aloud; the pronunciation of the word “raspberry” is with a “z” sound and not with an “sp” sound. Another example of how reading and speaking in English are different is when a person reads “pa**c**^{1}ifi**c**^{2} o**c**^{3}ean.” A person learning to read in English for the first time would expect to read all three “c”s as a hard “c” sound, in other words, the /k/ sound as in the word “cat.” However, the first c^{1} is pronounced as a /s/ sound, the second c^{2} is pronounced like the /k/ sound, and the c^{3} is pronounced as a /sh/ as in the word “shoe.”

Likewise, there is an inconsistency with the production of vowels, as well. In English, there are long and short vowels for the “a,” “e,” “i,” “o,” and “u,” and readers need to know when to use the long vowel sound or a short vowel sound. One such example was with the “King Ed” that dealt with the final “e.” Additionally, students learning how to read need to know how to handle the vowels when two are adjacent to each other. For example, in the word “boat,” one reads it as a long “o” sound and does not pronounce the “a.” Another example with the inconsistency of vowels is when the word has a double “oo” as in words, “boot” and “book.”

Finally, there is the agreement that the primary skills of phoneme awareness, letter knowledge, and RAN play a vital role for students in being able to read. However, the importance of these roles differs depending upon the consistency of the alphabetic orthography. In Spanish and Czech languages, there is consistency, but there is inconsistency in the English language. For example, Caravolas et al. (2013) in their longitudinal study, analyzed the orthographies in three different languages (English, Spanish, and Czech) to see if there is a difference in how students learn how to read in their native languages. From their study, they found that for English speaking, students showed slower growth in being able to learn how to read. For all three of these languages, the students used phoneme awareness, RAN, and letter knowledge. However, the difference was with letter knowledge. In the initial reading levels, for the consistent orthographies, the students relied on letter knowledge to assist them in learning how to read were in English; this was a weaker predictor in being able to learn to read.

Students with ID had lower scores when compared to TD students on word recognition, phonological decoding, phonological awareness, and phonological memory. However, students with ID can still learn these skills.

In contrast, van Tilborg, Segers, van Balkom and Verhoeven (2014, 2018) found that students with ID and who spoke Dutch had different results. In their 2018 study, their study focused on analyzing the early literacy skills among students with ID and students with normal language acquisition (NLA). They had a sample size of 53 children with ID aged six years of age and 74 peers with normal language acquisition. Their study found that students with ID did not use phonological awareness to decode words like their NLA

peers but used their nonverbal reasoning skills. They indicated the following important points that (a) students with ID may not have had the skills yet to do phonological awareness or (b) did not apply these skills (p. 8). Additionally, from their study there was a direct relationship with the students with ID with their rapid naming skills predicted their letter knowledge. Overall, that nonverbal reasoning skills predicted phonological awareness and word decoding skills.

Channell et al. (2013) suggested that instructors needed to focus phonological skills to assist students with ID in increasing their word recognition skills. Likewise, Dessemontet and de Chambrier (2015) stressed the importance that along with phonological awareness training, there needs to be explicit phonics instruction as well for students with mild to moderate ID to learn how to read. Furthermore, Van Tilborg et al (2018) reported that educators need to teach phonological awareness skills.

Factors Influential in Learning to Read

Amount of Time

Students with ID can learn the skills of phonics, phonemic and phonological awareness but takes an extended amount of time to learn them (Allor et al., 2013; Allor et al., 2014; Dessemontet & de Chambrier, 2015). Therefore, from this increase in time for students to learn the foundations in reading, specifically phonological and phonemic awareness, instructors must make the activities meaningful for their students. Having meaningful activities for the students supports what Bandura (1977 stated about the motivation that students need to have to learn.

Behavioral Issues

The second factor that may influence some students with ID in learning to read is the possibility of behavioral issues. These behavioral issues can occur because of the length of time it takes for students with ID to learn the foundational skills involved in reading. As a review, these foundational skills consist of phonemic awareness, phonological awareness, and phonics. Behavioral issues that may occur are inattention, difficulties with dealing with other peers, and noncompliance in doing the tasks (Allor et al., 2013; Allor et al., 2014). Additionally, Dandashi et al. (2015) indicated that students with ID often have difficulty with their social adjustment in which they can be aggressive, struggle with their self-esteem, and be emotionally imbalanced. Therefore, instructors can avoid some of the behavioral issues that occur by being proactive in dealing with these behaviors by providing an individual behavior plan for their students.

Strategies to Deal with Behavior Issues

This next section discusses the different approaches that an instructor can use in the classroom to avoid many of the behavioral issues that can occur. Some of the strategies that an instructor can use include visual schedules, token boards, positive reinforcement, frequent praise, and changing the activities.

Visual schedules and token boards. Visual schedules allow the student to know what is coming next within the lesson (Spriggs, Mims, van Dijk, & Knight, 2017; Zimmerman, Ledford, & Barton, 2017). The student will know how many activities there are and be able to progress to each task. Token boards are an excellent visual representation of what the students designated as their preferred activity after they

complete the given task. After each activity, the student can earn points or receive a token to put on the token board. The benefit of using visual schedules and token boards is that they save time for instructors by combing the two strategies. Instructors can put small icons of the tasks to be completed and the desired activity chosen by the student after completing each task. Through this combination, students see what they are working for and how many tasks the students need to complete.

Praise and positive reinforcement. Other essential techniques that many teachers are already doing, but still needs mentioning are praising their students often and using positive reinforcement (Allor et al., 2013). It takes time for students with ID to grasp the concepts for the foundations of reading. Positive reinforcements consist of students doing their favorite activity after they complete the task. Furthermore, based on Bandura's (2001) social cognitive theory, students have to be motivated to learn, and reinforcement is critical for motivating students. Therefore, through reinforcements, there is increased motivation for students with ID to learn to read.

Just by praising their students and using positive reinforcement, teachers can eliminate many behavioral issues that may occur. By recognizing the skills that the students have and meeting their individual needs, the students will be able to attend to the tasks more efficiently (Allor et al., 2013). Overall, by instructors being proactive by using these behavioral strategies, they are then able to teach these foundational skills. In short, not only will it be enjoyable for the students but also the instructors, as well. Equally important is the style of how the instructor teaches these skills.

Style of instruction. According to Allor et al. (2013), it is vital to have a behavioral modification plan for students with ID such as the activities are fast past, the tasks at a fast pace, with a short time frame, and highly motivating. Therefore, since it does take time and multiple repetitions for many of the students with ID to learn how to read, they may become bored in learning these foundational skills. Another way to teach these foundational skills is in a naturalistic environment. Hansen, Wadsworth, Roberts, and Poole (2014) explored this concept of teaching phonological awareness skills in a naturalistic setting. This naturalistic environment in their study was with students in kindergarten who were playing. The researchers taught phonological awareness skills while children with ID and developmental disabilities played. The researchers focused on the specific skills of syllable segmentation, first sound identification, and phoneme segmentation. From their study, all the kindergarten children made gains in all of the areas. Therefore, by recognizing the skills the students have and meeting their individual needs, the students will be able to attend to the tasks more efficiently (Lemons et al., 2016). In summary, the style of teaching these skills is vital to eliminate any behavioral issues that may arise because of the extended time it takes to teach these fundamental reading skills.

Additionally, there is an added benefit for students with ID to be able to choose their activities. The ability to choose not only will assist with compliance with learning the tasks to read but will also help them later in life. Curryer, Stancliffe, Dew, and Wiese (2018) found that when adults with ID can make choices, there is a direct relationship with their confidence in being able to control some areas of their lives (p.196).

Learning to Read Among English Language Learners (ELLs)

As a review, ever since the passing of NCLB, students who are ELLs qualified for more special education services. According to Artiles et al. (2005), this increase in qualifying for special education services was because ELLs no longer received native language support. In a more recent study, Sullivan (2011) reported that there continues to be a disproportionate number of ELLs identified as having an intellectual disability (ID) more so than their monolingual Caucasian students have. Teaching reading to students who do not have English as their primary language is that many sounds may not occur within the student's native language. For example, the sound of /th/ as in the word "the" does not occur in Spanish.

Even though there are more ELL students identified as having ID, there has been little research about reading skills for students with the dual status as an ELL student identified with mild ID. In a review of the research, Reed (2013) analyzed the effects of sight-word instruction with a picture fading design versus a phonics approach in teaching students to read. Reed found that the students did well from both explicit phonics and sight-word instruction and were able to read novel words, which increased in complexity.

In a more recent study, Chai, Ayres, and Vail's (2016) study focused on teaching phonological awareness using the iPad to ELL students with disabilities. Even though their sample size was small (three students), the students made progress in identifying the initial phonemes even three weeks after the completion of the study. The three students were able to maintain the majority of their skills. They were also able to write down their targeted phonemes.

Lively Letters

The reason the LL research-based program is potentially an effective tool for teaching students with ID the ability to read is that it is a multisensory program. This multisensory program utilizes physical movement, imagery, music, and mnemonics (Telian & Castagnozzi, 2007, 2020). In 1990, Telian developed the LL program and focused on the foundations of reading by using a phonemic and phonics approach. Research showed that LL was successful with students with a variety of eligibilities such as "cognitively delayed, visually impaired, bilingual, language impaired" and students with dyslexia (Telian & Castagnozzi, 2007, p. 91). Williams, Hall, Garrison, Viswanath, and Petersen (2014) analyzed the LL program for students in a general education kindergarten classroom there were 15 students in the experimental group and 15 students in the control group. Both classes received a general education reading literacy program. The experimental group which received the multisensory LL program had 20 sessions consisting of 30 minutes of the supplementary instruction. For the first four sessions, the LL lessons were the whole group, and then for the last 16 lessons consisted of 10 minutes in a whole group activity of reviewing the letter sounds and then small group lessons for the remaining 20 minutes, which focused on encoding and decoding activities. In the small group sessions, the students were paired on their ability level. The results were that there was a significant statistical difference in all areas (letter sounds, diphthongs, nonsense words, and total language score) when compared to the control group.

In a more recent study, Quinney (2018) analyzed the effects of teaching phonemic awareness to eight preschool students who had autism using the LL program. The central

purpose of the study was to see if teaching the LL program was a beneficial tool for preschool students with autism in learning how to read through a multisensory approach. The results of Quinney's study indicated that preschool students improved with their phonemic awareness and phonics skills. Another advantage of using the LL program was that the students showed improvement with their speech sound production. Since it was a qualitative study, the two instructors indicated that it was essential to teach students the foundations of phonemic awareness and phonics at the preschool level. The instructors also reported that the LL program is an appropriate tool to teach these foundational skills in learning how to read because it utilizes a multisensory approach.

Conclusion

The focus of the literature review was to show that students with ID could learn to read by using a phonemic and phonological awareness approach. Before the passing of NCLB (2001), students with ID used the sight-word recognition approach. The reasoning behind this approach was that students with ID had good visual processing skills. However, with the passing of NCLB, students were now required to take the mandated testing. The problem with the sight-word recognition approach was that students did not learn novel words and the sounds of each letter for them to become independent readers. To meet the directives of NCLB and ESSA, researchers found that students with ID could learn the skills of phonemic and phonological awareness and even phonics but took an extended amount of time to learn them.

Therefore, to teach phonemic and phonological awareness and even phonics, instructors could use the research-based LL program. Since students with ID do have

phonological and working memory issues, this program strengthens their memory skills through this multisensory approach. Furthermore, the imagery component of this program incorporates the strengths of visual processing skills that students with ID have.

Additionally, instructors can best support their students in teaching these skills by understanding and using the theoretical foundations of Bandura and Mayer. The social cognitive theory (Bandura) deals with people learning through observations and modeling. Within the LL program, observations and modeling occur to teach the different sounds of the letters. LL also incorporates Bandura's (1986) concept of "triadic reciprocality" that consists of behavior, cognition, and environmental events, with all three interacting with each other. By using this program, instructors can capitalize on the environmental aspect of teaching reading by using the multisensory approach. As a result, the students with ID will not have the behavioral problems that may occur in learning new tasks and ultimately increase their cognitive skills in learning the tasks involved in learning to read.

The rationale for Mayer's CTML is that LL utilizes a multisensory approach to teach phonemic awareness and phonics. Mayer also stated the importance of preventing cognitive overload for students while using multimedia devices. The gap addressed in this study is to see if a multisensory approach in learning how to read is beneficial for students with ID in a self-contained program. The social change hypothesized to occur in teaching students with ID the LL program is that they may become independent readers. Through reading, it may assist them not only while they are in school but also be successful in reading community-based information, as well. Chapter 3 will go into the

methodology on how I conducted the study for students with ID in a self-contained classroom.

Chapter 3: Research Method

The purpose of this study was to analyze whether LL, a researched-based program, was a useful tool for teaching students with ID in a self-contained LIF self-contained classroom to read novel words. LL incorporates phonics and phonemic awareness through a multisensory approach. This chapter consists of the following major sections: research design and rationale, methodology, threats to validity, and the ethical issues involved in doing this study.

Research Design and Rationale

Research Design

The research design is a quantitative, pre-experimental pretest-posttest design based on its appropriateness for analyzing the four research questions for this study. Additionally, all the students who were in the self-contained LIF self-contained classrooms received the LL program. The students took the CORE Phonics Survey (Diamond & Thorsnes, 2008) to serve as the pretest and posttest. The inclusion criterion was participation in the LL program. The independent variables were (a) the language ability (monolingual or bilingual), (b) the students' severity of their ID (mild, moderate, or severe), and (c) the student's grade. The dependent variable was the results of the post-assessment from the CORE Phonics Survey.

Benefits of the Pre-experimental Design

The advantage of doing a pre-experimental design is that it allows researchers to obtain information when other research designs may not be feasible (Frankfort-Nachmias, Nachmias, & DeWaard, 2015). This type of design was appropriate for this

study because the participants in this study are a vulnerable population because they were children and have ID. There is no random assignment because all of the students received the LL program. However, there are limitations to using this type of design.

Limitations of the Pre-experimental Design

There were disadvantages to doing a pre-experimental study. Frankfort-Nachmias et al. (2015) reported that pre-experimental designs are weak in the areas of validity (both internal and external) and that researchers cannot make causal inferences from their research results (p. 117). Even though for this study, it was best not to have random assignment because of the participants in the study, the limitation was that without random assignment the results of the study could not be generalized. Therefore, the interpretation of the results from this study were limited by this design.

Time Constraints

There were time constraints in doing this study. This type of design relied on teacher-student interactions and because of this, I had to work within the time constraints of the school year. Specifically, the interventions and assessments occurred during class time and I had to consider the holidays that occurred in the fall and spring semesters.

Methodology

Population

Overall, according to the data for the SD, 2,648 students had some form of intellectual disability from pre-kindergarten through high school. These students were in a variety of self-contained programs, receiving services at home, or were in the general education classroom and receiving services from the resource special education teacher.

The specific population for this study consisted of elementary students who had the eligibility of ID. Therefore, I removed the students from middle schools (junior high) and high schools, which brought the number of students with ID at the elementary school level to 1,225 students. See Table 3 for a breakdown of the specific programs and eligibilities for students with ID at the elementary school level.

Table 3

Specific Programs and Eligibilities Intellectual Disabilities or Multiple Impairments as a Primary Disability

Programs	ME	MU	Total
Autism	32	32	64
Deaf and hard of hearing (DHH)	0	1	1
Early Childhood Hearing Impairment (ECHI)	4	5	9
Early Childhood Inclusion AM (ECIA)	2	0	2
Early Childhood Inclusion PM (ECIP)	2	0	2
Early Childhood KIDS Program (ECKD)	3	3	6
Early Childhood Special Class AM (ECSCA)	49	27	76
Early Childhood Special Class PM (ECSCP)	28	13	41
Functional Life Skills FS	48	91	139
Home	2	20	22
Life Skills (LIF)	354	69	423
Specialized Diversely Challenged (SDC)	11	7	18
Social/Emotional Teaching and Reinforcement (STAR)	10	2	12
Specific Learning Disability (SLD)	146	18	164
Special Schools (SS)	30	214	244
Visual Impairment Program (VI)	0	2	2
Total	721	504	1225

Note. ME=Intellectual Disability; MU=Multiple Impairments

When specifically looking at the students who were in the LIF self-contained programs, there are 354 students with the primary eligibility of ID (ME) and a total of 69 students with the primary eligibility of multiple impairments (MU) with a total of 423

students. MU includes ID and other eligibilities, for example, health impairment, traumatic brain injury, and vision impairment.

Sampling Size and Sampling Procedures

The best sample strategy for this study was cluster sampling (Frankfort-Nachmias et al., 2015). There are two main groups for this study, the monolingual and bilingual populations who have ID, which can also be broken down into groups of the students who have the eligibility of mild, moderate, or severe ID. The other types of probability samples, which consist of the simple random sample, systematic, and stratified, would not have worked for this study because I had to break the populations down into further smaller groups such as grouping the participants by grades or the severity of the students' eligibility of mild, moderate, and severe intellectual disability (see Figure 6). There was the possibility of not being able to control all the situations that may arise.

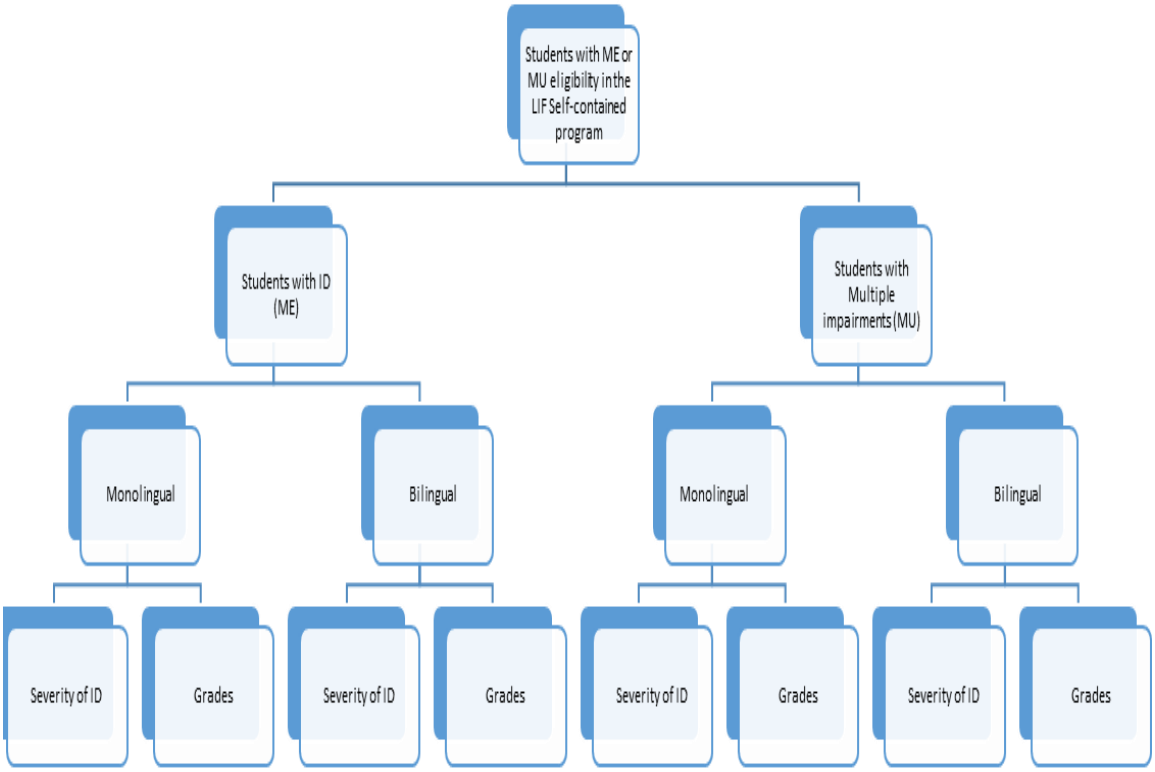

Figure 7. Breakdown of the groups for students with ID.

Because this study focused on students in LIF-skills self-contained programs, the total number of students was 428. The population for this study includes 357 students with the primary eligibility ME and 71 students with the eligibility of MU. In order not to discriminate the students with MU within these LIF self-contained programs, they too were included in this study. There are 30 elementary schools that have the LIF self-contained programs. For a breakdown of the schools and eligibilities, see Table 4. Additionally, there may be students with an eligibility besides ME and MU enrolled in the LIF-skills self-contained program. for the following reasons:

- A student's eligibility does not drive placement to where a student will be enrolled at a school. Case management looks at the individual educational

plans (IEPs) and places the student where the student will succeed best. For example, in this study, there was a student with autism. The SD does have self-contained autism programs. But this student was placed in the LIF Skills program.

- Additionally, there were students with developmental delays because the SD eliminated specialized kindergarten classrooms. Therefore, since the start of the 2017 -2018 school year, students who were kindergarten age would transition into regular kindergarten classrooms or in a self-contained program.

Table 4

Students in the LIF Self-Contained Programs

School	ME	ME + 2nd eligibility	MU	MU+2nd eligibility	Total
1	2	0	0	4	6
2	15	4	1	2	22
3	25	4	1	1	31
4	9	0	1	2	12
5	10	0	1	0	11
6	16	1	0	2	19
7	6	3	0	1	10
8	15	1	3	2	21
9	4	3	0	1	8
10	1	0	0	0	1
11	13	0	1	2	16
12	8	0	0	1	9
13	20	0	0	3	23
14	12	0	0	1	13
15	9	0	0	2	11
16	13	6	0	2	21
17	2	0	2	1	5
18	6	1	0	1	8
19	17	6	2	3	28
20	16	1	0	4	21
21	16	3	2	1	22
22	11	1	1	3	16
23	1	0	0	0	1
24	8	2	1	1	12
25	4	2	0	1	7
26	16	1	3	2	22
27	14	3	0	2	19
28	7	1	0	1	9
29	1	0	0	0	1
30	13	1	1	3	18
Total	310	44	20	49	423

Note. ME = Intellectual disability; MU = Multiple impairments.

According to the RAOsoft sample size software, to have an effective sample size with a population size of 423 with a margin of error of 5% and a confidence level of 90%, I needed 202 students.

A qualitative design was not feasible for this study because the subjects within this study are elementary school children with ID. I would not have been able to ask the students their opinions about the study because some of the students have limited expressive language abilities. The primary purpose of this study was to see if the LL program is an effective means to teach children with ID in learning how to read in the LIF self-contained classrooms.

Procedures

I received approval from the principals at the elementary schools, after I received Institute Review Board (IRB) approval from Walden and the SD. The instructors received a demographics data sheet on which they filled out their students' eligibility, grade, and ELL status.

Eligibility. I needed to determine the eligibility of the students who were in the LIF self-contained classrooms since a student's eligibility does not drive placements for the student to be in the self-contained LIF classroom. Additionally, I had to know if the student's eligibility was ME or MU (see Table 6). Furthermore, all of the students in the self-contained received the LL program.

Grades. Students in the LIF self-contained classrooms have three different grade levels. For example, in the primary classroom, the grades consisted of students in

kindergarten up to second grade. For the intermediate classes, the grades consisted of third through fifth.

ELL status. Additionally, the instructors specified which students were bilingual or monolingual. The assessment to verify a student's proficiency in English is the WIDA (2014) – Alternate ACCESS. This assessment is for students who have a dual status of being an ELL and have significant cognitive impairments. The assessment evaluates the student in four language areas: language, speaking, reading, and writing. Then the child receives a level of English proficiency for each one of these language areas. The levels go from Initiating (Level A1), where students are just beginning to learn English to the level Developing (P3).

Intervention from the Instructors

Lively Letters program. There are five reasons why I chose the LL program to teach students with ID the foundational skills in learning how to read. First, Telian (1990) developed the LL program, which focused on the foundations of reading by applying a phonemic and phonics approach. This program used a multisensory approach, which consisted of physical movement, imagery, music, and mnemonics (Telian & Castagnozzi, 2007, 2020). Secondly, research showed that LL was successful with students with a variety of eligibilities such as "cognitively delayed, visually impaired, bilingual, language-impaired" and students with dyslexia (Telian & Castagnozzi, 2007, p. 91). Another advantage of doing this program was that the instructor could adapt the program to meet the needs of the students and not the students attending to the needs of the LL program. Furthermore, this program can enhance the students' memory through the

multisensory approach. Since students with ID often have phonological and working memory issues (Channell et al., 2013) and do better with visual cues (Lemons et al., 2017). Finally, in using the LL program, the instructor was able to decrease the behavioral issues by keeping the attention of their students by using the many different activities that the program provides. For these reasons, the LL program was the best option to teach students with ID the ability to learn the foundational skills of reading by learning phonics and phonemic awareness through a multisensory approach. The next section discusses the LL program in detail.

Procedure for the Lively Letters program. During the first week of doing the LL program, instructors gave an overview of the anatomy involved in speaking and will introduce the first two letters of /p/ and /b/. The only difference in saying the /p/ and /b/ sound is voicing. Instructors explained that the /p/ sound is a quiet (voiceless) sound and that the /b/ sound is voiced. According to Tellian and Castagnozzi (2007, 2020), the reason for linking similar sounds together is to eliminate the possible confusion that may occur if the sounds are introduced separately. Telian and Castagnozzi (2007,2020) suggested the following sequence for teaching the consonants and vowels: “p, b, t, d, f, v, k, g, qu, th (voiceless), th (voiced), a, o, m, n, ng, l, r, u, s, z, sh, zh, ch, j, i, w, wh, h, x, y, e, King Ed, oo/ oo, ou, ow, au, aw, oy, oi, er, ir, ur, or, ar, c, soft g, and other vowel pairs” (p. 11). The progression through the program introduced the students with 10-11 consonant sounds before introducing a vowel sound. A student had to obtain 90% accuracy before advancing to a new sound.

The specific order to teach vowels are the following: “a, o, u, i, and e” (Telian & Castagnozzi, 2007, p. 14). Telian and Castagnozzi explained that the rationale behind this specific order for vowels is to eliminate frustration for the student because the vowels go from the easiest production to the most challenging production. Additionally, instructors taught short vowels first. Once the students were proficient with the vowels, tracking was the next step. For example, the instructor took the consonant and vowel sounds and put them into words so the student could decode (read) the words or another task was for the student to encode (spell) the words. Initially, the words were short-vowel words that consisted of consonant-vowel-consonant (CVC) or vowel-consonant (VC) words. The skills needed in learning how to read are rapid automated naming, phonological awareness, and phonological- short-term memory skills (Solatni & Roslan, 2012). The LL program supports this research. One of the critical components of the LL program is that it allows a lot of practice in learning these sounds so the students can state the letter sounds automatically.

Schedule. Instructors gave the lessons for 45 minutes four to five times a week. In this time frame, the first 5-10 minutes were a whole group activity, which consisted of introducing and reviewing the letters of the week. After the whole group, the students were in two to three small groups doing different activities to learn the new letter sounds of the week. After five minutes, the students went to the next center and do the next activity. The rationale for doing 5 minutes is that it is essential to have the tasks at a fast pace, with a short time frame, which promotes student engagement (Allor et al., 2013). The study could have ranged from 8-12 weeks, the specific amount of time to do this

program varis depending upon how quickly the students learn their sounds because the instructor can adapt the program to meet the needs of the students and not the students meeting the needs of the LL program.

Instrumentation

To assess the validity of the LL program, instructors assessed their students with the CORE Phonics Survey (Diamond & Thorsnes, 2008) individually to each one of the students. The Core Phonics Survey evaluated the students' knowledge of their skills of knowing the alphabet, the letter sounds, along with their reading, and decoding skills. There were pre and post-tests. The pre-assessment took place one-two weeks before the LL program. Then the post-assessment took place one-two weeks after the study ended.

CORE Phonics Survey. The pre-assessment and the post-assessment consisted of giving the students the CORE Phonics Survey (Diamond & Thorsnes, 2008). The CORE Phonics Survey assessed the students on their skills in knowing the alphabet, the letter sounds, along with their reading and decoding skills. There are two main sections. The first section deals with the student being able to label the upper and lower-case letters. This section also has the student stating the sounds for consonants, long vowel sounds, and short vowel sounds. The second section deals specifically with reading skills and is broken down into eight subsections. In these sections, students need to use their skills to decode words that consist of 10 real words and five pseudo-words (not real words). These eight subsections address the following areas:

1. Short vowel in consonant-vowel-consonant (CVC) words an example of this is the word "sip."

2. CB with short vowels. An example of the type of words is “stop.”
3. Short vowels, digraphs, and -tch trigraph, examples of these are “when,” “dodge,” and “match.”
4. R-controlled vowels: an example of this is the word “harm.”
5. Long vowel spellings: an example of this is the word “tape.”
6. Variant vowels, an example of a variant vowel is the word “few.”
7. Low-frequency vowel and consonant spellings, an example of this is the word “kneel.”
8. Multisyllabic words (pp 44-48)

The survey becomes progressively harder for students to read because they have to know how to apply the rules for specific sounds.

The developers of the CORE Phonics Survey did not have in their manual the construct and content validity, nor the test-retest and interrater reliability. However, Reutzel, Brandt, Fawson, and Jones (2014) conducted a study of using 592 K-3 elementary school children in two SDs in the Western part of the United States to obtain the validity and reliability of using the CORE Phonics Survey. Out of the 592 students, 80 were ELLs, and 47 students had special services, the researchers did not indicate what these special services were.

For the test-retest reliability, the researchers used a random sample of 170 K-3 students receiving the CORE Phonics survey with a separation of two weeks. Test-retest descriptive statistics and Pearson ’s *r* coefficients indicated that the Pearson’s *r* correlation coefficients by grade level were the following: K = .95, 1^{st} = .91, 2^{nd} = .94,

and 3rd = .95 (p. 58). The results indicated that the CORE phonics survey has good test-retest reliability.

Data Analysis Plan

For this study, I used the most current SPSS Statistics 25 (IBM, 2017) program version to analyze the data. To effectively analyze if the LL program is a valid tool to teach monolingual and bilingual students with ID the ability to read, the four questions guiding this study were as follows:

RQ1: Does the LL program improve Phonological Awareness (PA) skills for students with ID in a self-contained classroom?

H_o1: The LL program does not improve PA skills for students with ID in a self-contained classroom.

H_A1: The LL program significantly improves PA skills for students with ID in a self-contained classroom.

RQ2: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's language ability (monolingual or bilingual)?

H_o2: There is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's language ability (monolingual or bilingual).

H_A2: There is a significant difference statistically in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in

the LL program based on the student's language ability (monolingual or bilingual).

RQ3: Is there a difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe)?

*H*o3: There is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe)?

H_A3: There is a significant difference statistically in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL based on the student's severity of his or her intellectual disability (mild, moderate, or severe).

RQ4: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade?

H_o4: There is no difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade.

H_A4: There is a significant difference statistically in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade.

Coding

The following coding was used to clean the data: I assigned the following numbers for the results of the CORE Phonics survey and filtered them out for the final analysis in SPSS:

- 995 – Absent after the winter break, one student was ill and was unable to complete the post-assessment,
- 996 – Did not test this is because the section was too difficult for the student,
- 997 – No response.
- 998- Withdrew from class
- 999- Non-Verbal

Statistical Tests to Analyze Research Questions

For research question one, the analysis consisted of a pre-test – post-test design using a repeated dependent t-test sample.

Variables. The variables were the results of the pre- and post-assessments of the CORE Phonics Survey.

Assumptions. There are four assumptions in doing this type of analysis: (a) the dependent variable was measured on a continuous scale, (b) the independent variable needs to have two categorical related or matched groups, (c) no significant outliers, and (d) distribution of the differences in the dependent variable between the two related groups should be approximately normally distributed (Lund Research, Ltd.,n.d., para 5-10).

For research questions two through four, the analysis was conducted using a repeated measure ANOVA design.

The benefits of using a repeated measures design are the following:

- The subjects in the study are the same therefore reduces variability (Howell, 2013)
- The researcher can have fewer subjects (Minke, 1997)
- Is more sensitive to pick up on the effects of the study (Field, 2018)

Repeated Measures Assumptions. There are five assumptions for the repeated measure ANOVA design. These assumptions include the following: (a) the dependent variable is measured on a continuous scale which is an interval or ratio level; (b) The independent variable needs to have two categorical, independent groups; (c) there are no significant outliers; (d) the dependent variable needs to be approximately distributed for each group of the independent variables; and (e) there is sphericity – the variances of the differences between the combinations of the groups need to be equal (Lund Research, Ltd., n.d.b, para 5-10).

Variables for Question 2. The variables were the results of the CORE Phonics Survey scores pre- and post-assessments, considering the students' language ability.

Variables for Question 3. Variables were the results of the CORE Phonics Survey scores pre- and post-assessments, considering the students' severity of their intellectual disability (mild, moderate, or severe). Additional variables were if the student's eligibility is ME or MU and the student's language ability.

Variables for Question 4. Variables were the results of the CORE Phonics Survey scores pre- and post-assessments, considering the students' grade level. Additional variables were the student's eligibility of ME or MU and the student's language ability.

To meet the main assumptions and what to do if there was a violation of these assumptions, see Table 5.

Table 5

Tests for Assumptions and Tests and Nonparametric Alternatives

Research Questions	Data Analysis	Assumptions	Test for assumptions	Test if in violation of Assumption
1	Pre- test-Post-test design using a dependent t-test	No significant outliers	Checking to see if the *z*-scores do not have a value of 3.29 or do a histogram	Winsorizing
		Distribution of the differences in the dependent variable	Shapiro-Wilk test	Non-parametric Wilcoxon
2, 3 and 4	Repeated Measure ANOVA design	No significant outliers	Checking to see if the *z*-scores do not have a value of 3.29. or I can do a histogram	Winsorizing
		Dependent variable approximately distributed	Shapiro-Wilk - significance is greater than 0.05, then the data are normal. If it is below 0.05, then it deviates from the normal distribution.	Non-parametric test Wilcoxon
		Sphericity	Mauchly's test of sphericity	Greenhouse-Geisser or the Huynh-Feldt

Sources: A Field 2018; Lund Research, Ltd. (n.d.- a, b)

Role of the Researcher

My role as the researcher in this study was as follows: (a) answering any of the questions or concerns the instructors had in implementing the program, (b) received the de-identified data from the instructors, and (c) cleaned and analyzed the data into the SPSS software program.

Threats to Validity

Threats to External Validity

To handle the threats to external validity, I made sure that I expressed in my study that the results were only for the LIF self-contained classrooms for students with ID. I could not make any assumptions that the results I received from this study would transfer to future studies and get the same results. The population for this study was monolingual and bilingual elementary school students with ID in the LIF self-contained classrooms in a single SD. Therefore, I cannot say that results from this study would have the same results for other schools and for other SDs.

Threats to Internal Validity

I evaluated the threats to the internal validity of this study. According to Creswell (2014), there are ten possible threats to the internal validity in research. These threats consist of "history, maturation, regression, selection, mortality, diffusion of treatment, compensatory resentful demoralization, compensatory rivalry, testing, and instrumentation" (Creswell, 2014, pp 174-175). The possible threats to this study that I considered were the following:

- Mortality - the primary internal threat in which I could not control was the one of mortality. This threat involved the participants within the study dropping out. I had two possible solutions for this if students withdrew from the study. Creswell (2014) mentioned the possibility of comparing these students to those who completed the study. Another option was that I could report on how well the student was doing with the LL program up to the point that he or she dropped out.

  Additionally, an additional feature of the LL program was the LL APP, in which the students could receive extra practice on the iPad. I could collect the data that the student completed on the iPad. I would not be able to include the students with the other students' results, but I could mention the individual results for the students who dropped out of the study.

- Maturation – is the case of the participants involved in the experimental design maturing or changing, which could influence the results. According to Creswell (2014), one way to handle this situation was to choose participants that were about the same age. For this study, the participants were all in the self-contained LIF self-contained classroom. Additionally, I did not believe that the participants would meet maturation. The reason was that students with ID can learn the skills of phonics, phonemic and phonological awareness but takes an extended amount of time to learn them (Allor et al., 2013; Allor et al., 2014). Furthermore, to address this issue, instructors gave the pre-post assessments using the CORE Phonics Survey.

- Regression – could occur when a participant in the study started with a high score, and then during the study, the score decreased. Creswell (2014) reported that "(s)cores over time regress towards the mean" (p.174). For this study, the students within the LIF self-contained classroom were not readers. However, since it does take an extended amount of time to learn the foundational skills for reading, I needed to consider the possible behavioral issues that could occur, which ultimately could lead to the students not doing well on the CORE Phonics Survey. Behavioral problems that may arise were inattention, difficulties with dealing with other peers, and noncompliance in doing the tasks (Allor et al., 2013). However, to avoid these behavioral issues, Allor et al. (2013) recommended having the activities at a fast paste to ensure student engagement.
- Selection – to control the internal threat of selection bias, the participants in this study was to take a census of the elementary school LIF self-contained life-skills programs and have an eligibility of ME or MU.
- Testing – involved the students learning the tests and remembering them in future assessments. For this study, instructors gave the CORE Phonics Survey at the beginning and end of the study. Furthermore, instructors continued to use the ULS in which the students received monthly exams. This study had no control groups.

Ethical Considerations

Since this study took place at elementary schools, I needed to follow the guidelines to ensure the safety of the students. To ensure this safety, I took the following steps. First, I sent my proposed study to the IRB and received permission in doing the research and followed the recommendations that the IRB had in doing this study. The IRB approval number for this study was 07-17-19-0248262. I also received approval from the SD's IRB committee.

Security of information. To ensure confidentiality, I stored all the data that the teachers emailed me such as the results of the CORE Phonics assessments in a locked filing cabinet so unauthorized persons will not be able to see the results. Furthermore, the information on the computer that I used was password-protected, and I changed the password every three months. I will destroy the data five years after the completion of this study.

Disclosure. I work at one of the elementary schools as a speech-language pathologist where the study took place in the LIF self-contained classroom. However, I need to stress that there was no conflict of interest in doing this study since another speech pathologist was providing therapy to the students within these LIF self-contained classrooms who require speech-language services. Furthermore, the instructors gave the pre- and post-assessments for the CORE Phonics Survey. In this way, there was objectivity and consistency in delivering the CORE Phonics Survey. Finally, in July 2018, I received training from the authors of the LL program and became a trainer to teach the LL program. However, I did not train the instructors who conducted this study.

Summary

In this chapter of methodology, I reviewed how I was going to do this quantitative study for students with ID in a self-contained program. The focus of this study is to see if the LL program is an effective means to teach monolingual and bilingual students with ID to learn how to read with a multisensory approach. The overall design of this study was a pre-experimental one. The pre-experimental design consisted of a pretest and posttest, which was the CORE Phonics Survey. I discussed why I chose a quantitative study versus a qualitative study, and I explained my active role in being the researcher for this study. Finally, I gave the research design and rationale, methodology, threats to validity, and the ethical issues involved in doing this study. In Chapter 4, I will provide the results of this study.

Chapter 4: Results

The purpose of this quantitative, pre-experimental, pretest-posttest study design was to analyze whether LL a researched-based program, was a useful tool for teaching students with ID in a self-contained classroom, the ability to read by using a multisensory approach. In this chapter, I will go through the data collection, intervention fidelity, and results. The four questions guiding the study and their associated hypotheses were as follows:

RQ1: Does the LL program improve Phonological Awareness (PA) skills for students with ID in a self-contained classroom?

H_o1: The LL program does not improve PA skills for students with ID in a self-contained classroom.

H_A1: The LL program significantly improves PA skills for students with ID in a self-contained classroom.

RQ2: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who received instruction in LL program based on the student's language ability (monolingual or bilingual)?

H_o2: There is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's language ability (monolingual or bilingual).

H_A2: There is a significant difference statistically in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in

the LL program based on the student's language ability (monolingual or bilingual).

RQ3: Is there a difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe)?

H_o3: There is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe).

H_A3: There is a significant difference statistically in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL based on the student's severity of his or her intellectual disability (mild, moderate, or severe).

RQ4: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade?

H_o4: There is no difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade.

H_A4: There is a significant difference statistically in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade.

Data Collection

Out of the 30 schools that have a LIF self-contained classroom, five schools began the study, but one had to drop out of the study. Therefore, four schools participated in the study. Since eligibility does not drive placement for students, there were a few students who had a different eligibility placed in the LIF Skills program. I first emailed all the principals at the elementary schools who had a LIF Skills program. Once I received approval from the principals, I then emailed the instructors who participated in the study the following forms (see Appendices A-H): (a) Letter to the principals, (b) Letter to the teaches (c) Deidentified worksheet, (d) Demographics, eligibility worksheet and sample of the spreadsheet, (e) LL tracking form and sample of the tracking form, (f) Summary sheet for CORE Phonics Survey, and (g) CORE Phonics Survey teacher's manual (H) Permission to use the LL from the authors.

After I received the information from the schools, I assigned each school a number and indicated if it was the primary (P) or intermediate (I) LIF Skills program. For example, School 1P and School 1I, etc. I entered the data onto a Microsoft Excel spreadsheet then uploaded the data into the SPSS 25 software. The time frame for the study was from August 2019 to January 2020.

There were some discrepancies with the data collection. The guideline was to do 45 minutes a day, four to five times a week for 8-10 weeks. Some instructors were not able to do the 45 minutes. The range of minutes was from 15 to 45 minutes a day. Additionally, one instructor was only able to do the study for 3 weeks. But noting these discrepancies was in no way to fault the instructors. The instructors knew their students

best, and one of the advantages of doing the LL program was that an instructor could adapt the program to meet the needs of the students.

Intervention Fidelity

The instructors involved in the study were able to receive training by participating in a 6-hour live or archived webinar. As reported above, the amount of time was different in doing the program. Additionally, the challenges that prevented the planned implementation was for a few reasons. First, due to budget constraints, some of the instructors did not have the money to purchase the LL app. Secondly, there were behavioral issues among the students and staffing issues in which the instructor did not have an aide in the classroom. The last possible reason was that this study took place during the Fall semester, when there were many holidays during which the students were out of school. To restate why I chose the LL program is that the instructor could adapt the program to meet their students' needs. The instructors indicated that the students enjoyed the program, and there were no adverse events related to using the LL program.

Results

Five schools started the study, but one school had to drop out of the study because the instructor had to teach her students the "learning to learn" behaviors. Overall, 76 students in the LIF self-contained classrooms received the LL program. All the students participated in the study. However, since the focus of this study was on students with the primary eligibility of ID, I filtered out of the analysis eight students because they had another primary eligibility such as orthopedic impairment, autism developmental delay, or health impairment. The student with the hearing impairment had this as a second

eligibility. As a result, 68 students were in the analysis for this study. To meet the requirements of the number of students to be in this study, I needed 58 students based on Raosoft software for 68 students with a confidence level of 95%. Therefore, I met the requirements for the number of students in the study.

The CORE Phonics Survey became progressively harder for students to read because they had to know how to apply the rules for the specific sounds. Therefore, specifically in the second section of the survey, there were fewer students. Instructors were only able to give the first two subsections, which were short vowels in CVC words as in the word *bat*, and short vowels with CBs as in the word *stop*.

Additionally, there were fewer students in the subsections for letter name uppercase and letter name lowercase. The reason for this was that six of the students were nonverbal, and the first two sections dealt with letter name recognition for both uppercase and lowercase letters. Therefore, these two assessments were not applicable.

Question 1

The first question guiding this study was: Does the LL program improve Phonological Awareness (PA) skills for students with ID in a self-contained classroom? Based on the data presented herein, the null hypothesis is tentatively rejected for six out of the nine assessments measured in the nonparametric tests.

Descriptive Statistics

For Question 1, I did a pretest/posttest design using a dependent *t* test (pair sample testing). The descriptive statistics show the number of students taking the assessments and their median scores. Sample sizes ranged from 16 to 67 observations per

assessment (see Table 6). Descriptive statistics for each assessment are provided in Table 7.

Table 6

Students Taking Each Test based on Primary Eligibility of Intellectual Disabilities or Multiple Impairments

		Missing				
	Students	Absent	Did not Test	No Response	Non-Verbal	Total
Letter uppercase recognition 26pre –	67			1		1
Letter upper case recognition 26 pos	66	1		1		2
Letter lowercase recognition 26pre –	67			1		1
Letter lowercase recognition 26pos	65	1		2		3
Letter name uppercase 26 pre –	55			7	6	13
Letter name uppercase 26pos	55	1		6	6	13
Letter name lower case26pre –	55			7	6	13
Letter name lowercase 26po	55	1		6	6	13
Consonant sound23pre –	59			9		9
consonant sound23pos	58	1		9		10
Long vowel sound5pre –	59			9		9
long vowel sound 5pos	58	1		9		10
Short vowel sound 5pre –	59			9		9
short vowel sound 5pos	58	1		9		10
Short vowel consonant-vowel-consonant word 15pre –	32		36			36
Short vowel consonant-vowel-consonant word 15pos	31	1	36			37
Short vowel consonant blend15pre –	17		51			51
Short vowel consonant blend15 post	16	1	51			52

Table 7

Descriptive Statistics for Students Taking the CORE Phonics Survey

						Percentiles		
			Std.				50th	
	n	Mean	Deviation	Min	Max	25th	(Median)	75th
Letter uppercase recognition 26 pre	67	10.61	9.804	0	26	.00	10.00	20.00
Letter uppercase recognition 26 post	66	14.15	10.034	0	26	5.00	13.00	25.00
Letter lowercase recognition 26 pre	67	10.10	9.843	0	26	.00	7.00	18.00
Letter lowercase recognition 26 post	65	13.42	10.224	0	26	4.00	13.00	25.00
Letter name uppercase 26pre	55	8.65	10.024	0	26	.00	4.00	19.00
Letter name uppercase 26 post	55	11.49	9.877	0	26	2.00	9.00	23.00
Letter name lowercase 26 pre	55	8.15	9.486	0	26	.00	4.00	16.00
Letter name lowercase 26 post	55	10.42	9.867	0	26	1.0	7.00	21.00
Consonant Sounds 23 pre	59	6.27	7.896	0	23	.00	3.00	10.00
Consonant Sounds 23 post	58	9.14	8.622	0	23	.00	6.50	16.50
Long vowel sounds 5 pre	59	1.19	1.747	0	5	.00	.00	2.00
Long vowel sounds 5 post	58	1.66	1.987	0	5	.00	1.00	4.00
Short vowel sounds 5 pre	59	1.08	1.523	0	5	.00	.00	2.00
Short vowel sounds 5 post	58	1.45	1.846	0	5	.00	.00	3.00
Short vowel consonant-vowel-consonant words 15 pre	32	.22	1.237	0	7	.00	.00	.00
Short vowel consonant-vowel-consonant words 15 post	31	1.10	3.091	0	13	.00	.00	.00
Short vowel CB word 15 pre	17	.29	1.213	0	5	.00	.00	.00
Short vowel CB 15 post	16	.88	2.802	0	11	.00	.00	.00

Meeting the Assumptions

Assumption 1. The dependent variables were measured on a continuous scale – the scores which are numbers from the pre- and posttests can be measured into smaller units therefore the assumption is met.

Assumption 2. The independent variable needed to have two categorical related or matched groups – the students were the same for each group for the pre and post testing, therefore the assumption met.

Assumption 3. That there were no significant outliers – I checked for this by analyzing if the *z*-scores did not have a value of 3.29 or by doing a histogram. In SPSS, to get the histograms, I ran the analysis for descriptive statistics – explore, marked the histograms in plots. There were outliers; one way to correct this was by Winsorzing, which involved giving the outlier the highest value possible that was not an outlier (Field, 2018). The second way to handle the outliers was to delete them. There were two cases in which there were outliers: Short vowels in CVC words and short vowels in CBs.

However, using the Winsorzing technique to handle the outliers or even deleting the outliers would not be feasible in these two cases because of the number of students for these assessments. There were 31 students for short vowels in CVC words and 16 students for the short vowels in CB words.

Assumption 4. The distribution of the differences in the dependent variable between the two related groups had to be normally distributed. The significance for all the 18 variables in the Shapiro-Wilk's test, were <.001, which meant there was a

deviation from a normal distribution. Based on the violation of the assumptions, I ran the Wilcoxon Test as a nonparametric alternative to the paired *t* test (see Table 8).

Table 8

Results of the Wilcoxon Test

	Z	Asymp. Sig. (2-tailed)
Letter uppercase recognition 26post - Letter uppercase recognition 26pre	-5.345	.000
Letter lowercase recognition 26post - Letter lowercase recognition 26pre	-4.887	.000
Letter name uppercase26post - Letter name uppercase 26pre	-4.931	.000
Letter name lowercase 26post - Letter name lowercase 26pre	-4.175	.000
Consonant sounds 23post - Consonant sounds 23pre	-4.001	.000
Long vowel sounds 5post – Long vowels sounds 5pre	-2.760	.006
Short vowel sounds 5 post - Short vowel sounds 5pre	-2.288	.022
Short vowel sounds consonant-vowel-consonant words 15post - Short vowel sounds consonant-vowel-consonant words 15pre	-1.826	.068
Short vowel sounds consonant blends 15post - Short vowel sounds consonant blends 15 pre	-1.342	.180

To see if there was a difference in the pretest and post test scores using the LL program, the Wilcoxon Signed-Ranks Test indicted the following:

- Letter uppercase recognition 26: A Wilcoxon Signed -Ranks Test indicated that the posttest ranks were significantly higher than the pretest ranks, $z = -5.345$, $p < .001$**.**
- Letter lowercase recognition 26: A Wilcoxon Signed -Ranks Test indicated that the posttest ranks were significantly higher than the pretest ranks, $z = -4.887$, $p < .001$.

- Letter name uppercase 26: A Wilcoxon Signed -Ranks Test indicated that the posttest ranks were significantly higher than the pretest ranks, $z = -4.931$, $p < .001$.
- Letter name lowercase pre and posttests 26, A Wilcoxon Signed -Ranks Test indicated that the posttest ranks were significantly higher than the pretest ranks, $z = -4.175$, $p < .001$.
- Consonant sounds 23: A Wilcoxon Signed -Ranks Test indicated that the posttest ranks were significantly higher than the pretest ranks, $z = -4.001$, $p <$ 001.
- Long vowels 5: A Wilcoxon Signed -Ranks Test indicated that the posttest ranks were significantly higher than the pretest ranks, $z = -2.760$, $p = .006$.
- Short vowels 5: A Wilcoxon Signed -Ranks Test indicated that the posttest ranks were significantly higher than the pretest ranks, $z = -2.888$, $p = .022$.
- Short vowel within a CVC word 15: A Wilcoxon Signed -Ranks test indicated that there was no significant difference, $z =$ -1.826, $p = .068$.
- Short vowel in a CB 15: A Wilcoxon Signed -Ranks test indicated that there was no significant difference, $z = -1.342$, $p = .180$.

In summation, I went with a more conservative alpha level of .01 because of the assumption violation for the related groups were not normally distributed. Therefore, six of the nine assessments had significant differences. If I went with .05 alpha level, then seven of the nine assessments had significant differences would be for one through seven.

Results for Question 1

Based on the results of the Wilcoxon analysis, we reject the null hypothesis and find that the LL program significantly improves PA skills for students with ID in a self-contained classroom for six out of the nine assessments measured in the nonparametric test using the conservative alpha level of .01. With this more conservative alpha level .01, eliminated the assessment of short vowels which had a p =.022. The two areas where we did not find a statistically significant difference were for the short vowels within a CVC word and the short vowel within the CB. For these, there was also a violation for assumption three for no significant outliers. However, when the Wilcoxon was conducted for these two assessments, the results did not show a statistically significant difference. Therefore, one can fail to reject the null hypothesis for the short vowels within a CVC word and the short vowel within the CB.

A repeated measures design analyzed questions, two through four. As aforementioned, there were violations in the assumptions for significant outliers, and the dependent variable needs to be approximately distributed for each group. Thus, there needs to be caution in interpreting the results for questions two through four. To assess the null hypotheses, the nonparametric tests would be performed in place of the parametric tests because of these violations. However, since these questions dealt with a repeated measures analysis, the Wilcoxon test did not show the repeated measures parametric values such as time x WIDA (monolingual and bilingual), time x severity, and time x grade. I considered the Friedman test, but this did not apply to my data because I only had two time periods, and the Friedman test required three time periods.

Nevertheless, reviewing the results of the repeated measures parametric assessments, still gives essential data on answering the research questions even though one needs to review them with caution, such as basing significance on the more restrictive alpha of .01.

Question 2

The second question guiding this study was: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who received instruction in LL program based on the student's language ability (monolingual or bilingual)? Based on the data presented herein, we tentatively fail to reject the null hypothesis that there is no difference in PA skills based on the students' language ability measured in the repeated measures parametric tests with a more restrictive alpha .01. In other words, there is not a statistically significant difference in growth in PA skills between monolingual or bilingual students

Descriptive Statistics

In this study, there were 39 students (57%) who had English as their primary language and 29 students (42%) were bilingual. For the analysis, there were two students who were unable to take the post-assessment. The first student was monolingual and made no response to the assessments and the second student was bilingual and was absent. Table 9 shows the number of students who were identified as monolingual and bilingual; for each assessment, the task increases in difficulty so there are less students completing the tasks. Figure 7 shows a visual representation of how the students did based on their language ability.

Table 9

Descriptive Statistics for Students with ID and Language Scores

		Pretest		Posttest		
Assessment	WIDA	Mean	Std. deviation	Mean	Std. deviation	*n*
Letter uppercase recognition 26	Monolingual	11.87	10.439	15.92	9.744	38
	Bilingual	8.82	8.936	11.75	10.094	28
	Total	10.58	9.875	14.15	10.034	66
Letter lowercase recognition 26	Monolingual	11.35	10.486	15.03	10.145	37
	Bilingual	8.61	9.044	11.29	10.114	28
	Total	10.17	9.911	13.42	10.224	65
Letter name uppercase 26	Monolingual	10.14	11.288	13.66	10.597	29
	Bilingual	6.76	8.383	8.72	8.547	25
	Total	8.57	10.101	11.37	9.929	54
Letter name lowercase 26	Monolingual	9.34	10.718	12.38	10.632	29
	Bilingual	6.48	7.864	7.76	8.447	25
	Total	8.02	9.527	10.24	9.871	54
Consonant sound 23	Monolingual	6.60	8.645	9.47	9.194	30
	Bilingual	5.82	7.283	8.79	8.117	28
	Total	6.22	7.956	9.14	8.622	58
Long vowel Sounds 5	Monolingual	1.03	1.712	1.50	2.013	30
	Bilingual	1.25	1.756	1.82	1.982	28
	Total	1.14	1.721	1.66	1.987	58
Short vowel Sounds 5	Monolingual	1.17	1.599	1.40	1.831	30
	Bilingual	.93	1.438	1.50	1.895	28
	Total	1.05	1.515	1.45	1.846	58
Short vowel consonant-vowel- consonant words 15	Monolingual	.44	1.750	1.25	3.587	16
	Bilingual	.00	.000	.93	2.576	15
	Total	.23	1.257	1.10	3.091	31
Short vowel consonant blend 15	Monolingual	.50	1.581	1.10	3.479	10
	Bilingual	.00	.000	.50	1.225	6
	Total	.31	1.250	.88	2.802	16

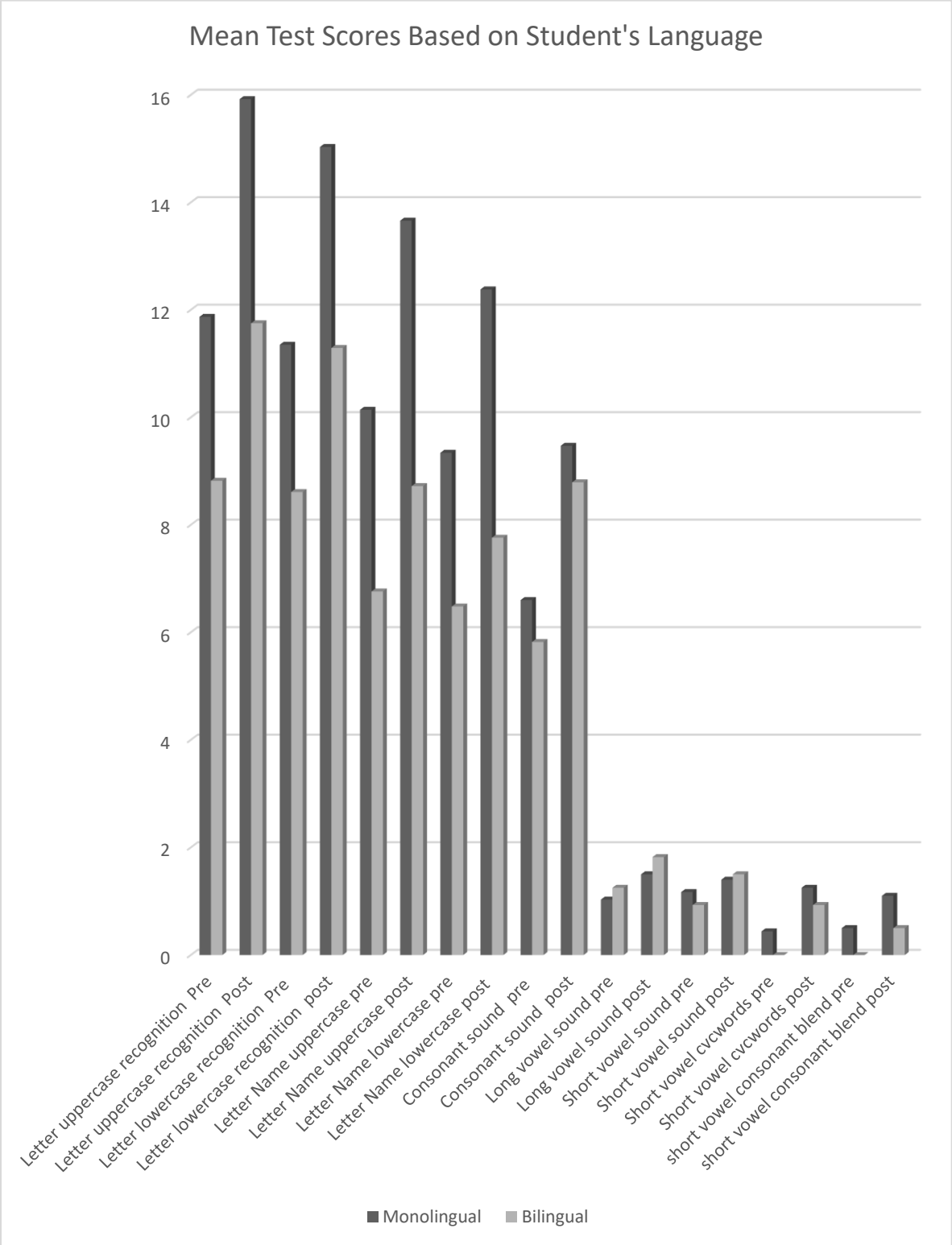

Figure 8. Pre and Post-Tests based on students' language.

Meeting the Assumptions

Assumption 1. The dependent variable was measured on a continuous scale – the scores, which were numbers from the pre and posttests, could be measured into smaller units. Therefore, the assumption was met.

Assumption 2. The independent variable needed to have two categorical related or matched groups – the students were the same for each group for the pre- and post-testing. The assumption was met.

Assumption 3. There were no significant outliers. There were significant outliers for the short vowels in CVC words and short vowels in CBs.

Assumption 4. The dependent variable needed to be approximately distributed for each group of the independent variables. The significance for all the 18 variables in the Shapiro-Wilk's test, were <.001, which meant there was a deviation from a normal distribution. The nonparametric test for repeated measures was not applicable due to the structure of the study, because I did not have three time periods to run the Friedman Test. Therefore, I went with the parametric test but took a more conservative alpha level of .01.

Assumption 5. Sphericity involved the assumption that the "variances of the differences between the data taken from the same participant are equal" (Field, 2018, pp 776-777). The Mauchly Test was one way to check for violations with sphericity. A significant value occurred when the probability value was less than .05, which meant that there were "significant differences between the variances," so the condition of sphericity was not met (Field, 2018 p 666).

However, when the probability value from the Mauchly's test was above .05, then the test was non-significant; therefore, the assumption was that the different variances could be considered equal, then sphericity was met (Field, 2018). Field (2018) gave guidelines on what tests to use for checking if the sphericity holds or not:

- Sphericity Assumed if the Mauchly's test has a *p* value (sig.) of > 0.05
- Greenhouse -Geisser if the Mauchly's test has a *p* value (sig.) of < 0.75
- Huynh Feldt if the Mauchly's test has a *p* value (sig.) of > 0.75

Table 10

Sphericity for Tests of Within Subjects Effects for Time and WIDASCORE

Dependent Variables (time)	Mauchly's Test	Source	Tests	Df	F	sig
Letter upper case recognition 26 pre and post	.	Time	Greenhouse - Geisser	1.000	27.603	.000
		Time *WIDASCORE	Huynh-Feldt	1.000	.716	.401
Letter lower case recognition 26 pre and post	.	Time	Greenhouse-Geisser	1.000	17.399	.000
		Time*WIDASCORE	Greenhouse-Geisser	1.000	.428	.515
Letter name upper case 26 pre and post	.	Time	Greenhouse-Geisser	1.000	22.372	.000
		Time*WIDASCORE	Huynh-Feldt	1.000	1.808	.185
Letter name lower case 26 pre and post	.	Time	Greenhouse-Geisser	1.000	10.059	.003
		Time*WIDASCORE	Greenhouse-Geisser	1.000	1.663	.203
Consonant sounds23 pre and post	.	Time	Greenhouse-Geisser	1.000	17.404	.000
		Time*WIDASCORE	Huynh-Feldt	1.000	.005	.945
Long vowel sounds 5 pre and post	.	Time	Greenhouse-Geisser	1.000	8.378	.005
		Time*WIDASCORE	Huynh-Feldt	1.000	.085	.771
Short vowel sounds 5 pre and post	.	Time	Greenhouse-Geisser	1.000	5.822	.019
		Time*WIDASCORE	Sphericity Assumed	1	1.028	.315
Short vowels consonant-vowel-consonant 15 pre and post	.	Time	Greenhouse-Geisser	1.000	4.089	.052
		Time*WIDASCORE	Greenhouse-Geisser	1.000	.020	.890
Short vowel consonant blend 15 pre and post	.	Time	Sphericity Assumed	1	1.592	.228
		Time*WIDASCORE	Huynh-Feldt	1.000	.013	.001

Results for Question 2

In answering the question about if there is a difference in PA skills based on the student's language ability (monolingual or bilingual) Table 11, shows the relationship between time and the students' language (WIDA). From the results, shown in Table 11, in going with a more conservative alpha level of .01, there was only a significant difference in time except in the last three assessments - short vowel sounds (p = .019), short vowel in CVC words (p =.052), and the short vowel in CBs (p = .228). In contrast, when looking at the interaction of time and WIDA scores, there was no significant difference in any of these assessments.

Table 11

Relationship between Time and WIDA Wilks' Lambda

Dependent Variables (time)	Source	Value	F	Hypothesis df	Error df	sig
Letter upper case recognition 26 pre and post	Time	.699	27.603	1.000	64.000	.000
	Time *WIDASCORE	.989	.716	1.000	64.000	.401
Letter lower case recognition 26 pre and post	Time	.784	17.399	1.000	63.000	.000
	Time*WIDASCORE	.993	.428	1.000	63.000	.515
Letter name upper case 26 pre and post	Time	.699	22.372	1.000	52.000	.000
	Time*WIDASCORE	.966	1.808	1.000	52.000	.185
Letter name lower case 26 pre and post	Time	.838	10.059	1.000	52.000	.003
	Time*WIDASCORE	.969	1.663	1.000	52.000	.203
Consonant sounds23 pre and post	Time	.763	17.404	1.000	56.000	.000
	Time*WIDASCORE	1.000	.005	1.000	56.000	.945
Long vowel sounds 5 pre and post	Time	.870	8.378	1.000	56.000	.005
	Time*WIDASCORE	.998	.085	1.000	56.000	.771
Short vowel sounds 5 pre and post	Time	.906	5.822	1.000	56.000	.019
	Time*WIDASCORE	.982	1.028	1.000	56.000	.315
Short vowels consonant-vowel-consonant 15 pre and post	Time	.876	4.089	1.000	29.000	.052
	Time*WIDASCORE	.999	.200	1.000	29.000	.890
Short vowel consonant blend 15 pre and post	Time	.898	1.592	1.000	14.000	.228
	Time*WIDASCORE	.999	.013	1.000	14.000	.910

Summary of the Results for Question 2

From a repeated measures analysis, we fail to reject the null hypothesis that there is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's language ability (monolingual or bilingual). In other words, there is not a statistically significant difference in growth in PA skills between monolingual or bilingual students.

Question 3

The third question guiding this study was: Is there a difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe)? Based on the data presented herein, we tentatively fail to reject the null hypothesis that there is no difference in PA skills based on the students' severity in the repeated measures parametric tests with a more restrictive alpha .01. In other words, there is not a statistically significant difference in growth in PA skills between the students' severity of their intellectual disability.

Descriptive Statistics

For this question, one student was deleted because the instructor indicated that the student had multiple impairments but did not designate what the level of severity the student's intellectual disability was. Table 12 shows the number of students taking each assessment and the means, based on his or her severity. Figure 8 shows the visual representation of how the students did based on the severity.

Table 12

Descriptive Statistics for Students with ID with Their Severity Pretest and Posttest Results

Assessment	Severity	Pre-Test Mean	Pre-Test Std. Deviation	Post Test Mean	Post Test Std. Deviation	*n*
Letter uppercase recognition 26	Mild	13.29	10.357	16.43	9.856	28
	Moderate	9.97	9.071	13.44	10.150	32
	Severe	1.40	3.130	6.60	8.234	5
Letter lowercase recognition 26	Mild	12.82	10.856	15.32	10.485	28
	Moderate	9.61	8.838	13.16	10.087	31
	Severe	.80	1.789	5.00	7.071	5
Letter name uppercase 26	Mild	12.00	11.446	15.17	10.624	23
	Moderate	7.15	8.606	9.15	8.780	26
	Severe	.00	.000	4.00	6.733	4
Letter name lowercase 26	Mild	11.43	11.196	14.26	10.813	23
	Moderate	6.15	7.572	8.19	8.314	26
	Severe	2.50	5.000	.50	1.000	4
Consonant sound 23	Mild	8.38	9.749	9.81	9.511	21
	Moderate	5.94	6.797	10.00	8.169	31
	Severe	.20	.447	2.80	5.215	5
Long vowel Sounds 5	Mild	1.57	2.135	1.62	2.037	21
	Moderate	1.06	1.482	1.94	2.048	31
	Severe	.00	.000	.40	.894	5
Short vowel Sounds 5	Mild	1.43	1.964	1.71	2.028	21
	Moderate	.97	1.224	1.42	1.822	31
	Severe	.20	.447	.80	1.304	5
Short vowel consonant-vowel-consonant words 15	Mild	1.00	2.646	3.14	5.490	7
	Moderate	.00	.000	.63	1.921	19
	Severe	.00	.000	.00	.000	4
Short vowel consonant blend 15	Mild	.71	1.890	2.00	4.123	7
	Moderate	.00	.00	.00	.000	7
	Severe	.00	.	.00	.	1

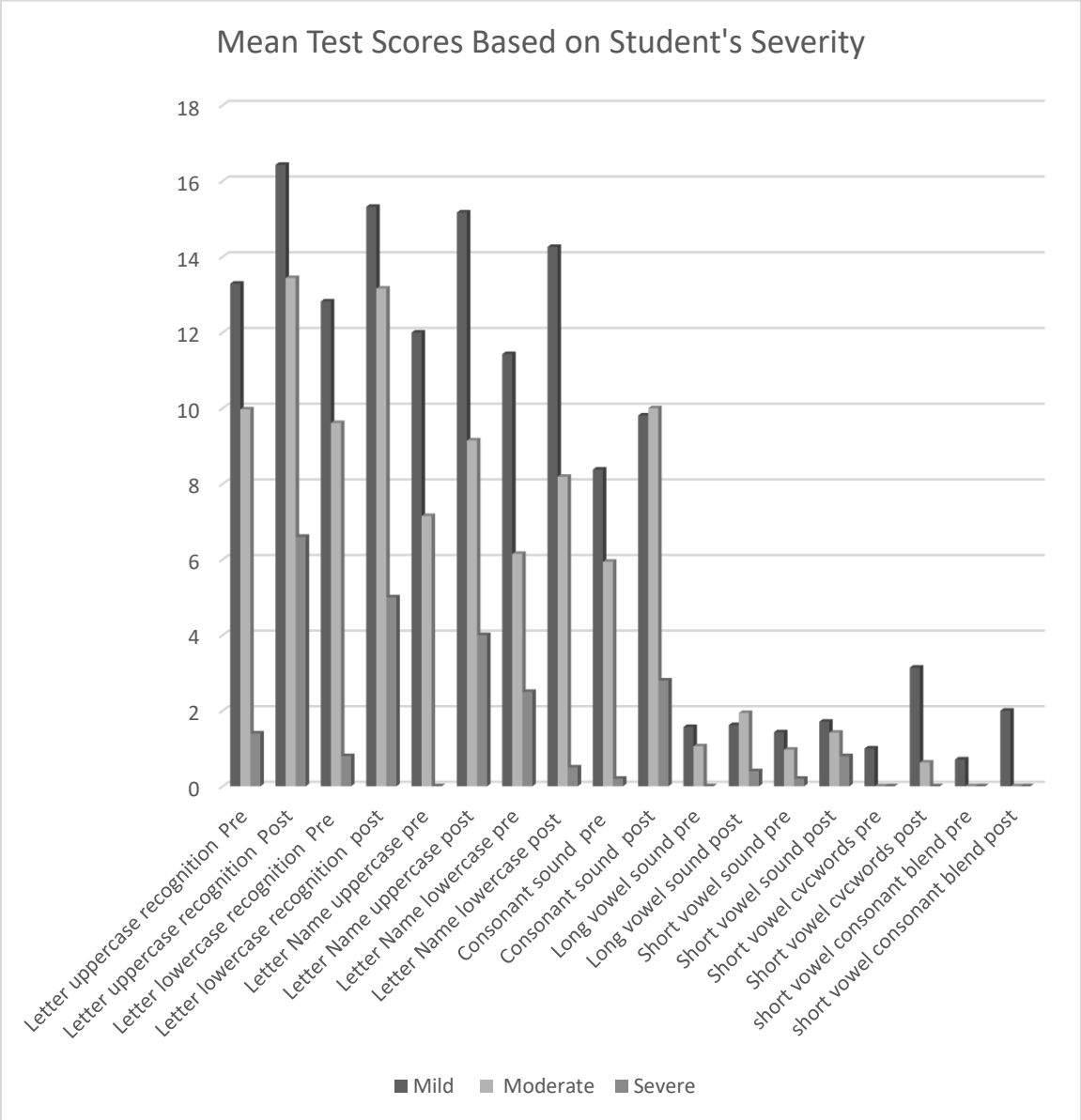

Figure 9. Mean test scores based on Student's Severity.

Meeting the Assumptions

Assumption 1. The dependent variable was measured on a continuous scale – the scores, which were numbers from the pre and posttests, could be measured into smaller units. Therefore, the assumption was met.

Assumption 2. The independent variable needed to have two categorical related or matched groups – the students were the same for each group for the pre- and post-testing. The assumption was met.

Assumption 3. There were no significant outliers. There were significant outliers for the short vowels in CVC words and short vowels in CBs.

Assumption 4. The dependent variable was approximately distributed for each group of the independent variables. The significance for all the 18 variables in the Shapiro-Wilk's test, were < .001, which means there was a deviation from a normal distribution. The nonparametric test for repeated measures was not applicable due to the structure of the study, Therefore, I went with the parametric test but took a more conservative alpha level of .01.

Assumption 5. Sphericity – the combinations were equal. See Table 13 for further details.

Table 13

Sphericity for Tests of Within Subjects Effects for Time and Severity ID

Dependent Variables (time)	Mauchly's Test	Source	Tests	Df	F	sig
Letter upper case recognition 26 pre and post	.	Time	Greenhouse-Geisser	1.000	18.324	.000
		Time *SeverityID	Greenhouse-Geisser	3.000	.315	.731
Letter lower case recognition 26 pre and post	.	Time	Greenhouse-Geisser	1.000	10.498	.002
		Time*SeverityID	Greenhouse-Geisser	2.000	.298	.743
Letter name upper case 26 pre and post	.	Time	Greenhouse-Geisser	1.000	14.223	.000
		Time*SeverityID	Sphericity Assumed	2	.690	.507
Letter name lower case 26 pre and post	.	Time	Greenhouse-Geisser	1.00	1.037	.313
		Time*SeverityID	Sphericity Assumed	2	1.666	.199
Consonant sounds 23 pre and post	.	Time	Sphericity Assumed	1	8.492	.005
		Time*SeverityID	Sphericity Assumed	2	1.591	.213
Long vowel sounds 5 pre and post	.	Time	Sphericity Assumed	1	3.508	.067
		Time*SeverityID	Sphericity Assumed	2	2.421	.098
Short vowel sounds 5 pre and post	.	Time	Sphericity Assumed	1	3.785	.057
		Time*SeverityID	Huynh-Feldt	2.000	.165	.849
Short vowels consonant-vowel-consonant 15 pre and post	.	Time	Sphericity Assumed	1	3.084	.090
		Time*SeverityID	Sphericity Assumed	2	1.376	.270
Short vowel consonant blend 15 pre and post	.	Time	Greenhouse-Geisser	1.000	.462	.510
		Time*SeverityID	Greenhouse-Geisser	2.000	1.108	.362

Results for Question 3

Table 12 gave the breakdown for the category for each student. Table 14 gave the repeated measures results for time and the student's severity. The student's severity could be mild, moderate, or severe. From the results in Table 14, in going with a more conservative alpha level of .01, the results of the repeated measures indicated that students with ID do improve with the LL program based on time. Only four of the nine assessments made a significant progress. The three assessments were letter uppercase recognition ($p < 001$), letter lower case recognition ($p < .001$), letter name upper case ($p < 001$), and consonant sounds ($p = .005$).

However, if I went with the more robust alpha level of .05, the short vowel assessment was marginal ($p = .057$). In contrast, there was not a statistically significant difference for severity x time for any of the nine assessments.

Table 14

Relationship Between Time and Severity of the Student's ID

Dependent Variables time	Test/Effect	Value	F	Hypothesis df	Error df	sig
Letter upper case recognition 26 pre and post	Wilk's Lambda Time	.772	18.324	1.000	62.000	.000
	Wilk's Lambda Time *SeverityID	.990	·315	2.000	62.000	.731
Letter lower case recognition 26 pre and post	Wilk's Lambda Time	.853	10.498	1.000	61.000	.002
	Wilk's Lambda Time *SeverityID	.990	.298	2.000	61.000	.743
Letter name upper case 26 pre and post	Wilk's Lambda Time	.779	14.223	1.000	50.000	.000
	Wilk's Lambda Time *SeverityID	.973	.690	2.000	50.000	.507
Letter name lower case 26 pre and post	Wilk's Lambda Time	.980	1.037	1.000	50.000	.313
	Wilk's Lambda Time *SeverityID	.938	1.666	2.000	50.000	.199
Consonant sounds23 pre and post	Wilk's Lambda Time	.864	8.492	1.000	54.000	.005
	Wilk's Lambda Time *SeverityID	.944	1.591	2.000	54.000	.213
Long vowel sounds 5 pre and post	Wilk's Lambda Time	.939	3.508	1.000	54.000	.067
	Wilk's Lambda Time *SeverityID	.918	2.421	2.000	54.000	.098
Short vowel sounds 5 pre and post	Wilk's Lambda Time	.934	3.785	1.000	54.000	.057
	Wilk's Lambda Time *SeverityID	.994	.165	2.000	54.000	.849
Short vowels consonant-vowel-consonant 15 pre and post	Wilk's Lambda Time	.897	3.084	1.000	27.000	.090
	Wilk's Lambda Time *SeverityID	.907	1.376	2.000	27.000	.270
Short vowel consonant blend 15 pre and post	Wilk's Lambda Time	.963	.462	1.000	12.000	.510
	Wilk's Lambda Time *SeverityID	.844	1.108	2.000	12.000	.362

Summary of the Results for Question 3

From a repeated measures analysis, we fail to reject the null hypothesis that there is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on his or her intellectual disability (mild, moderate, or severe). In other words, the students made progress in the pre and post testing and was not based on his or her intellectual disability.

Question 4

The fourth question guiding this study was: Is there a difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade? Based on the data presented herein, the null hypothesis is tentatively rejected for two out of the nine assessments measured in the repeated measures parametric tests with a more restrictive alpha .01.

Descriptive Statistics

Before adding in the filter to only accept students with the primary eligibility of ID there were 76 students. Eleven students in kindergarten (14.5%), 13 students in first grade (17.1%), 12 students in second grade (15.8%), 18 students were in third grade (23.7%), 12 students were in fourth grade (15.8%), and 10 students in fifth grade (13.2%). Once the filter was in place, it dropped the number of students to 68 students. Eight students were in kindergarten (11.8%), 12 students were in first grade (17.6%), 12 students were in second grade (17.6%), 16 students in third grade (23.5%), 11 students in fourth grade (16.2%), and 9 students in fifth grade (13.2%). Therefore, with this filter on, the grades that dropped the most were kindergarten with a decrease of three students, and for third grade with two students with first, fourth, and fifth grade only one student. The only grade that remained the same was second grade.

Table 15 has the descriptive statistics for how students in the primary LIF self-contained classroom did (grades kindergarten through 2nd) on the CORE Phonics Survey, and Figure 9 shows the visual representation how the students did base on their grades. Table 16 presents the descriptive statistics for the students in the intermediate LIF self-

contained classroom and Figure 10 shows the visual representation of how the intermediate class did based on their grades.

Table 15

Descriptive Statistics for Students in the Primary LIF Classroom based on Grades

		Pre-Test		Post Test		
Assessment	Grade	Mean	Std. Deviation	Mean	Std. Deviation	*n*
Letter uppercase recognition 26	Kindergarten	3.00	8.485	4.88	8.983	8
	First	9.09	11.300	11.55	10.103	11
	Second	4.58	8.039	10.00	9.648	12
Letter lowercase recognition 26	Kindergarten	2.00	5.657	3.63	6.413	8
	First	9.27	11.585	11.00	11.153	11
	Second	4.17	7.744	8.17	8.943	12
Letter name uppercase 26	Kindergarten	3.13	8.442	4.75	9.020	8
	First	8.91	11.406	10.18	10.980	11
	Second	4.50	8.085	10.08	9.605	12
Letter name lowercase 26	Kindergarten	2.00	5.657	3.75	6.714	8
	First	9.09	11.709	8.45	10.662	11
	Second	5.00	7.793	7.67	9.247	12
Consonant sound 23	Kindergarten	2.00	5.657	2.25	6.364	8
	First	7.36	10.481	6.09	9.586	11
	Second	2.67	5.646	4.92	6.142	12
Long vowel Sounds 5	Kindergarten	.38	1.061	.50	1.414	8
	First	1.00	1.789	.55	1.036	11
	Second	.58	1.443	.58	.669	12
Short vowel Sounds 5	Kindergarten	.13	.354	.13	.354	8
	First	.82	1.601	.64	1.567	11
	Second	.58	1.165	.58	1.165	12
Short vowel consonant-vowel-consonant words 15	Kindergarten	.00	.000	.00	.000	6
	First	.00	.000	.00	.000	6
	Second	.00	.000	.00	.000	9
Short vowel consonant blend 15	Kindergarten	.00	.	.00	.	1
	First	.00	.000	.00	.000	4
	Second	.00	.000	.00	.000	3

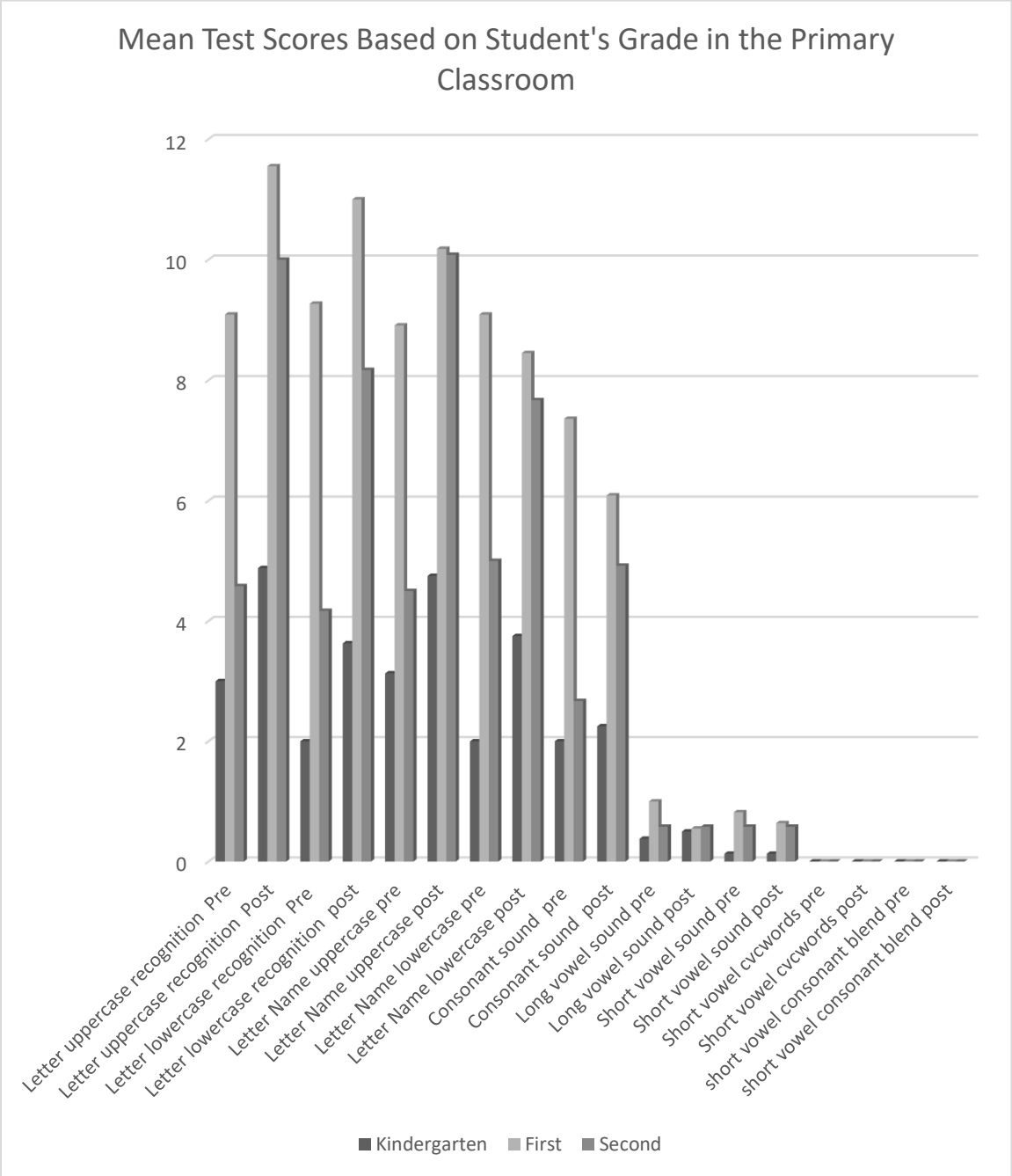

Figure 10. Mean Test Scores based on Students' Grades in the Primary Classroom.

Table 16

Descriptive Statistics for Students in the Intermediate LIF Classroom based on Grades

		Pre-Test		Post Test		
Assessment	Grade	Mean	Std. Deviation	Mean	Std. Deviation	*n*
Letter uppercase recognition 26	Third	12.53	8.184	17.53	8.975	15
	Fourth	15.55	6.775	19.45	6.186	11
	Fifth	17.78	9.615	19.00	9.760	9
Letter lowercase recognition 26	Third	12.07	7.896	17.27	9.004	15
	Fourth	14.09	8.264	17.64	7.672	11
	Fifth	19.63	9.195	21.38	8.176	8
Letter name uppercase 26	Third	10.91	9.617	14.18	9.152	11
	Fourth	11.00	8.573	14.40	6.731	5
	Fifth	15.86	11.335	16.43	10.937	7
Letter name lowercase 26	Third	8.82	8.109	13.45	9.842	11
	Fourth	10.80	8.786	14.00	7.036	5
	Fifth	15.14	11.320	17.14	10.286	7
Consonant sound 23	Third	7.79	7.392	13.64	7.541	14
	Fourth	8.86	5.551	14.71	5.024	7
	Fifth	10.17	10.534	15.33	7.763	6
Long vowel Sounds 5	Third	1.29	1.684	2.79	2.293	14
	Fourth	2.29	2.059	3.43	1.902	7
	Fifth	1.83	2.137	2.67	2.066	6
Short vowel Sounds 5	Third	1.36	1.737	2.29	2.091	14
	Fourth	2.14	1.574	3.43	1.272	7
	Fifth	1.67	1.633	2.17	1.835	6
Short vowel consonant -vowel-consonant words 15	Third	.00	.000	1.50	3.674	6
	Fourth	.00	.	5.00	.	1
	Fifth	2.33	4.041	6.67	6.506	3
Short vowel consonant blend 15	Third	.00	.000	.50	1.225	6
	Fourth	No data		No data		0
	Fifth	2.50	3.536	5.50	7.778	2

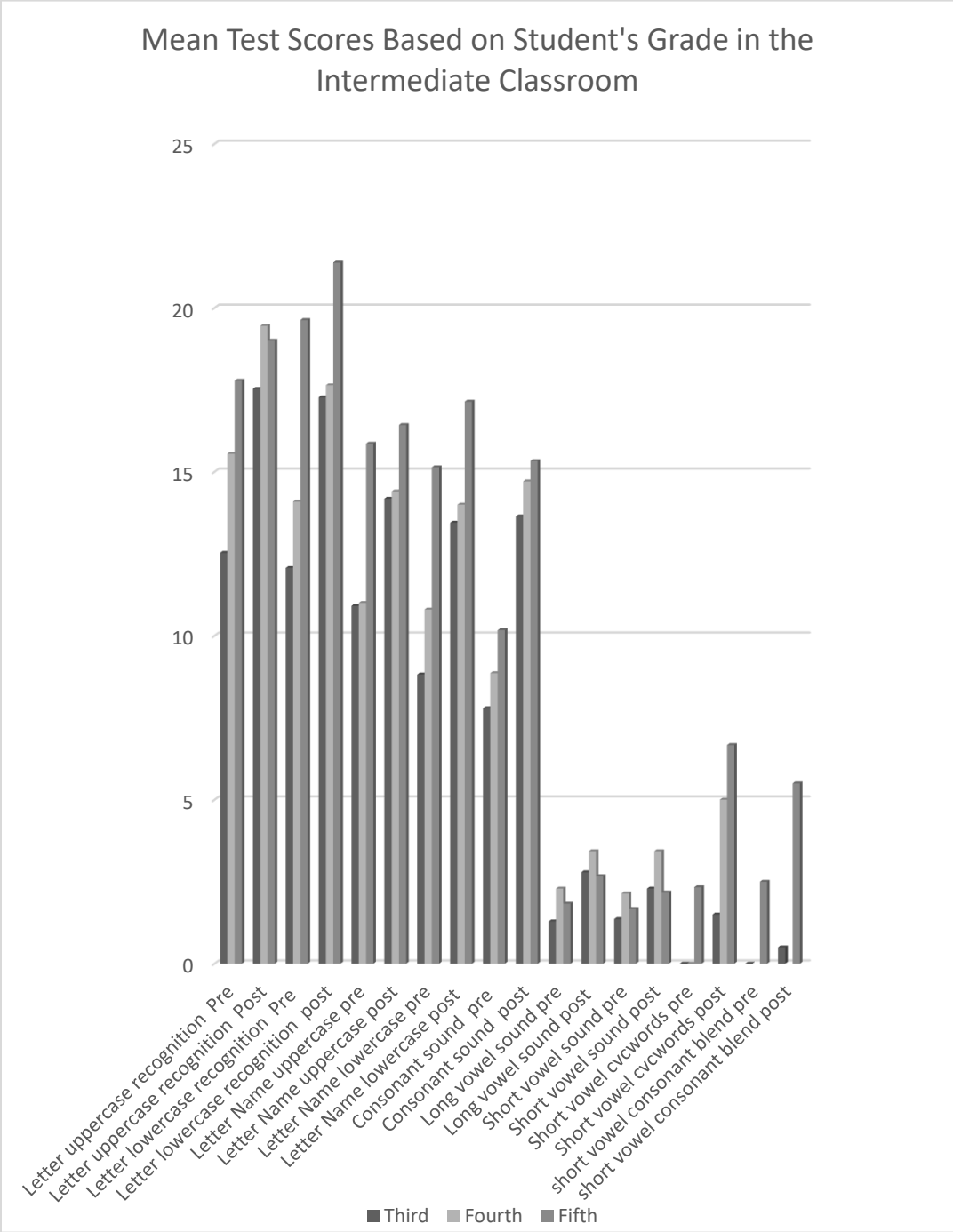

Figure 11. Mean Test Scores based on Students' Grades in the Intermediate Classroom.

Meeting the Assumptions

Assumption 1. The dependent variable was measured on a continuous scale – the scores, which were numbers from the pre and posttests, could be measured into smaller units. Therefore, the assumption was met.

Assumption 2. The independent variable needed to have two categorical related or matched groups – the students were the same for each group for the pre- and post-testing. The assumption was met.

Assumption 3. There were no significant outliers. There were significant outliers for the short vowels in CVC words and short vowels in CBs.

Assumption 4. The dependent variable was approximately distributed for each group of the independent variables. The significance for all the 18 variables in the Shapiro-Wilk's test, were < .001, which means there was a deviation from a normal distribution. The nonparametric test for repeated measures is not applicable due to the structure of the study, since I did not have three time periods to run the Friedman Test. Therefore, I went with the parametric test but took a more conservative alpha level of .01.

Assumption 5. Sphericity – the combinations were equal.

Table 17

Sphericity for Tests of Within Subjects Effects for Time and Grade

Dependent Variables (time)	Mauchly's Test	Source	Tests	Df	F	sig
Letrupperrec26 pre and post	.	Time	Greenhouse-Geisser	1.000	24.803	.000
		Time *grade	Sphericity Assumed	5	1.135	.352
Letrreclow 26 pre and post	.	Time	Greenhouse-Geisser	1.000	14.572	.000
		Time*grade	Sphericity Assumed	5	.689	.634
Letrnameupp26 pre and post	.	Time	Greenhouse-Geisser	1.000	20.239	.000
		Time*grade	Sphericity Assumed	5	2.024	.092
Letrnamelow 26 pre and post	.	Time	Greenhouse-Geisser	1.000	10.377	.002
		Time*grade	Sphericity Assumed	5.000	1.340	.264
Consound23 pre and post	.	Time	Greenhouse-Geisser	1.000	22.436	.000
		Time*grade	Greenhouse-Geisser	5.000	4.349	.002
Longvow5 pre and post	.	Time	Greenhouse-Geisser	1.000	10.399	.002
		Time*grade	Greenhouse-Geisser	5.000	4.528	.002
Shortvow5 pre and post	.	Time	Greenhouse-Geisser	1.000	6.495	.014
		Time*grade	Sphericity Assumed	5	2.257	.062
Shvowcvcwrd15 pre and post	.	Time	Greenhouse-Geisser	1.000	15.691	.001
		Time*grade	Greenhouse-Geisser	5.000	3.708	.012
Shvowcb15 pre and post	.	Time	Sphericity Assumed	1	2.349	.154
		Time*grade	Sphericity Assumed	4	1.557	.253

Results for Question 4

From the results of Table 18, in going with a more conservative alpha level .01, the results of the repeated measures test indicated that students did improve in time for seven of the nine assessments. These were letter uppercase recognition ($p < .001$), letter lowercase recognition ($p < .001$), letter name uppercase ($p < .001$), letter name lowercase ($p = .002$), consonant sounds ($p < .001$), long vowel sounds ($p = .002$) and short vowel sounds ($p = .001$). Likewise, there were significant differences for time x grade for two

out of the nine assessments. These were for consonant sounds (p = .002) and for long vowel sounds (p =.002). There was a marginal significant difference for short vowels (p = .012).

Table 18

Relationship between Time and Grade

Dependent Variables time	Test/Effect	Value	F	Hypothesis df	Error df	sig
Letter upper case recognition 26 pre and post	Wilk's Lambda Time	.708	24.803	1.000	60.000	.000
	Wilk's Lambda Time *Grade	.914	1.135	5.000	60.000	.352
Letter lower case recognition 26 pre and post	Wilk's Lambda Time	.802	14.572	1.000	59.000	.000
	Wilk's Lambda Time * Grade	.945	.689	5.000	59.000	.634
Letter name upper case 26 pre and post	Wilk's Lambda Time	.703	20.239	1.000	48.000	.000
	Wilk's Lambda Time * Grade	.826	2.024	5.000	48.000	0.92
Letter name lower case 26 pre and post	Wilk's Lambda Time	.822	10.377	1.000	48.000	.002
	Wilk's Lambda Time * Grade	.878	1.340	5.000	48.000	.264
Consonant sounds23 pre and post	Wilk's Lambda Time	.699	22.436	1.000	52.000	.000
	Wilk's Lambda Time * Grade	.705	4.349	5.000	52.000	**.002**
Long vowel sounds 5 pre and post	Wilk's Lambda Time	.833	10.399	1.000	52.000	.002
	Wilk's Lambda Time * Grade	.697	4.528	5.000	52.000	**.002**
Short vowel sounds 5 pre and post	Wilk's Lambda Time	.889	6.495	1.000	52.000	.014
	Wilk's Lambda Time * Grade	.822	2.257	5.000	52.000	.062
Short vowels consonant - vowel- consonant 15 pre and post	Wilk's Lambda Time	.614	15.691	1.000	25.000	.001
	Wilk's Lambda Time * Grade	.574	3.708	5.000	25.000	.012
Short vowel consonant blend 15 pre and post	Wilk's Lambda Time	.824	2.349	1.000	11.000	.154
	Wilk's Lambda Time * Grade	.638	1.557	4.000	11.000	.253

Summary of the Results for Question 4

From the repeated measures analysis, we reject the null hypothesis and find that there is a difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade for two out of the nine assessments measured. These two assessments were for consonant sounds (p = .002) and long vowels (p = .002).

Summary

In this chapter, I reviewed the data collection, intervention fidelity, and I discussed the possible reasons why there were different time frames and results. There were four research questions in this study. The first question explicitly dealt with did the LL Program significantly improve PA skills for students with ID in a self-contained classroom. To answer this question, the analysis used was the pre-test/post-test design using a pair sample testing. The results were that the LL program does improve for six out of the nine assessments measured from doing the CORE Phonics Survey using the nonparametric tests.

For the analysis of the repeated measures data for Questions 2 through 4 caution is required due to assumption violations specifically assumption three that there are no outliers and assumption four that the distribution of the differences in the dependent variable is normally distributed between the groups. As I had two time periods, I was unable to run the nonparametric tests to fix this violation due to the nature of my study. Therefore, I went with the repeated parametric results but took a more conservative alpha level of .01.

The second question tested the difference in PA skills among elementary school students with ID in a self-contained classroom who received instruction in LL program based on the student's language ability (monolingual or bilingual). The results for this second question indicated that there was no difference in PA skills between monolingual and bilingual students. The third question tested the difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's severity of his or her ID (mild, moderate, or severe). The results indicated that there is no difference in PA skills between elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on his or her intellectual disability (mild, moderate, or severe). The fourth question tested the difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade. The results indicated that there is a difference in PA skills among elementary school students with ID in a self-contained classroom who receive instruction in the LL program based on the student's grade for three out of the nine assessments measured. In Chapter 5, I will provide an interpretation of the findings, limitations to the study, and give recommendations for further research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative, pre-experimental, pretest-posttest study design was to analyze whether LL, a researched-based program, was a useful tool for teaching students with ID the ability to read by using a multisensory approach to students with ID.

Out of the 30 schools that have a LIF Skills program, four schools participated in the study. Since eligibility does not drive placement for students, there were a few students who had a different eligibility placed in the LIF Skills program. All 76 students participated in the study. However, since the focus of this study was on students with the primary eligibility of ID, I filtered out of the analysis eight students who did not have a primary eligibility of intellectual disability. Thus, 68 students were in the analysis for this study.

To answer the research questions, for Question 1, I used a pretest-posttest design with a repeated dependent *t*-test sample, and Questions 2 through 4 utilized a repeated measures design. For the analysis of the repeated measures data for Questions 2 through 4, caution is required because of the assumption violations. Therefore, for these questions I took the results from the repeated measures parametric tests with a more conservative alpha level of .01.

The questions that had significant differences were for Questions 1 and 4. Question 1 assessed whether the LL program improved PA skills for students with ID in a self-contained classroom. The results of the pretest and posttest design were that the LL program improved six out of the nine assessments measured from doing the CORE Phonics Survey. With a more conservative alpha level .01, eliminated the assessment of

short vowels which had a p =.022. The two areas where we did not find a statistically significant difference were for the short vowels within a CVC word and the short vowel within the CB. Question 4 assessed whether there was a difference in PA skills for students with ID based on their grade; the results indicated that there is a difference in PA skills among elementary school students with ID in a self-contained classroom who received instruction in the LL program based on the student's grade for three out of the nine assessments. The three parameters that had an effect were for the consonant sounds, long vowel sounds, and for the short vowel CVC words.

Questions 2 and 3 were not found to have an effect. The findings were that there were no differences in PA skills between elementary school students based on their language ability (monolingual and bilingual) and for the student's severity of his or her ID (mild, moderate, or severe). For these two questions, the students showed improvement regardless of their language abilities and severity. In further analysis of Question 2 regarding the student's language, there was only a significant difference in time except in two assessments. The eighth assessment, short vowel in CVC words, the significance was marginal (p = .052) and for the ninth assessment for short vowel in CB words with a significance of p = .228. In contrast, when looking at Time x WIDA scores there was no significant difference in any of these assessments.

Likewise, for Question 3, only three of the nine assessments made a significant progress was time. The three assessments were letter uppercase recognition (p < .001), letter lower case recognition (p = .002), letter name upper case (p < .001). However, if I went with the more robust alpha level of .05, then two more assessments would be added

with the consonant sounds (p = .027). The short vowel assessment was marginal (p = .057). In contrast, there was not a statistically significance difference for Severity x Time for any of the nine assessments.

Even though Questions 2 through 4 must be viewed with caution, there is growth when one considers the language ability of the students, the severity, and the grades. The visual representations truly show this (see Figures 7, 8, 9, and 10).

In this chapter, I will discuss the interpretation of the findings, the limitations to this study, and recommendations.

Interpretation of the Findings

Students with ID can learn the foundational skills for reading by using a multisensory approach, explicitly using the LL program. From this study, students with ID showed gains with the following subtests from the CORE Phonics Survey: uppercase letter recognition, lowercase letter recognition, letter names uppercase, letter names lowercase, consonant sounds, long vowel sounds, short vowel sounds, and short vowel sound in CVC words. These research findings of using a multisensory approach support the conclusions from Pieretti et al. (2015), Quinney (2018), and Williams et al. (2014) that such an approach can effectively be used to teach early literacy skills. These three studies demonstrated that the multisensory approach works well with students with disabilities and without disabilities. Quinney's research focused on students with autism. Pieretti et al.'s study focused on children in preschool with speech disorders and Williams et al.'s study focused on students without disabilities in a kindergarten

classroom. Quinney and Williams et al. used the multisensory approach through LL, and Pieretti et al. used a multi-modal approach of FONEMZ.

Music is also essential to learn foundational skills for literacy. The LL program uses music to teach the consonants and vowel sounds. From this study, instructors indicated that the students enjoyed the music. This supports the findings of Hocanson's (2019) qualitative study that analyzed the use of music to teach phonics in a kindergarten classroom. All the instructors in Hocanson's study indicated their belief not only that students will have better retention in learning phonics, but also that music provides an added benefit for classroom management.

The two main theories for this study were Bandura's (1977) social cognitive theory and Mayer's CTML (2005). In Bandura's social cognitive theory, the concepts of observation and motivation have a vital role. Students are active learners in doing the LL program. They observe and act on the movements while doing the songs. They also have the visual component to assist them in learning the sounds. Additionally, with Mayer's theory, the LL picture cards give enough information on the card which does not overwhelm the student with too much information to know how to make the sounds. Even the songs are short and to the point, which maintains the attention of the student. Furthermore, the LL program benefits both monolingual and bilingual students because of the visual representation of the cards and the stories to assist the students in remembering how to make the sounds. Overall, using the LL program supports the main ideas that Bandura and Mayer discussed in their theories. Bandura also discussed the concept of triadic reciprocality; using the LL program, the instructors are manipulating

the environment so their students can learn the fundamental reading skills in an environment that is conducive to the students' learning.

Limitations of the Study

There were limitations to this study. The first was the number of students: there were 68 students involved in the study, which represented 17% of the students in the LIF self-contained classrooms. Another limitation is the type of design for this study, which was a pre-experimental, pretest-posttest design in which there is the possibility of maturation. However, I do not believe that the students in this study reached maturation because students with ID can learn the skills of phonics and phonemic and phonological awareness, but it takes an extended amount of time to learn them (Allor et al., 2013; Allor et al., 2014). The pre and posttests assessments using the CORE Phonics Survey assessed for the possibility of maturation. An additional limitation was that, due to budget constraints, the instructors were not able to purchase the LL app. The app is a great way to assist the students in learning the sounds and being able to read words. Additionally, there was the time constraint of consistency in doing the LL program. This study started in August 2019 to January 2020. The students had a week off at Thanksgiving and 2 weeks off for winter break. Few of the instructors did their post-assessment in January, which was after the students' winter break; therefore, some students did not do as well in their post-assessments. A possible explanation for students' not doing well is the concept of regression-recoupment, which is what students experience when they have been out of school for an extended amount of time (Barnard-Brak & Stevens, 2020; Burke & Decker, 2017). They lose the skills they have learned, and it takes time for them to regain their

skills. Another limitation was that one student who started the study transferred to a new school. Finally, the results of this study cannot be generalized to other self-contained classrooms and school districts.

Recommendations

The first recommendation is for the self-contained primary classes (kindergarten through second grade), especially when there are behavioral concerns within the classroom. Instructors should focus the first quarter or even the first semester of school teaching the learning to learn behaviors and getting their students used to the classroom routines and behaviors; then, when the students obtain the necessary skills, instructors can focus on the academics. One instructor from the self-contained primary class had to discontinue the study because she had to address the students' behavior. The instructor had to work on their hierarchy of needs, such as teaching the students' toileting and feeding skills.

Additionally, she indicated that some of her students had never been in the class before and did not have the learning to learn skills. According to Webster (2019, April 5), learning to learn skills consist of being able to attend to the tasks, which include paying attention to the instructor or when students are presented with materials to use in the class. Additionally, students need to sit appropriately and wait for the instructions or materials from the instructor.

A second recommendation is to do the post-assessments during a time when there are not so many holidays or vacations, so students will not experience regression-recoupment. A few of the instructors did their post-assessments after the winter break.

There were a few students whose scores went down or who made no response to the post-testing. This may be because they had their posttest after their 2-week winter break. When I emailed one of the instructors for clarification about the scores, the instructor mentioned that if she had been able to work with the students for a month, the scores might have been better. This possibility of having more time is in line with the concept of the regression- recoupment period.

A third recommendation in order to deal with the budget constraints is to write a grant to be able to purchase the LL app and the LL materials so the students will be able to continue the multisensory approach in learning how to read.

A fourth recommendation is for general and special education teachers to collaborate with each other so they can utilize different types of activities that enhance their students' skills in learning the phonemic awareness skills. This addresses the point that students with ID can learn the phonemic awareness skills but require an extended amount of time to do so. By using different techniques, the students will not become bored by using the multisensory techniques.

Finally, there is the recommendation that LL be incorporated into the curriculum to teach reading skills and this evidence-based program complements the current curriculum of the ULS that the special education teachers are already implementing in their classrooms.

Implications

Positive Social Change

IDEA stressed the importance that students with disabilities have an equal opportunity to learn the skills to live independently and with "economic self-sufficiency" (1400.c). Therefore, the effectiveness of using a multisensory approach can assist students with ID in becoming more independent in their reading skills. These skills include advancing their ability to decode novel words for their academic subjects and statewide testing, but also be successful in reading material out in the community once they leave high school. In being able to read novel words, students with ID will have the opportunity to be able to find jobs and lead a productive life .

Recommendations for Practice

Students with and without disabilities need to be socially accepted. One possible way for this acceptance is for students in the LIF self-contained classrooms and students in the general education work together in learning how to read. The general and special education teachers can co-teach the LL program to their students in the classroom. The instructors can strategically match students without disabilities to students with ID. There can be four in a group that consists of two students from the general education classroom with two students from the self-contained class. Beck et al. (2010) recommended that for the groupings, from the general education classroom, a girl should be paired with a male with the two students from the self-contained classroom. The reason is that Beck et al. found that there was an increased acceptance of students with disabilities that occurred with females and with typically achieving students who had an increased familiarity with

students with disabilities. Even though this study was back in 2010, it is still applicable today through the research of Radici, Heboyan, Mantovani, and De Leo (2020). These researchers found from their study, that females showed a more positive attitude towards a person with disabilities than male subjects. Therefore, through this grouping, students who are unfamiliar with disabilities or even males can learn the appropriate way to work with students with disabilities. This modeling supports Bandura's theory of observation, that students learn through observation. Furthermore, the advantages of small group instruction are that students can learn other sounds that their peers are learning along with their own targeted sounds (Chai, 2017).

The advantages of grouping students are the following. First, according to IDEA, students with disabilities need to be with students without disabilities. Using music and doing the activities, including the LL app, both groups can learn the fundamental skills for reading. The second advantage is one of acceptance. Dada, Horn, Samuels, and Schlosser (2016) found that there was a better attitude towards students who used an iPad. Students who are nonverbal can use their iPad to learn literacy skills and then when required, use the speech generating software to communicate their needs and wants.

To follow the guidelines of IDEA that students need to be in the general education classroom, instructors and staff need to mindful of students who are nonverbal. One way to bridge the gap of a student with alternative augmentative communication (AAC) devices and students without disabilities is using the iPad. When both classrooms (general education and self-contained) meet for the LL session, the students can utilize the LL app with the iPads. Students are more accepted by others when they do common

activities. In this way, students who are nonverbal can quickly switch from the LL app to their speech-generating software to indicate their needs and wants.

Future Research

Future research ideas are endless. The main ones include the following:

- Future research should continue to analyze the LL program in the self-contained classrooms for students with ID but have a more robust sample size.
- The research should also look at the continuous quality improvement (CQI) in which the instructors can assess midway through the program to see if they need to adapt their instruction.
- Another possibility is to do a longitudinal study to follow the students to see how they progress with their reading skills.
- Have the students paired with students without disabilities to learn the foundational reading skills not only will this adhere to the mandates of IDEA but also will have the added benefit of social acceptance.

Conclusion

Historically, the curriculum for students with ID did not focus on reading skills for students with ID. Instructors taught the sight-word recognition approach or a functional reading approach to assist students with their ADLs. The difficulty with the functional reading approach does not teach students how to read novel words. However, after the passing of NCLB, instructors were accountable to teach students evidence-based practices to teach reading to students

Therefore, this study looked at if the LL program was an effective tool in being able to teach monolingual and bilingual students with ID in a self-contained classroom the ability to read. The LL program is a multisensory program that utilizes music, mnemonics, and movement to teach phonemic awareness and phonics skills. The reason for the LL program is that students with ID have strong visual processing skills (Lemons et al., (2018). The cards used in the program have a visual representation on how to produce the sounds. Once the student knows the sounds with these cards then the instructor can generalize the students to the plain picture cards. Additionally, with the LL program the instructors can adapt the program to the students' needs.

The two main theorists for this study were Bandura's social cognitive theory and Mayer's CTML. In Bandura's social cognitive theory, the concepts of observation and motivation have a vital role. Students are active learners in doing the LL program. They observe and act on the movements while doing the songs. They also have the visual component to assist them in learning the sounds. Being able to attend to the tasks is important in both theories. The students can do this with the assistance from the instructors. The LL program complements these two theories by using the multisensory approach. The program considers the components of Mayer's theory, in not overwhelming the student. For example, the LL picture cards give enough information on the card which does not overwhelm the student with too much information to know how to make the sounds. Even the songs are short and to the point which maintains the attention of the student. Furthermore, the LL program benefits both monolingual and

bilingual students because of the visual representation of the cards and the stories to assist the students in remembering how to make the sounds.

All the students in the four self-contained elementary classrooms participated in the study, there were 76 students, but eight students were filtered out of the study because they did not have the primary eligibility of ID. The results from the study that there were statistically significant differences for the first and fourth questions. The LL program improved PA skills for students in a self-contained classroom for seven out of the nine assessments. The fourth question dealt with grades. There was a statistically significant difference in consonant sounds and long vowels.

The major limitation to the study was its sample size. The study only had 68 students. Even though the Raosoft sample indicated that for a good sample I would need 58 students with a with a confidence level of 95%. However, The CORE Phonics Survey becomes progressively harder with each assessment therefore I did not have 58 students for many of the assessments. If I had a more robust sample, it is felt that I would not have violated the assumptions specifically for the fourth assumption that the dependent variable had to be normally distributed between the groups.

There were four recommendations. The first one was for the primary self - contained classroom to do the LL program during the second semester of school so students can learn the learning to learn behaviors. Second, to do the post assessments when there are not so many holidays or vacations so students will not experience regression-recoupment. Third, dealt with budget constraints for the possibility of writing

a grant to purchase the LL app and additional LL materials. The last one dealt with collaboration among the special and general education teachers.

Future research ideas addressed the possibility of continuing to analyze the LL program in LIF self-contained classrooms but have a more robust sample size, research can look at the continuous quality improvement, to do a longitudinal study, and have the students paired with students without disabilities.

The positive social change from this study is that students with ID will be able to learn the foundational skills for reading with a multisensory approach. Not only will they be able to decode novel words for school-based subjects but be able to be successful once they leave high school.

In summary, the results from this study are very promising, even though they must be viewed with caution. From the results of this study, it helped bridge the gap in the literature, that the LL program, a multisensory program, is a remarkably effective tool to teaching the foundational skills for reading in a self-contained classroom for students with ID. Ainsworth, Evmenova, Behrmann, and Jerome (2016) said it best that "IQ scores are not impediments to literacy skill acquisition …When instruction is direct and systematic, students from all disability categories can make progress" (p. 165). The results from this study support Ainsworth et al. that yes, students with ID can learn how to read with the proper supports.

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Appendix A: Letter to Principals

Good Afternoon,

You are invited to take part in a research study about how the Lively Letters (LL) program can assist students with intellectual disabilities in learning how to read. The researcher is inviting special education instructors who teach students with intellectual disabilities in the self-contained LIF program to be in the study.

This study is being conducted by Barbara Forney-Misuraca, who is a doctoral candidate at Walden University. You might already know Barbara as a speech-language pathologist for the School District, but this study is separate from that role.

Background Information:

The purpose of this quantitative, pre-experimental, pre-test-post-test study is to analyze whether LL, which is a researched based program, is an effective tool to augment the current curriculum of the Unique Learning System (ULS) for teaching students with ID in a self-contained life-skills classroom to learn how to read. The advantages of incorporating the LL program is that it utilizes a multisensory (music, pictures, physical movements, and mnemonics) approach to teach students to learn how to read.

Procedures

If you and your instructors volunteer to participate in this study, you will need to do the following:

a. Instructors will need to be trained in the Lively Letters Program
b. Administer the CORE Phonics Survey as a pretest and posttest.
c. To maintain consistency of the study, instructors will need to do the Lively Letters Program 4 to 5 times a week for 45 minutes.

It is anticipated that the study will be 8 to 10 weeks.

I will also need the de-identified data for the following:

a. The students' current grade (1st, 2nd etc.)
b. The students' primary eligibility status and the severity of their eligibility (mild, moderate, or severe intellectual disability)
c. The students' WIDA score if applicable.
d. The pretest and posttest CORE Phonics Survey data.

Voluntary Participation

Participation in this study is voluntary. You may refuse to participate in this study or withdraw from this study at any time without any negative consequences.

Risks and Benefits of Participation

As with any research project, there are risks. For this specific study, the risks are minimal. There is a possibility for the breach of confidentiality. However, there will be many steps to ensure that this will not occur.

A possible benefit from doing the Lively Letters program is to assist students with intellectual disabilities to be more engaged in learning how to read by using a multisensory approach. Research has shown that students with intellectual disabilities can learn how to read based on the foundational skills of reading (phonemic awareness,

phonological awareness, and phonics) but takes an extended amount of time to do so (Allor et al., 2013; Allor et al., 2014; Barker, 2013). Since it does take an extended amount of time to read, there may be some behavioral issues such as inattention, difficulties in dealing with other peers, and noncompliance in doing assigned tasks (Allor et al., 2013; Allor et al., 2014).

It is my hope that the Lively Letters program can assist students with their attention and increase their compliance with the tasks using music, physical movements, pictures, and mnemonics.

We hope to learn if using the Lively Letters program is a beneficial tool to augment the current curriculum of ULS in order to teach students with ID to learn how to read novel words.

Cost/ Compensation

There is a financial cost of buying the supplies for this program. The authors of the Lively Letters program will train the special education instructors who teach in the LIF program for free (6 hours) and will give 50% off the supplies for the program.

The overall cost for the supplies that each instructor will receive is approximately $89 dollars and with 10% shipping cost. I have attached the letter from the authors for you to read.

You will not be compensated for your time.

Privacy

Throughout this study, all the information and data collected will be kept confidential. For any public records, we will make sure that we have not included any information that can make it possible to identify you or the school. To ensure confidentiality, I will store all paper and pencil assessments such as the CORE Phonics assessments in a locked filing cabinet so unauthorized persons will not be able to see the results. Furthermore, the information on the computer that I will be using is password protected, and I change the password every three months. I will destroy the data five years after the completion of this study.

If you should have any questions or need clarifications about this study, please e-mail me or call me.

I want to thank you for your consideration of doing this study.

Respectfully submitted,

Barbara Forney-Misuraca, M.A. CCC-SLP

Speech- Language Pathologist

Attachments:

a. Letter of Acknowledgement of a Research Project at a CCSD Facility
b. Quote for the Lively Letters training and materials

Appendix B: Letter to the Teachers

I want to thank you again for doing this study for me.
I just wanted to give you some information about the study.

Background Information:

The purpose of this quantitative, pre-experimental, pre-test-post-test study is to analyze whether LL, which is a researched-based program is an effective tool to augment the current curriculum of the Unique Learning System (ULS) for teaching students with ID in a self-contained life-skills classroom to learn how to read. The advantages of incorporating the LL program is that it utilizes a multisensory (music, pictures, physical movements, and mnemonics) approach to teach students to learn how to read.

Procedures

a. Instructors will need to be trained in the Lively Letters Program
b. Administer the CORE Phonics Survey as a pretest and posttest.
c. To maintain consistency of the study, instructors will need to do the Lively Letters Program 4 to 5 times a week for 45 minutes.

Timeline: It is anticipated that the study will be 8 to 10 weeks.

Deidentified Data: I will also need the de-identified data for the following: (I will make a spreadsheet for you to fill out with the information).

a. The students' current grade (1^{st}, 2^{nd} etc.)
b. The students' primary eligibility status and the severity of their eligibility (mild, moderate, or severe intellectual disability)
c. The students' WIDA score if applicable.
d. The pretest and posttest CORE Phonics Survey data.

Voluntary Participation

Participation in this study is voluntary. You may refuse to participate in this study or withdraw from this study at any time without any negative consequences.

Risks and Benefits of Participation

As with any research project, there are risks. For this specific study, the risks are minimal. There is a possibility for the breach of confidentiality. However, there will be many steps to ensure that this will not occur.

A possible benefit from doing the Lively Letters program is to assist students with intellectual disabilities to be more engaged in learning how to read by using a multisensory approach. Research has shown that students with intellectual disabilities can learn how to read based on the foundational skills of reading (phonemic awareness, phonological awareness, and phonics) but takes an extended amount of time to do so (Allor et al., 2013; Allor et al., 2014; Barker, 2013). Since it does take an extended amount of time to read, there may be some behavioral issues such as inattention,

difficulties in dealing with other peers, and noncompliance in doing assigned tasks (Allor et al., 2013; Allor et al., 2014).

It is my hope that the Lively Letters program can assist students with their attention and increase their compliance with the tasks using music, physical movements, pictures, and mnemonics.

We hope to learn if using the Lively Letters program is a beneficial tool to augment the current curriculum of ULS to teach students with ID to learn how to read novel words.

Privacy

Throughout this study, all the information and data collected will be kept confidential. For any public records, we will make sure that we have not included any information that can make it possible to identify you or the school. To ensure confidentiality, I will store all paper and pencil assessments such as the CORE Phonics assessments in a locked filing cabinet so unauthorized persons will not be able to see the results. Furthermore, the information on the computer that I will be using is password-protected, and I change the password every three months. I will destroy the data five years after the completion of this study.

If you need the CORE Phonics Assessment, I will be able to give that do to you.

If you should have any questions or need clarifications about this study, please e-mail me or call me.

Again, thank you so much,

Barbara Forney-Misuraca

Appendix C: De-identified Worksheet

De-identified Data Worksheet

You do not need to turn in this form. This form is for you to remember who has the codes for the de- identified data of your students. Then you can transfer this information to the

a. Demographics, Eligibility, and WIDA Information
b. The Pre and posttest CORE Phonics Survey.

Student's Real Name	De-identified Data
	Student 1
	Student 2
	Student 3
	Student 4
	Student 5
	Student 6
	Student 7
	Student 8
	Student 9
	Student 10
	Student 11
	Student 12
	Student 13
	Student 14

Appendix D: Demographics. Eligibility and WIDA Information and Sample Worksheet

Demographics, Eligibility, and WIDA Information

You will be giving me the de-identified information for your students.

Please indicate the following information:

Student	Primary or Intermediate LIF Program	Current Grade	Primary Eligibility	Secondary Eligibility (if applicable)	Severity (Mild, Moderate, or Severe,	WIDA Score if applicable	Comments

Demographics, Eligibility, and WIDA Information Sample

You will be giving me the de-identified information for your students.

Please indicate the following information:

Student	Primary or Intermediate LIF Program	Current Grade	Primary Eligibility	Secondary Eligibility	Severity (Mild, Moderate, or Severe)	WIDA Score if applicable	Comments
Student 1	Primary	Kindergarten	ME	-	Mild	NA	
Student 2	Primary	1st	MU	-	Moderate	Level 1	
Student 3	Primary	2nd	ME		Severe	NA	

ME= Intellectual Disability

Mu = Multiple impairments

Appendix E: Lively Letters Tracking Form and Sample Sheet

Date study began_____

Week	Week of:	Number of Days you were able to do the Lively Letters Program ?	Amount of time for each day you were able to do the Lively Letters program?	Sounds you were able to do?	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Date study began_____

Sample

Week	Week of:	Number of Days you were able to do the Lively Letters Program?	Amount of time for each day you were able to do the Lively Letters program?	Sounds you were able to do?	Comments
1	9/9	M T W Th	45 min, 30 min, 45 min, 45 min	P, b started t, d	The students are enjoying the program and the centers. They caught on very quickly and was able to start the /t, d/. 30 minutes because of an assembly.
2					
3					
4					
5					
6					
7					
8					
9					
10					

Appendix F: Summary Sheet for CORE Phonics

Alphabet Skills and Letter Sounds

	Letter Recognition Uppercase (/26)		Letter Recognition lower case (/26)		Letter Names Upper case (/26)		Letter Names Lowercase (/26)		Consonant sounds (/23)		Long Vowel Sounds (/5)		Short Vowel Sounds (/5/	
	Pretest	Post Test	Pretest	Post Test	Pretest	Posttest	Pretest	Posttest	Pretest	Post test	Pretest	Post test	Pretest	Posttest
Student 1														
Student 2														
Student 3														
Student 4														
Student 5														
Student 6														
Student 7														
Student 8														
Student 9														
Student 10														
Student 11														
Student 12														
Student 13														
Student 14														

Reading and Decoding Skills

	Short vowels in CVC words (/15)		Short vowels and consonant blends (/15)		Short vowels, digraphs, and – trigraphs (/15)		R controlled vowels (/15)		Long Vowel Spellings (/15)		Variant Vowels (/15)		Low frequency vowel and consonant spellings		Multisyllabic Words	
	Pretest	PostTest	Pretest	Post Test	Pretest	Posttest	Pretest	Posttest	Pretest	Post test	Pretest	Post test	Pretest	Posttest	Pretest	Post test
Student 1																
Student 2																
Student 3																
Student 4																
Student 5																
Student 6																
Student 7																
Student 8																
Student 9																
Student 10																
Student 11																
Student 12																
Student 13																
Student 14																

Appendix G: Permission to use the Lively Letters Program

3/28/19

Reading with TLC

775 Pleasant Street, Suite 6

Weymouth, MA 02189

Dear Nancy Telian,

I am working on my doctoral dissertation at Walden University entitled Increasing Reading Skills for Students with Intellectual Disabilities Through Lively Letters. I would like to request your permission to use the Lively Letters program, songs, and Lively Letters Phonemic Awareness and Phonics App for iPads. Within the dissertation, I would also like to give a couple of examples of how the mouth cues for the letters are embedded into the pictures.

The requested permission extends to any future revisions and editions of my dissertation and to the prospective publication of my dissertation by Pro-Quest Dissertation, Publishing. ProQuest may produce and sell copies of my dissertation on demand and may make my dissertation available for free internet download at my request. These rights do not in any way restrict republication of the material in any form by you or by others authorized by you. By signing this letter, it will also confirm that you own the copyright to the above –described material.

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Respectfully submitted,

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