THE IMPACT OF USING ELKONIN SOUND BOXES FOR STUDENTS WHO ARE AT-RISK FOR DYSLEXIA

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DEDICATION

To my husband of almost 25 years, Steve and our three boys, Cayden, Carson, and Cale, who have tolerated absences away from them during this endeavor. They all have encouraged me during these last six years as I have earned two master's degrees and now a PhD.

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ABSTRACT

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Dyslexia is a common, lifelong, language and brain-based learning disability that can affect language processing and may lead to difficulties with reading, spelling, and writing. Symptoms of dyslexia include problems with decoding or single word reading, poor reading fluency, and poor spelling (IDA, 2018a). The use of Elkonin Sound Boxes (ESBs) is a specific instructional method used primarily with early elementary students; ESBs help students build phonemic awareness by segmenting words into individual sounds or syllables (Durst & Joseph, 2016). Adding to the current literature on the importance of early screening, early identification, and early intervention related to students' overall reading progression from the results of this study. Results indicate that ESBs is associated with an increase in identifying letter sounds and word identification of consonant-vowel-consonant (CVC) words across all participants. Discussed are the implications of these findings and future steps for further research on ESBs intervention.

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CHAPTER I

INTRODUCTION

Dyslexia is a common, lifelong, language and brain-based learning disability that can affect language processing and may lead to difficulties with reading, spelling, and writing. More than 60% of students per year (over two million children) have trouble learning to read and fail to meet standards for reading proficiency (National Assessment of Educational Progress, 2017, as cited in Handler, 2018). One evidence-based early intervention for students at-risk for dyslexia is the Elkonin Sound Box (Keesey et al., 2015). The Elkonin Sound Boxes (ESBs) are a specific instructional method used primarily with early elementary students; ESBs help students build phonemic awareness by segmenting words into individual sounds or syllables (Durst & Joseph, 2016). Additionally, ESBs also teach students how to count the number of phonemes in words and can help students understand alphabetic principles in decoding and encoding (National Institute of Child Development [NICHD], 2000).

In 2000, the National Reading Panel (NRP) report found teaching students to recognize and manipulate segments of sounds in words (i.e., phonological awareness) and to link those sounds to letters was necessary to prepare students to read words and comprehend text. Of the 17 relevant studies reviewed by the What Works Clearinghouse (WWC) staff and panel assigned to this recommendation, they determined the level of evidence was strong. All of the studies found positive effects in at least one of the two domains: letter names and sounds, and phonology (Foorman et al., 2016).

To give an overview of the development of dyslexia, one should look back at the international medical literature where the term *dyslexia* was first coined in 1887 by Rudolf

Berlin, a German ophthalmologist and professor at Stuttgart (Anderson & Meier-Hedde, 2001; International Dyslexia Association [IDA], 2002; Wajuihian & Naidoo, 2011). It was the German physician Adolph Kussmaul in 1877 who first developed the concept of word-blindness. The term word-blindness is an old-fashioned phrase used to describe dyslexia when it was first referred to by doctors in the late 19th century to mean that a person is unable to recognize and understand words that he/she sees (i.e., reading printed words). The IDA was born in the 1920s with direct roots to Dr. Samuel T. Orton's pioneering studies in the field of reading research and multisensory teaching. In 2002, IDA Research Committee and the National Institute of NICHD proposed a revised definition that describes dyslexia as a specific learning disability, that is neurobiological in origin.

There have been many different definitions over time for dyslexia. The IDA defines dyslexia in the following way: Dyslexia is a specific learning disability (SLD) that is neurobiological in origin (IDA, 2002). Difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities is a key characterization. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (IDA, 2017a). In 2017, the United States Senate voted unanimously as part of the Senate Resolution 284, 115th Congress to establish the following definition of dyslexia: 1) an unexpected difficulty in reading for an individual who has the intelligence to be a much better reader; and 2) most commonly caused by a difficulty in phonological processing (the appreciating of the individual sounds of

spoken language), which affects ability of an individual to speak, read, and spell, and often, the ability to learn a second language (Toolkit, 2018).

The Individuals with Disabilities Education Act (IDEA) is federal educational law that makes available a free appropriate public education (FAPE) to eligible children with disabilities and ensures special education and related services to those students (IDA, 2017a).

Dyslexia is the most common SLD, representing 80% of all learning disabilities. Some degree of dyslexia occurs in 15–20% of students in the US, unfortunately is often under identified and approximately 5% of children have dyslexia severe enough to qualify for special education services (Handler, 2018).

The identification of a child with dyslexia is a challenging process. However, there are ways that teachers and parents can learn more about the reading difficulty and support children (Hudson et al., 2007). Research indicates that reading disabilities can manifest themselves as language difficulties during preschool while the latter problems can be used to identify children who are at-risk and should provide them with early intervention (Catts & Hogan, 2003). The diagnosis may involve screening tools which are relatively simple and quick methods of indicating whether a student might have dyslexia. While dyslexia screening tools are beneficial to use when first determining deficits of some students, full assessments might be necessary for other students. A comprehensive evaluation for dyslexia typically includes intellectual and academic achievement testing, in addition to assessment of the critical underlying language skills that are closely linked to dyslexia (IDA, 2017b).

The state of Texas, while still using the term SLD for identification and intervention for students with reading disabilities, separates the identification and services delivery for dyslexia from SLD and provide guidelines for parents and educators through published dyslexia

handbooks and other informational documents (Youman & Mather, 2013). Texas is one of only 10 states in the US to have a dyslexia handbook for parents and educators (Youman & Mather, 2018). Texas has also adopted teacher training and practice standards for those who work with students with dyslexia. Additionally, Texas allows for students with dyslexia to have access to further assessments who will be attending an institution or higher education (Youman & Mather, 2015).

Intervention studies have demonstrated that intensive; daily, one-on-one, and small group, phonologically-based treatments can close the gap for reading accuracy, even with students who fall as low as the second percentile in word-level reading skills (Alexander & Slinger-Constant, 2004). Utilizing interventions at an early age can result in higher rates of progress and possibly closing the reading gap for some students who are at-risk for dyslexia. Reading programs that follow the IDA guidelines call for a structured literacy (SL), which prepares students to decode words in an explicit and systematic fashion. SL instruction includes several elements, including; phonology, sound-symbol association, syllable instruction, morphology, syntax, semantics, systematic and cumulative, explicit instruction, and diagnostic teaching (IDA, 2017a). Multisensory learning, based on Orton-Gillingham techniques, includes the use of visual, auditory, tactile and kinesthetic pathways simultaneously to enhance student learning, the more effective reading instruction for struggling readers is SL according to Handler (2018).

The later interventions begin, the longer they take to work for students, the longer they need to be implemented each day, and the less likely they are to produce desired effects for students (Petscher et al., 2019). Extensive evidence exists that supports that early intervention is critical (IDA, 2017b). Problems with slow or inaccurate word reading can, in turn, be a

roadblock that impedes adequate reading comprehension (Snowling, 2013). Primarily because reading problems can be prevented, early problems can be remediated and it can increase student progress (Petscher et al., 2019).

Reading interventions that begin in third grade or later are likely to be less successful and less cost-effective than interventions that begin in the younger grades (Petscher et al., 2019). It takes four times as long to intervene in fourth grade than it does in late kindergarten due to brain development and the increase in content for students to learn as they grow older (IDA, 2018c).

It is crucial to recognize the signs of the common symptoms of dyslexia. Early detection of dyslexia involves teachers and specialists trained in language concepts, reading theory, and the common signs of dyslexia. It is possible to identify potential reading problems in young children even before the problems turn into reading failures. For students with undiagnosed literacy-related disabilities, including dyslexia, early screening and intervention services are critical (Petscher et al., 2019). Early screeners and interventions should focus on early literacy skills as well as areas of self-regulation and executive control that can hinder the development of reading, writing, and language processing, and comprehension (Petscher et al., 2019). Students at risk for reading difficulties can be reliably identified even before kindergarten (IDA, 2018c). Rapid dyslexia screening tests have now been developed for use in kindergarten and first grade students (Handler, 2018). It is imperative for parents and educators to know what to look for and begin intervening early. The earlier reading difficulties are identified, the more students will advance with their reading skills with proper intense interventions. Early identification, intervention and treatment is the key to helping individuals with dyslexia, or those who show warning signs of dyslexia, achieve in school and in life (IDA, 2017a).

Early intervention programs in kindergarten and first grade can increase reading skills to grade level for nearly 90% of poor readers (Handler, 2018). Early intervention with intense, explicit instruction is critical for helping students avoid the lifelong consequences of poor reading. Moreover, involving parents early in the process of identifying what programs and services are best for their child will ensure greater levels of success and cooperation between school and home (Hudson, 2007). Dyslexia can be treated through early intensive interventions by highly trained educators who teach reading skills and explain language in patterns that are explicit, systematic, and multisensory (Handler, 2018).

One specific early intervention for students at risk for reading difficulties such as dyslexia is known as ESBs. These boxes are a specific instructional method primarily used in early grades to help build phonological awareness by segmenting words into individual sounds or syllables. These sound boxes can also serve as a supportive visual structure to help students string together sounds and blend them to form words. The ESBs intervention has a substantial research base and the current study can be added to the many studies showing evidence of progress with letter sound, spelling and reading skills in young children.

Statement of the Problem

Extensive evidence supports the use of early screening and early intervention with students who have undiagnosed literacy-related disabilities, including dyslexia (IDA, 2017). Symptoms of dyslexia include problems with decoding or single word reading, poor reading fluency, and poor spelling (IDA, 2018a). Early screening and early intervention may help prevent reading problems, remediate early difficulties, and increase student overall progress (Petscher et al., 2019). Children as young as three years old may demonstrate precursors to dyslexia, including deficits in phonological awareness, rapid automatized naming, verbal

working memory, and letter knowledge (Gaab, 2017). Research indicates that reading disabilities often manifest as language difficulties in preschool-aged students; identifying and acting on early indicators could increase these students' access to the early intervention necessary to limit the impact of reading difficulties (Catts & Hogan, 2003). Even before kindergarten, children at risk for reading failure can be reliably identified and begin to receive interventions (IDA, 2018c). Since early identification is critical when designing interventions and strategies for success for students with dyslexia, educators need training in identifying students at-risk for reading difficulties, and how to provide appropriate educational interventions for students who are struggling.

Research Question

This study added to the current literature on the importance of early screening, early identification, and early intervention related to students' overall reading progression. Early screening, identification, and intervention can help individuals who are at-risk for dyslexia achieve in school and in life (IDA, 2017b). This study also contributed to the current literature on effective early interventions for students who show reading difficulties at early ages. This study focused on the following research question: What is the impact of using ESBs to sound out letters and read words for students who are at-risk for dyslexia or other reading disabilities?

CHAPTER II

REVIEW OF RELATED LITERATURE

First coined by Rudolf Berlin, the term dyslexia has a deep history of interpretation, use, and understanding spanning from the 1600s to the early 1900s (Kirby, 2018). The word dyslexia is a derivative from the Latin words dys (dis = difficult/impaired) + legere (to read) and a combination of the Latin and Greek words dys + Greek lexis (speech). As a result, dyslexia would mean difficulty with reading and speaking or the absence of language (Richardson, 1992). Another German pioneer in reading difficulties was Adolph Kussmaul, a German neurologist and a professor of medicine at Strassburg, 1877. Kussmaul was the first to introduce the labels *word-blindness* and *word-deafness* when referring to reading disabilities in adult patients in spite of their normal sensory acuity and average intelligence (Anderson & Meire-Hedde, 2001; Pullen, 2016). The outcomes of this literature review were conclusive that early interventions are beneficial for students who are at-risk for reading difficulties. Using early interventions gives students an advantage in learning specific strategies and interventions, such as explicit instruction, multisensory methods, and assistive technology. This dissertation supports the research that proves early intervention for reading is beneficial, especially for those who may have dyslexia characteristics.

Development of Dyslexia

In an effort to align the diagnosis with contemporary international medical literature the term dyslexia was coined in 1887 by Rudolf Berlin, a German ophthalmologist and professor at Stuttgart (Anderson & Meier-Heede, 2001; IDA, 2002; Wajuihian & Naidoo, 2011). Berlin observed the difficulties faced by some of his adult patients in reading printed words, but he found no problem with their vision; therefore, he speculated that their difficulties must be caused

by some physical change in the brain (Kirby, 2018). There is still continuing interest in the role of vision factors in dyslexia; however, most research suggests that issues with vision does not cause difficulties in reading printed words (Snowling, 1996). Yet a specific definition evaded professionals for more than one hundred years (IDA, 2002).

Although dyslexia was originally used by Berlin to describe a group of patients who had great difficulties in reading due to cerebral disease (Richardson, 1992), it was Kussmaul who first identified the kind of difficulties described by Berlin. Kussmaul described these difficulties (i.e., reading printed words) as *Wortblindheit* or word-blindness (Kirby, 2018). The term word-blindness is an old-fashioned phrase used to describe dyslexia when it was first referred to by doctors in the late 19th century to mean that a person is unable to recognize and understand words that he/she sees.

Prior to the 1900s, the topics of child development and how children learn were theorized without much research. The medical profession played the dominant role identifying learning difficulties in those days (Anderson & Meire-Hedde, 2001; Pullen, 2016). In 1896, W. Pringle-Morgan, a general practitioner, and John Hinshelwood, an ophthalmologist, also writing at the turn of the century, speculated that such difficulties with reading and writing were due to *congenital word blindness*, and for many years the dominant view was that dyslexia was caused by visual processing deficiencies (Snowling, 2001; Stein, 2018; Temple & Marshall, 1983).

In *The Lancet* in 1900, the first medical literature that attempted to analyze and explain the symptoms of word blindness, were identified. John Hinshelwood theorized the primary area of disability was defective visual memory for letters and words (Pullen, 2016; Richardson, 1992). Hinshelwood wrote about two cases of word blindness and was the first researcher that discussed the difficulties in teaching children with this condition could be overcome by

persistent training (Richardson, 1992). James Hinshelwood was the first physician to advocate a specific instructional approach for written language disorders in children, advocated for one-on-one teaching and using what he called the alphabetic method in a multisensory approach (Richardson, 1992). Hinshelwood was a pioneer in the area of research related word-blindness and the implications the disability had on education. As knowledge about the disorder continued to grow and develop, research instructional practices related to dyslexia also increased. By the early 1900s, practitioners and researchers in the United States were focusing their attention on reading disabilities in children, especially from an educational perspective (Pullen, 2016).

In alignment with the previous research surrounding dyslexia, Samuel Torrey Orton made several major contributions to our understanding of dyslexia today. First, he published a paper in 1925 detailing word-blindness in school aged children. Next, in a presentation to the American Neurological Association (ANA) in Washington, DC, Orton was able to highlight the topic of word-blindness in school aged children in front of an audience of annual meeting members. Orton's presentation was a turning point in the field of dyslexia in that it was the first report in the American medical literature on individuals with word-blindness (Kirby, 2018; Richardson, 1992). Additionally, Orton also introduced the term *strephosymbolia* referring to the difficulty of reversing letters in print when reading. Also, Orton reportedly encouraged the use of the term *development* rather than *congenital*, because he thought congenital included both hereditary tendency and environmental factors (Richardson, 1992). Although Orton's theory of cerebral dominance proved incorrect, it was key to shifting the discussion of dyslexia's origin toward theories of cognitive development as opposed to brain functions (Kirby, 2018). Until the mid-20th century, most people believed that developmental dyslexia was a hereditary deficit affecting

the visual processing of words, leaving oral language and non-verbal reasoning skills relatively intact (Stein, 2018). Equally important, sensory connections began to be a topic of discussion.

Orton was the first medical scientist to stress the unity of the language systems and its sensory-motor connections and favored using a multisensory approach to reading. Listening, speaking, reading, and writing are all interconnected functions of the system of communication are recognized as language (Pullen, 2016, Richardson, 1992). Orton was one of the first researchers to advocate phonics instruction for those with dyslexia. This similar approach is still recommended today (Kirby, 2018). Orton, along with Anna Gillingham, promoted explicit phonics and mixed instruction using this multisensory idea, known as the Orton-Gillingham approach. The Orton-Gillingham approach, or parts of it, remain popular methods still today (Gillingham & Stillman, 1936, cited in Pullen, 2016). Additionally, they provided teachers with specific new approaches when working with students with reading disabilities. Their program guidelines stress the use of visual, kinesthetic, and auditory methods in the classrooms when delivering various types of input for children with reading difficulties.

Finally, to solidify his overall impact on the field of dyslexia, in 1949 Orton's widow, June, formed the Orton Dyslexia Society to honor and further the work of her late husband. Although branded with another name, the IDA, remains a fixture in the dyslexia community (Kirby, 2018). The IDA is the oldest organization dedicated to the study and treatment of dyslexia. It is also committed to providing complete information and services to address the full scope of dyslexia and related reading and writing challenges. The IDA was born in the 1920s with direct roots to Dr. Samuel T. Orton's pioneering studies in the field of reading research and multisensory teaching.

In 1968, in addition to Orton's definition, the World Federation of Neurology recommended and approved the first consensus definition of dyslexia (Snowling, 2001; Wajuihian & Naidoo, 2011; Fletcher, 2009). The Federation recommended that the term should be applied to children who fail to read despite sufficient intelligence, conventional instruction, and sociocultural opportunity. However, the definition fell from favor because it was a definition by exclusion or failure: if the concept of dyslexia is to be useful, then it should be possible to use positive signs to identify children with dyslexia (Fletcher, 2009; Snowling, 2001). To date, evidence still exists there is not a consensus about definitions, explanations or the concept of dyslexia. Dyslexia had always been researched as a deficit in various cognitive weaknesses and neurological deficits. However, in the early 1980s, a new notion began to emerge that seemed to be about to revolutionize the understanding of dyslexia. This notion indicated dyslexia to be more likely a difference instead of a deficit, after all. While some may see it as a different learning style and others, primarily educators in the field, recognize dyslexia as a specific SLD (Anderson & Meirer-Hedde, 2001; Richardson, 1992).

As the term dyslexia continued to grow in popularity in the education and medical community, researchers began comparing those persons with and without dyslexia. In 1972, Sandhya Naidoo published *Specific Dyslexia*, the first account in Britain to make a systematic comparison of dyslexic and non–dyslexic students. Naidoo, focused on how students develop literacy, argued that "preventive and supportive steps taken early are immeasurably more humane and fruitful than attempts to remedy a problem which becomes increasingly complex as the child grows older" (Kirby, 2018, p. 58). Currently, 42 states in the US have dyslexia-specific laws and most have updated their education codes to clearly define dyslexia and provide

guidelines to school districts on how to identify dyslexia and provide specific evidence-based interventions (Youman & Mather, 2018).

In 2002, the IDA Research Committee and the NICHD proposed a revised definition that describes dyslexia as a SLD that is neurobiological in origin. Dyslexia is characterized by difficulties with accurate and/or fluent word recognition as well as poor spelling and decoding abilities (IDA, 2017b; Lyon et al., 2003). Although the IDA definition places emphasis on phonological processing as the proximal cause of dyslexia, definitions from other countries include additional cognitive and linguistic factors. Despite some lack of agreement regarding a definition over the years, and the exact causes of dyslexia, researchers and scientists from around the world have investigated the characteristics and symptoms of the disorder, in addition to attempting to learn how dyslexia affects reading and spelling development (Youman & Mather, 2013). Equally important is the medical model information surrounding dyslexia.

Contemporary Definition of Dyslexia

Dyslexia has had many different definitions over time among many different organizations. While Rudolf Berlin coined the term dyslexia in 1887, a precise definition escaped professionals for more than 100 years. As scientific research unraveled more of the mystery behind the causes of difficulties in the reading experiences for some, the term dyslexia caught on as a term used to describe a specific reading difficulty and it became increasingly important to reach consensus on a definition. As a result, the IDA defines dyslexia in the following way:

> Dyslexia is a specific learning disability (SLD) that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the

> phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge. (IDA, 2017a)

A more current definition was provided through the federal government. While it is a clear definition, it does not have all the components of the IDA definition and seems to have some contrast. In 2017, the U.S. Senate voted unanimously as part of the Senate Resolution 284, 115th Congress to establish the following definition of dyslexia: 1) an unexpected difficulty in reading for an individual who has the intelligence to be a much better reader; and 2) most commonly caused by a difficulty in phonological processing (the appreciating of the individual sounds of spoken language), which affects ability of an individual to speak, read, and spell, and often, the ability to learn a second language (Toolkit, 2018).

Dyslexia within the Individuals with Disabilities Education Act

The IDEA is an educational law that makes available a FAPE to eligible children with disabilities throughout the nation and ensures special education and related services to those students (IDA, 2017a). IDEA governs how states and public agencies provide early intervention, special education, and related services and supports to more than 6.5 million eligible infants, toddlers, children, and youth with disabilities. Congress reauthorized the IDEA in 2004 (Individuals with Disabilities Education Improvement ACT, 20 U.S.C. 1412 and 20 U.S.C. 1474 et seq.) and most recently amended the IDEA through Public Law 114-95, the Every Student Succeeds Act, in December 2015.

In the law, Congress states that disability is a natural part of the human experience and in no way diminishes the right of individuals to participate in or contribute to society. Improving

educational results for children with disabilities is an essential element of our national policy of ensuring equality of opportunity, full participation, independent living, and economic self-sufficiency for individuals with disabilities (IDA, 2017).

Educators and parents are often confused over the use of the term SLD and dyslexia, even though dyslexia is one of the specific types of disorders included in the category of SLD within the Individuals with Disabilities Act (IDEA, 2004). Dyslexia is a SLD in reading that frequently affects spelling as well (Hudson et al., 2007). In many schools, the term dyslexia is not used to describe students who might fit the criteria for this disorder instead school teams might use the term SLD, which is specified within IDEA (IDEA, 2004), and reading disability, which is used within the *Diagnostic and Statistical Manual of Mental Disorders*™ (DSM-V; American Psychiatric Association, 2013).

The exact causes of dyslexia are still not clear, but anatomical and brain imagery studies show differences in the way the brain of a person with dyslexia develops and functions. The brain of a person with dyslexia has a different distribution of metabolic activation than the brain of a person without reading problems when completing the same language task (Hudson et al., 2007). Dyslexia is not due to either lack of intelligence or desire to learn. Using effective teaching methods, students with dyslexia can learn reading strategies successfully (IDA, 2017b). Dyslexia also runs in families; having a parent or sibling with dyslexia increases the probability that you will also have dyslexia. According to Gaab (2017), dyslexia is strongly inheritable, occurring up to 50% of individuals who have a first-degree relative with dyslexia and initial screening should include family history.

Dyslexia is the most common SLD, representing 80% of all learning disabilities. In the 2017 National Assessment of Educational Progress (NAEP) found more than two million

children per year in the US have trouble learning to read and fail to meet standards for reading proficiency (Handler, 2018). There is a wide range of prevalence rates of dyslexia and other types of reading disabilities, which may be influenced by method of identification, cutoff scores used, and various other factors. Estimates vary greatly, ranging from as low as 3% to as high as 20% of the school-aged students (Ward-Lonergan & Duthie, 2018). Phillips and Odegard (2017) reported, there is a discrepancy between the reported prevalence of dyslexia and the identification and service delivery for these students in public schools.

Dyslexia is a common and lifelong language-based learning condition with variation in brain functioning affects language processing, leading to difficulties with reading, spelling, and writing. Dyslexia has a strong genetic basis with approximately 40% of siblings receiving a diagnosis of dyslexia from a parent (Handler, 2018). Dyslexia also affects males slightly more than females (Handler, 2018). The IDA reveals that dyslexia applies to 13–14% of the school population. The NICHD claimed in 2000 that one in five children experiences serious reading problems (Peterson et al., 2017).

Phonological weaknesses or disorders, are usually the underlying cause of literacy problems associated with dyslexia (IDA, 2018a). Comprehension may be impaired and writing will be difficult if spelling is not mastered. Language and vocabulary problems can also cause comprehension difficulties (IDA, 2018a). As with all disorders, the definition and defining characteristics guide the process of identification. Dyslexia might be differentiated from other types of reading disabilities in that it is mainly characterized by inaccurate word recognition or decoding abilities with good language comprehension (Ward-Lonergan & Duthie, 2018). Dyslexia has been attributed to deficiencies in visual, linguistic, and low-level sensory functions (Vellutino et al., 2004). Problems with decoding or single word reading and/or poor reading

fluency and poor spelling are all key symptoms of dyslexia (IDA, 2018a). Students with dyslexia will often demonstrate two obvious difficulties when asked to read text at their grade level. First, they will not be able to read as many words in a text by sight as average readers due to "fluent word recognition." Second, they will often demonstrate decoding difficulties, meaning they will make many errors as they attempt to identify words they may not know. These problems in word recognition are due to an underlying deficit in the sound component of language that makes it difficult for readers to connect letters and sounds in order to decode. People with dyslexia frequently have difficulties comprehending what they read because of the difficulty they experience in learning printed words (Hudson et al., 2007).

Identification Process

Research indicates that reading disabilities can manifest themselves as language difficulties during preschool with problems can be used to identify children who are at-risk and should provide them with early intervention (Catts & Hogan, 2003). However, the identification of a child with dyslexia is a challenging process, but there are ways that teachers and parents can learn more about the reading difficulty and support children (Hudson et al., 2007). At this time, 39 states have some type of legislation that addresses the identification and provision of appropriate services for students with dyslexia (Proctor et al., 2017). The diagnosis may involve screening tools which are relatively simple and quick methods of indicating whether a student might have dyslexia. Utilizing screening tools (e.g., Universal Screening K-2 Reading™, Colorado Learning Disabilities Questionnaire-Reading Subscale™ [CLDQ-R], and Shaywitz DyslexiaScreen™) is beneficial for educators to determine what specific interventions and possibly remediation needs a student might have. Research on the language basis of reading disabilities has led to significant advancements in the early identification and remediation of

reading difficulties and disabilities (Catts & Hogan, 2003). While dyslexia screening tools are beneficial to use when first determining deficits of some students, full assessments might be necessary for other students.

Assessments used to diagnose are a more in-depth way designed to identify dyslexia and the pattern of strengths and weaknesses. The diagnosis of dyslexia is usually in the realm of education and psychology (Wajuihian & Naidoo, 2011). Formal clinical evaluation of reading, language, and writing skills are necessary to confirm a diagnosis of suspected dyslexia if the student continues to struggle with literacy skills despite high-quality instruction using a Response to Interventions™ (RTI)/Multi-Tiered System of Support™ (MTSS) approach (IDA, 2017b; IDA, 2018a). Fortunately, using educational testing can verify the presence of dyslexia and can provide the needed diagnostic documentation that is required for eligibility for specially designed instruction and accommodations throughout the educational career, from elementary school through college and beyond (IDA, 2018a). Unfortunately, assessment of dyslexia involves individualized testing most often by a team of qualified professionals with extensive clinical training in assessment; therefore, it can be difficult to conduct timely assessments to identify students with dyslexia (IDA, 2018a). Most importantly, evaluation by a medical doctor is not required for screening, assessment or identification of SLD or dyslexia (IDA, 2018a). A comprehensive evaluation for dyslexia typically includes intellectual and academic achievement testing, in addition to assessment of the critical underlying language skills that are closely linked to dyslexia (IDA, 2017b). These skills include receptive (listening) and expressive (speaking, signing, gesturing) language skills, phonological skills including phonemic awareness, and also a student's ability to rapidly name letters and names (IDA, 2017b).

Although the diagnosis of dyslexia is typically not given before the end of second grade or the beginning of third grade, intensive interventions are most effective in kindergarten or first grade (Gaab, 2017). Research has shown that brain plasticity decreases through childhood (IDA, 2018b). Students at risk for reading difficulties can be reliably identified even before kindergarten (IDA, 2018b). Dyslexia is not a disease and: therefore, there is no cure. But with proper diagnosis, appropriate and timely instruction, hard work, and support from family, teachers, and others, individuals who have dyslexia can succeed in schools (IDA, 2017a).

For some people, dyslexia is identified early in their lives, while others, dyslexia goes unidentified until they are much older (IDA, 2017b). Since early identification of dyslexia is critical when designing interventions and strategies for success for students with dyslexia, educators need to be well versed in evidence-based methods that help to identify the risks for reading difficulties, and educators need to make good decisions that provide appropriate educational interventions for students who may be struggling. The decisions must be informed by data that is gathered as a result of effective assessments and timely progress monitoring (IDA, 2017a). To ensure that all students have the best opportunities for developing adequate literacy skills it is critical that all educators understand the importance of these factors in universal screening and early intervention (IDA, 2018b).

Dyslexia in Texas

Texas is one of only 10 states in the US with a dyslexia handbook for parents and educators (Youman & Mather, 2018). While still using the term SLD for identification and intervention for students with reading disabilities in the state of Texas, it does separates the identification and services delivery for dyslexia from SLD and provides guidelines for parents and educators through published dyslexia handbooks and other informational documents

(Youman & Mather, 2013). While dyslexia has always been considered a SLD in many states, Texas has most often qualified and served students with dyslexia under Section 504, maintaining dyslexia separate from special education. When investigating early screenings in Texas, Youman and Mather (2013) reported the Texas Education Code 38.003 specifies that all students be tested for dyslexia using a program that is approved by the State Board of Education. In Texas, all kindergarten students must be evaluated or screened before the end of the school year in order for teachers to know if interventions are needed.

Many school districts in Texas acknowledge the needs of students with dyslexia during high stakes statewide testing, therefore students with dyslexia are provided with "Dyslexia Bundled Accommodations" during the Texas Assessments of Knowledge and Skills™ (TAKS), the statewide assessments of Texas education standards in reading, writing, math, science, and social studies or the State of Texas Assessment of Academic Readiness™ (STAAR) as the successor to the TAKS™ (Texas Education Agency, 2018a). Some of these first laws in Texas for students with dyslexia mostly focused on modifying existing requirements to meet the needs of students with dyslexia. However, in more recent years there is an increased emphasis on the role of technology, not just as an accommodation during state testing, but to enhance student's overall reading and writing performance (Texas Education Agency, 2018a; Youman & Mather, 2018).

Texas has also adopted teacher training and practice standards for those who work with students with dyslexia. These standards include knowledge and skills of the psychology of reading and reading development, knowledge of language structure, practical skills of instruction and knowledge of assessment of classroom reading, writing, and spelling skills (Youman & Mather, 2013). A few states, like Texas, have dyslexia specialists or therapists who provide

instruction solely to students with dyslexia, they may obtain a license or higher education degree to work with students with dyslexia (Youman & Mather, 2013). These specialists and therapists provide services such as Multisensory Teaching Approaches™ (MTA) or other interventions that include explicit instruction in phonemic awareness, phonics, spelling, fluency, and vocabulary (Youman & Mather, 2018). Additionally, Texas allows for students with dyslexia to have access to further assessments who will be attending an institution or higher education (Youman & Mather, 2015). The most apparent difference between Texas and other states in terms of students with dyslexia is the Dyslexia Handbook, clear intervention procedures, and the identification process that begins with initial detection of the symptoms of dyslexia during kindergarten through second grade and must include mandatory periodic screening (Youman & Mather, 2013).

Unfortunately, the contradictions in terminology and the lack of a clear definition of dyslexia as a separate type of SLD has caused confusion regarding the distinction of dyslexia from other language, reading and learning disorders (Youman & Mather, 2013). Many states have proposed or passed dyslexia laws that provide more detail than IDEA (2004) and attempt to give students with dyslexia additional protections and rights. These state laws are aimed at trying to ensure services provided are consistent for students with dyslexia across school districts within the state (Ward-Lonergan & Duthie 2018).

Interventions

Dyslexia is a common and lifelong language-based learning disability that can be detected as early as kindergarten or first grade. Dyslexia can be treated through early intensive instruction by highly trained educators who teach reading skills and explain language in patterns that are explicit, systematic, and multisensory (Handler, 2018). Utilizing early interventions can

result in higher rates of progress and possibly closing the reading gap for some students. Unfortunately, a diagnosis of dyslexia is not typically given before the end of second grade or the beginning of third grade and often does not occur until the student shows lower grades or struggles in reading. The issue with identification in later grades (i.e., second or third grade) is that intensive interventions are most effective in kindergarten and first grade (Gaab, 2017). Early treatment of dyslexia while students are young, focuses on remediation, while for older students there is a shift toward providing tools and accommodations (e.g., extra time, test alternatives, such as verbal testing) that allows these students to access their higher-level thinking and reasoning skills. Remediation programs that follow the IDA guidelines call for a SL, which prepares students to decode words in an explicit and systematic fashion. SL instruction includes several elements: phonology, sound-symbol association, syllable instruction, morphology, syntax, semantics, systematic and cumulative, explicit instruction, and diagnostic teaching (IDA, 2017a). While multisensory learning, based on Orton-Gillingham techniques, includes the use of visual, auditory, tactile and kinesthetic pathways simultaneously to enhance student learning, the more effective reading instruction for struggling readers is SL according to Handler, 2018.

Intervention studies have demonstrated that intensive daily, one-on-one, and small group, phonologically-based treatments can close the gap for reading accuracy, even with students who fall as low as the second percentile in word-level reading skills (Alexander & Slinger-Constant, 2004). Educators who are specially trained in reading disabilities can develop and implement intervention plans for students with dyslexia. Teams of parents, educators, psychologists, and school representatives determine eligibility for special education and develop an individual education program (IEP) plan for the student, depending on their individual needs.

Providing Interventions Too Late

Since research has shown that the rapid growth of the brain and its response to instruction in the primary years make the time from birth to age eight a critical period for literacy development (Nevills & Wolfe, 2009, as cited by IDA, 2018b), it is essential to identify the needs of struggling students as quickly as possible. While it is known that dyslexia is a neurobiological disorder, research is also showing that brain plasticity decreases throughout childhood (IDA, 2018b). It can be argued that even before kindergarten, children who are at risk for reading failure can be reliably identified and begin to receive interventions (IDA, 2018c). Deficits in phonological awareness, rapid automatized naming, verbal working memory and letter knowledge have been known to be robust precursors of dyslexia in children as young as three years old (Gaab, 2017).

Furthermore, research studies involving brain measures, such as electroencephalography or magnetic resonance imaging™ (MRI), have shown that the brain characteristics of people with dyslexia can be observed as early as infancy and preschool, especially those children who have a genetic risk for dyslexia (Gaab, 2017). The language-related areas of the brains of people with dyslexia function differently compared to typical readers. They function differently because people who do not have dyslexia can use their visual input, visual representation of written words and later connect speech sounds and word meaning without difficulty. Functional magnetic resonance imaging™ (fMRI) has shown that people with dyslexia exhibit dysfunction in the left hemisphere posterior reading areas and display compensatory use of the right occipito-temporal area and the bilateral inferior frontal gyri (Handler, 2018).

Moreover, functional connectivity data have revealed an increased overall connection to the right hemisphere, especially in younger people with dyslexia (Handler, 2018). Other studies

have revealed that following phonological remedial reading intervention, the dyslexia-specific brain activation profile improves (Handler, 2018).

Early Detection/Screening

Screenings are important to use at an early stage in a student's reading progress as this helps to determine the needs for the students. Research indicates that reading disabilities often manifest as language difficulties during preschool years, such indicators could be used to identify and provide students with early intervention that is necessary to prevent and limit reading difficulties (Catts & Hogan, 2003). Prior to assessing and evaluating to determine a disability, educators must be highly equipped with evidence-based interventions that help to identify the risks for reading difficulties. Educators must also make good decisions that provide appropriate educational interventions for the students who may be struggling. Teachers must have a set of tools to address students who might be at risk for a reading disability. Lastly, teachers should know the process and determine when to refer a student to RtI™ for further support and possibly evaluation. These decisions must be based on data that was gathered as a result of effective assessments and timely progress monitoring, such as Qualitative Reading Inventory™ (QRI) (Leslie & Caldwell, 2010), and Running Records (IDA, 2017a). Students at risk for reading difficulties can be reliably identified even before kindergarten (IDA, 2018b).

Early detection of dyslexia involves teachers being trained in language concepts, reading theory, and the common signs of dyslexia. It is possible to identify potential reading problems in young children even before the problems turn into reading failures. For students with undiagnosed literacy-related disabilities, including dyslexia, early screening and intervention services are critical (Petscher et al., 2019). Catts et al. (2001) found that the performance of children with early language problems at the age of five years in letter knowledge, sentence

imitation, phoneme/syllable deletion and rapid naming, together with mother's education, made a significant contribution to predicting the risk of reading comprehension difficulties in the second grade. Early screeners and interventions should focus on early literacy skills as well as areas of self-regulation and executive control that can hinder the development of reading, writing, and language processing, and comprehension (Petscher et al., 2019). Screenings should be used with all children in a school in all grades, beginning in kindergarten, to locate those students who are "at-risk" for reading difficulty. Furthermore, screenings for reading disabilities should take place multiple times per year (Petscher et al., 2019).

Screening measures, by definition, are typically brief assessments of a particular skill or ability that is highly predictive of a later outcome and should be quickly and easily administered. Early screening measurements are designed to quickly differentiate students into one of two groups: 1) those who require intervention and 2) those who do not (IDA, 2018b). The results from a screener should identify those students who are potentially at risk for reading failure, including those who may have developmental reading disabilities (IDA, 2018b). Rapid dyslexia screening tests have now been developed for use in kindergarten and first grade students (Handler, 2018). In addition, measures of phonological awareness, memory, and rapid naming are typically included in kindergarten and beginning first grade screening tests that can identify children who need targeted intervention to improve these critical skills so these children can meet grade-level benchmarks (IDA, 2017b). Two examples of available screening tools include the Shaywitz Dyslexia Screen™ and the CLDQ-R™ School Age Screener (IDA, 2018a). If a student is not identified until beyond third grade, only one in four is likely to improve to grade level (Handler, 2018). This is a concern since it has been proven that early intervention is successful in assisting students who are at risk for reading difficulties. Students who demonstrate

weak skills on screenings should be placed in intensive reading programs, and students who do not progress should undergo a comprehensive educational evaluation (Handler, 2018).

There are three empirical findings to support the use of screenings for students who are at risk for dyslexia in the early grades (Petscher et al., 2019). First, reading difficulties can be prevented, and some early challenges can be remediated, through early intervention. Utilizing early identification through screenings will allow interventions to be implemented sooner. Second, patterns of reading development can be identified early once school begins. Further, patterns of reading development tend to become stable over time creating an opportunity for educators to identify significant changes in reading development and perhaps identifying early reading difficulties for students. Third, without intense interventions, struggling readers do not catch up to their average performing peers (Petscher et al., 2019). These are all concerning issues for many students, but especially those who are at risk for dyslexia and other reading difficulties. Because of the risk involved in waiting to determine a deficit related to reading development and because reading development is critical, educators must be cognizant of the warning signs and prepared with interventions to support the student's reading needs. It is imperative for parents and educators to know what to look for and begin intervening early. Research now shows that the rapid growth of the brain and the brain's response to instruction in the primary years make the time from birth to age eight a critical period for literacy development (Gaab, 2017). Before the second grade, it is more important to focus an evaluation on the precursors of reading development. Measures of language skills, phonological awareness, memory, and rapid naming are more suggestive of being at-risk for dyslexia among young children than are measures of word reading, decoding, and spelling. After thinking about screening and the benefits of the

screeners, federal and local state policies come into play. In order to provide such screeners and interventions districts, and schools must follow policies and guidelines.

Most school districts in the US maintain records of students' reading progress during the early grades in order to comply with No Child Left Behind (NCLB), 2002. On December 10, 2015, President Obama signed the Every Student Succeeds Act (ESSA), officially replacing the NCLB. This new law represents a compromise between policymakers who wanted a greater federal role as well as those who wanted to provide more flexibility to states and school districts. Importantly, ESSA incorporates many key provisions that help to ensure students with disabilities (e.g., dyslexia) will be included, rather than excluded, from educational opportunity.

Additionally, some states have mandated screening for dyslexia and other reading disorders as part of reading progress monitoring in kindergarten through second grade. Along with the initiative to screen early, a few states provide guidelines for early screening of children with dyslexia. However, the screening procedure or program must be approved by the state's office of education and must include common correlates of dyslexia, including phonological awareness, rapid naming, knowledge of the correspondences between sounds and letters, and a family history of difficulty in learning to read (Youman & Mather, 2018). Many districts are giving screening and progress monitoring tests to all students in areas related to early reading skills. While this helps identify students who are at risk for dyslexia, and may benefit from early intervention, there is no guidance on which programs districts should use for these interventions nor is there dyslexia-specific training for teachers and reading specialists in most states. Yet, Texas, for example, has licensed dyslexia therapists and specific programs for students, such as Multisensory Teaching Approach™ (MTA) and Take Flight™ (Youman & Mather, 2018). The ultimate goal of early screeners and assessments are to identify students at risk for reading failure

and provide early interventions that will help students succeed in later grades (Youman & Mather, 2015). Early identification, intervention and treatment is the key to helping individuals with dyslexia, or those who show warning signs of dyslexia, achieve in school and in life (IDA, 2017b).

Students with dyslexia need a great deal of structured practice and immediate, corrective feedback to develop automatic word recognition skills (IDA, 2017b). Readers with dyslexia must expend more attention, concentration, and energy on decoding and word recognition, which in turn makes reading tiring and difficult. Students who cannot read well, read less (Handler, 2018). Due to these difficulties, educators must be looking for the signs of deficits and be prepared to utilize more intensive strategies to meet those student's needs.

If the instructional needs of a struggling reader can be identified early then preventive intervention can and should begin immediately (IDA, 2018b). There are many schools of thought on how to implement interventions or remediation programs. Whatever program or intervention used should be evidence-based methods that are aligned with individual student needs. For most children, reading difficulties and problems can be remediated with programs such as MTA during kindergarten and first grade. These remediation sessions can take about 30–45 minutes per day (IDA, 2017b).

Early Intervention

It is crucial to recognize the signs of the common symptoms of dyslexia. The earlier a student is evaluated, the sooner they can gain the appropriate instruction and accommodations they need to succeed in school (IDA, 2017a). General problems experienced by people with dyslexia include a few of the following: learning letters and their sounds, reading quickly enough

to comprehend, spelling, correctly doing math operations (IDA, 2017a). It is important to mention that not all students who have difficulties with the skills listed have dyslexia.

Early intervention programs in kindergarten and first grade can increase reading skills to grade level for nearly 90% of poor readers (Handler, 2018). Early intervention with intense, explicit instruction is critical for helping students avoid the lifelong consequences of poor reading. Moreover, involving parents early in the process of identifying what programs and services are best for their child will ensure greater levels of success and cooperation between school and home (Hudson et al., 2007). Students with dyslexia need special instruction, and the earlier the deficit or disability is detected is when intervention is the most beneficial for these students. Students with dyslexia will also benefit from having a teacher specifically trained in using a multisensory, systematic, direct instructional approach; ultimately utilizing their hearing, seeing, and touching senses simultaneously, a crucial intervention to support these students and their academic success (Peterson et al., 2017). Additionally, teachers must learn what the signs for dyslexia are and how to assess or screen their students to further determine if evaluation of dyslexia is needed.

Today, in the 21st century, dyslexia is recognized as a reading difficulty by the educational and medical communities and has become a topic of research. Currently, educators, researchers in psychology, medical sciences, and educational sciences are working together with the diagnosis, treatment, and preventative strategies of dyslexia (Kirby, 2018). While it is still up for debate, how, where, and by whom students with dyslexia are supported; it is educators' job to teach and train teachers and parents on the research-based strategies and interventions for students who are at risk or have dyslexia. Students with dyslexia who do not receive appropriate services are at risk for a greater number of potential negative outcomes (Ward-Lonergan &

Duthie, 2018). Educators must use explicit, intense, systematic instruction in the sound structure of language (phonemic awareness) and in how sounds relate to letters (phonics) is needed for readers with dyslexia (Hudson et al., 2007). Phonemic awareness is a type of phonological awareness, which is, the awareness of the sound structure of language in general (Yopp & Yopp, 2000).

Specific Intervention

An early intervention for students at risk for reading difficulties such as dyslexia are called the ESBs. These boxes are a specific instructional method primarily used in early grades to help build phonological awareness by segmenting words into individual sounds or syllables. When students are learning to read, being able to segment sounds and blend them together is an important step in student's reading development. The ESB also teaches students how to count the number of phonemes in words. Lastly, they help students understand alphabetic principle in decoding and encoding (NICHD, 2000).

D. B. Elkonin first introduced the use of sound boxes in his work with preschool aged children (Joseph, 2000). These rectangle boxes are divided with three sections resembling three connected boxes. The student places a token or counter below each divided section of the rectangle. Each time the student hears each sound of the word they are instructed to move the counters into the boxes. This is first demonstrated or modeled by the teacher slowly while the students listen to hear the first sound, they place a counter into the box, then the second sound and so on. ESBs are designed to teach children how to segment sounds sequentially (Joseph, 2000). These sound boxes can also serve as a supportive visual structure to help students string together sounds and blend them to form words. In 1963, Elkonin reported that reading is a reconstitution of the sound forms of a word on the basis of its graphic representation. Sound

boxes can be used when young children transition from an early childhood program such as Head Start to kindergarten and from kindergarten to first grade (Durst & Joseph, 2016).

In order to carry out this recommended early intervention the WWC educator's practice guide suggests teaching students to recognize and manipulate segments of sound in speech or phonological awareness skills. First, teachers should begin by introducing students to larger segments of words with which they are familiar, and gradually draw their attention to smaller and smaller sound segments (Foorman et al., 2016). Students can use the ESB to practice isolating the sounds in words and sorting pictures. Students can use colored discs or letter tiles to mark the unique sounds, then they can sort cards with pictures based on the beginning, middle, or ending sounds of the word each picture represents. Second, teachers must teach students letter-sound relations by teaching each letter and their corresponding sounds, working with only a few phonemes at a time. Lastly, teachers need to use word-building activities to link students' knowledge of letter-sound relationships with phonemic awareness. This is the final step in teaching the alphabetic principle of how words are segmented into sounds, which then allows students to begin spelling and decoding words. Using the ESB with letter tiles and word-building activities for this last step of instruction as soon as a student has learned their first few letter sounds is beneficial. ESBs assist students to sound out each phoneme and spell words correctly.

Educators and parents have been advocating for awareness, early identification, and increased access to appropriate interventions and services in the schools for students with dyslexia (Ward-Lonergan & Duthie, 2018). When intensive, systematic phonological awareness instruction is delivered in preschool or kindergarten, children may enter first grade with a higher level of phonological skills instead of acquiring those skills at the same time acquiring beginning reading skills (Hagans & Good, 2013).

It has been well-documented that students who are considered to be poor readers are those who enter the first grade with limited phonemic awareness skills (Keesey et al., 2015). The goals of the specific intervention discussed in this review is not to improve student's reading skills, but to develop a foundation that enables students to better understand and utilize the alphabetic system. For those students who might be at-risk, they require more explicit and intensive instruction and it should be provided early so all students have an opportunity to become fluent, competent readers (Keesey et al., 2015).

Dyslexia impacts a large number of students in the Pre-Kindergarten through second grade settings and can be a difficult disability to overcome if identified after second grade. Currently, students are not identified as having dyslexia until second grade and sometimes not until even later. This is an issue because if a student is identified too late then educators have the task of providing accommodations and modifications for the student to help mitigate the impact dyslexia has on the education of the student. However, if students that are suspected of having dyslexia are identified in earlier years, like kindergarten, then educators can address the specific issues related to dyslexia (i.e., spelling and phonemic awareness) with specific and targeted instruction and interventions such as the use of ESB.

Dyslexia is a reading disorder that is characterized by struggles with accurate and/or fluent word recognition, poor spelling, and decoding abilities. These difficulties typically result from a deficit in the phonological component of language. Some of the primary characteristics of dyslexia are: difficulty reading words in isolation, difficulty accurately decoding unfamiliar words, difficulty with oral reading (slow, inaccurate, or labored), and difficulty spelling.

According to the American Dyslexia Association, 20% of school-aged children in the United States are dyslexic. About 13–14% of the school population nationwide has a

handicapping condition that qualifies them for special education (IDA, 2017b).Current studies indicate that one half of all the students who qualify for special education are classified as having a SLD (6–7%). About 85% of those students have a primary learning disability in reading and language processing. Nevertheless, many more people, perhaps as many as 15–20% of the population as a whole, have some of the symptoms of dyslexia, including slow or inaccurate reading, poor spelling, poor writing, or mixing up similar words. Not all of these will qualify for special education, but they are likely to struggle with many aspects of academic learning and are likely to benefit from systematic, explicit, instruction in reading, writing, and language.

The IDEA 2004, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act (ADA) define the rights of students with dyslexia and other specific learning disabilities. These individuals are legally entitled to special services to help them overcome and accommodate their learning barriers. Such services include education programs designed to meet the needs of these students. The Acts also protect people with dyslexia against unfair and illegal discrimination (IDA, 2017b).

One of the main approaches for teaching students with reading difficulties including dyslexia is SL™ instruction. It is the umbrella term used by the IDA to unify and encompass evidence-based programs and approaches that are aligned to the Knowledge and Practice Standards™ (KPS; Cowen, 2016). IDA defines KPS as knowledge and skills that teachers of reading should possess to teach students to read proficiently. SL approaches are effective at helping students with learning disabilities in the area of reading, such as dyslexia, learn to read and write (Spear–Swerling, 2019). Put simply, SL is explicit, systematic teaching that focuses on phonological awareness, word recognition, phonics and decoding, spelling, and syntax at the sentence and paragraph levels.

There are six SL elements: phonology, sound-symbol association, syllable instruction, morphology, syntax, and semantics. These elements are especially helpful to students with dyslexia due to directly assessing the core weaknesses in phonological skills, decoding, and spelling. This study focused on early intervention and the phonological and sound-symbol association needs of first graders who have documented deficits. The ESBs intervention addresses both of these elements.

While there are many interventions and strategies teachers and specialists use to address these needs, in this research there is evidence this is a very quick and easy tool teachers can use to supplement their reading curriculum. Due to COVID–19, this research was completed solely via ZOOM™ with parents at home. This intervention proved to be easily supported by parents and has added to the body of research showing its effectiveness.

Definitions

Dyslexia

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (IDA, 2017a).

Phonemic Awareness

Phonemic awareness is the ability to hear, identify, and manipulate individual sounds-phonemes–in spoken words. Before children learn to read print, they need to become more aware

of how the sounds in words work. They must understand that words are made up of speech sounds, or phonemes (the smallest parts of sound in a spoken word that make a difference in a word's meaning).

Specific Learning Disability (SLD)

A disorder in one or more of the basic psychological processes involved in understanding or in using language that is spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do math calculations.

Response to Interventions (RTI)

Response to Intervention (RTI) is a multi-tier approach to the early identification and support of students with learning and behavior needs. The RTI process begins with high-quality instruction and universal screening of all children in the general education classroom

Multi-Tiered System of Support (MTSS)

A Multi-Tiered System of Supports (MTSS) is a systemic, continuous-improvement framework in which data-based problem solving and decision-making is practiced across all levels of the educational system for supporting students

Word-Blindness

Reading disabilities in adult patients in spite of their normal sensory acuity and average intelligence (Anderson & Meire-Hedde, 2001; Pullen, 2016).

Elkonin Sound Boxes™ (ESB)

Elkonin boxes build phonological awareness skills by segmenting words into individual sounds, or phonemes. To use ESB, a child listens to a word and moves a token into a box for

each sound or phoneme. In some cases different colored tokens may be used for consonants and vowels or just for each phoneme in the word.

Fluency

Fluency is defined as the ability to read with speed, accuracy, and proper expression. In order to understand what they read, children must be able to read fluently whether they are reading aloud or silently. When reading aloud, fluent readers read in phrases and add intonation appropriately. Their reading is smooth and has expression.

Consonant-vowel-consonant (CVC)

A CVC word is a word that is made up of a consonant, vowel, and consonant sound. Examples: Cat, hot, tip, man, and hut.

Letter-sound correspondence

Letter-sound correspondence, or the relationship of the letters in the alphabet to the sounds they produce, is a key component of the alphabetic principle and learning to read.

Phoneme

Any of the perceptually distinct units of sound in a specified language that distinguish one word from another, for example p, b, d, and t in the English words pad, pat, bad, and bat.

Coronavirus (COVID–19)

COVID–19 is an illness caused by a virus that can spread from person to person. The virus that causes COVID–19 is a new coronavirus that has spread throughout the world. COVID–19 symptoms can range from mild (or no symptoms) to severe illness.

ZOOM™

Zoom helps businesses and organizations bring their teams together in a frictionless environment to get more done. Our easy, reliable cloud platform for video, voice, content sharing, and chat runs across mobile devices, desktops, telephones, and room systems.

CHAPTER III

METHODOLOGY

Multiple baseline design (MBD) is useful for interventions that are irreversible due to learning effects, or when intervention or treatment cannot be withdrawn. In MBD, interventions are measured across behaviors, participants, or settings. The multiple baseline starts with the baseline (Phase A), then proceeds with the intervention (Phase B). The return to the baseline is unnecessary to demonstrate the effect of treatment, instead, the treatment is applied to another participant, another behavior, or another setting, depending on the variable being manipulated. In the MBD across participants, the same behavior is studied for multiple individuals, this design has many advantages. In addition to not requiring withdrawal of the intervention, it is fairly easy to conceptualize and is commonly understood by teachers and parents.

This study used a multiple baseline single-subject research design across participants to examine the effects of ESBs on letter sound and word identification. The MBD allows the intervention (i.e., ESBs) to be implemented in a staggered fashion across participants so that changes in performance during instructional sessions are directly comparable to non-instruction (i.e., baseline) conditions (Joseph, 1998). The replication of the change in performance across subjects indicates effectiveness of the intervention. All participants received administration of a letter sound and word identification spelling pretest for the baseline phase. For the intervention and maintenance phases, three-letter words were selected randomly from a pool of 113 CVC words. After the completion of the intervention phase, all participants went into maintenance probes. This chapter describes the methods for implementing this study. Explicitly, this chapter provides a description on the setting, participants, independent variable, dependent variable,

interobserver agreement, social validity measures, study design, fidelity of implementation, and data analysis.

Setting

Before beginning the study, Institutional Review Board (IRB) approval was obtained from Texas Woman's University and the school district site (i.e., a suburban public school district in Texas). Approval was obtained from the school district to use their data to find student participants. Minor participant's parents or guardians were emailed and asked if they wished for their child to participate in this research study. Once parents or guardians provided written consent for their students to participate, signed assent was obtained from each student participant. Due to COVID-19 and school closures in March 2020, the study took place via ZOOM™ meetings from the individual students' homes. The ZOOM™ meetings were recorded for further analysis as needed. The students drew ESBs with the parent's help if needed, on a piece of paper or a dry erase board. The students used pennies or other small household objects (i.e., beans, pasta) to move into the boxes. Finally, student participants then wrote on their paper or white board the correct letters and ultimately words into the ESBs.

Participants

After going through the Istation's Indicators of Progress™ (ISIP) data for all first graders in the public school district, the primary researcher began recruiting student participants from four of the elementary schools within the district by emailing parents the recruitment letter for those students who met the requirement. E-mail addresses were acquired through the school district's parent information platform, Skyward™ system. All participation was completely voluntary and participants were advised that they could withdraw at any time. Study participants were six first-grade students who had phonological processing and pre-literacy deficits with

average receptive language. All participants were (a) six or seven years old and (b) scored below benchmark on the nationally normed ISIP™, which measures student growth with computer-adaptive diagnostic and screening programs (Mathes, 2007). These criteria were chosen for inclusion for this study after speaking with the school district director and dyslexia specialist as they had data reflecting low scores with this age group or grade level. All participants who met inclusion criteria and produced signed assent and signed parent consent forms were eligible for the study. Table 1 presents the demographics for each participant. To protect the confidentiality of each student participant, pseudonym names were used for each participant and data were kept in a folder in a locked cabinet. Only fellow researchers included in the IRB were able to discuss and view participant data.

Table 1

Student Information

Participant	Age	Grade	Gender	ISIP Score*
G	7	2	Female	189
J	7	2	Male	188
MI	7	2	Female	191
C	8	2	Female	165
MA	7	2	Female	184
Z	7	2	Male	186

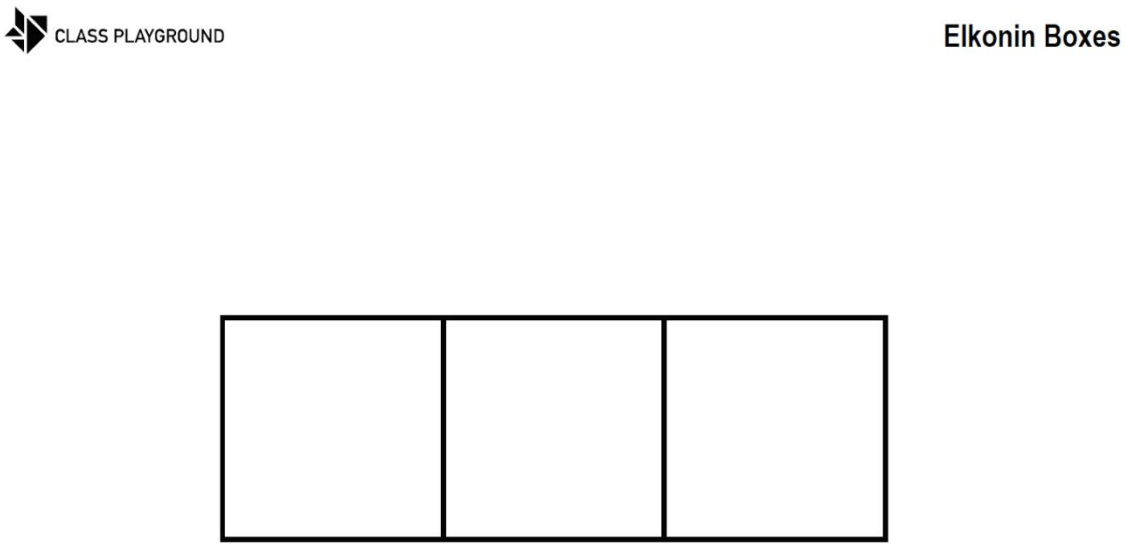
*Criteria for this research study was a summary score below 192 in Tier 3 in February 2019 on ISIP Phonemic Awareness section.

Measures

Elkonin Sound Boxes

The independent variable (i.e., intervention) in this research study was the ESBs intervention, a supplementary reading instruction technique used to target sequential one-to-one letter-sound correspondences in words (Alber-Morgan et al., 2016). To create an ESB, the student participant or parent, drew or printed a rectangle into three sections resembling three connected boxes. Some participants made eight copies of the example below, as each session had eight words. Some participants created the ESBs on dry erase boards while others drew their own boxes on blank pieces of paper.

Figure 1
Elkonin Sound Boxes



The student placed a counter (e.g., coin, token, bean or pasta) below each divided section of the rectangle. At first, the researcher demonstrated the process, modeling slowly. The primary

researcher pronounced a word slowly, then used it in a sentence, each sound was stretched out so that each individual sound was articulated clearly. At the same time the researcher pushed a penny into each box as a new sound began. The student said the word, then said each sound of each letter as they moved their object into each box (Joseph, 2002). Lastly, the student wrote the letters in the boxes while continuing to say each sound as they wrote the letters. Finally, the participant said the whole word. For this study, words were randomly chosen from a list of 113 CVC words from Jan Richardson's *Guided Reading*™ program (see Appendix E; Richardson, 2016). During each session in the intervention and maintenance phases, a recording sheet was used to score the participant's responses. For each randomly selected word spelled and read, a correct or incorrect response was recorded as a one or zero. After all eight words were completed, the researcher totaled the amount of correct words and then added the number to the graph. For example, one student spelled seven of the eight words correctly yet misspelled *bum* because the student flipped the "b" to a "d", spelling *dum*. Resulting in a score of seven on the graph for this student participant during this session during the intervention phase.

Correct Letter Sounds and Spelling Words

The dependent variables for the study were (a) the number of correctly stated letter sounds and (b) the number of words correctly identified and written inside the boxes within 3 seconds without prompts. If the student participant states a letter incorrectly, writes a letter or word incorrectly or requires a prompt these would be counted incorrect. The dependent variables were measured using probes that contained 10–20 letters, for the letter sound, and 113 CVC words total for the word identification. During each session students worked with eight words. Each CVC word contained one of the five short vowels (i.e., a, e, i, o, or u). The list of CVC words was from *The Next Step Forward in Guided Reading*™ (Richardson, 2016) which is a list

of words based on the levels of Guided Reading program for kindergarten and first graders (see Appendix E). All probes contained up to 20 letters and eight CVC words. The total number of correct responses were recorded for each session in each phase of the study. Mastery criteria was eight words stated, written, and read correctly per probe. Data were collected during ZOOM™ meetings using 3-s whole-interval recording to determine the total score of words spelled correctly using the ESB recording sheet (see Appendix A). Whole interval recording refers to the observer who is interested in behavior that occurs during the entire interval. During each session, an ESB recording sheet was used to score the participant's responses. First, the words were written on the recording sheet, then the researcher would write what the student wrote and circle either zero or one, depending if the student wrote a correct or incorrect response. Prior to meeting with the student participants, eight randomly selected words were written on the recording sheets. After observing the student, via the ZOOM™ meeting, write the word on their paper or dry erase board the primary researcher circled a zero or one depending if it was correctly or incorrectly spelled. Also, if the students participant misspelled or flipped a letter, the primary researcher indicated the misspelling or flipped letter beside the original word for further analysis and if needed, assisted the participant and parent in correcting the mistake. After all eight words were assessed and the primary researcher totaled the number of correct words out of the total.

Procedures

This multiple baseline across participants study examined the effects of the ESBs on letter sound and word identification of six first-grade students who have documented phonological processing and pre-literacy deficits and below-average scores on the ISIP™ screening tool. In single-subject research, intervention outcomes are attributed to the independent

variables when changes in performance coincide with the treatment or intervention. A maintenance phase allows for a determination of whether effects of an intervention will continue after completion of the intervention was completed (McCormick, 1995). All participants were administered a letter sound and word identification spelling pretest to assess their starting point or baseline. Using Pearson's *Word Their Way Primary Spelling Inventory Feature Guide*™ (see Appendix D), the first eight words were given to each participant for each baseline session. For intervention and maintenance probes, words were randomly selected from *The Next Step Forward in Guided Reading*™ word list (Richardson, 2016) by shuffling and picking every tenth word in the stack to be used for the eight-item probe from the pool of 113 CVC words. Once the words were selected, intervention data collection began. After the completion of the intervention phase, all participants participated in maintenance probes.

Baseline Phase

Prior to the intervention, participants were given a letter sound and word identification spelling pretest to obtain a baseline measure of performance on identifying letter sounds and word identification of CVC words. The primary researcher and two trained doctoral students were data collectors. The two doctoral students completed a minimum of five observations/sessions with each of the six participants using the ESB recording sheet to determine if the student read and spelled the words correctly. All data collectors conducted baseline observations over approximately 10–15 days or when data showed a stable pattern or declining pattern. After each session, the primary researcher asked the parents or guardian to take a photo of the student's spelling test and sent it via email. The primary researcher printed the photos and placed them into the individual student's data collection folder.

At the conclusion of each student's baseline phase, the primary researcher met with the student to review the expectations of the intervention sessions. The primary researcher explained that a word is counted as correct when the student can read a word correctly and placing the object then the correct letter representing each phoneme in each box. The researcher and other data collectors circled one only if the student read the word correctly without prompts and wrote the correct letter or phoneme in each sound box.

Intervention Phase

The ESB intervention consisted of instruction delivered individually to each participant in 10–15 minute sessions, two to three times per week. All doctoral students followed the intervention integrity checklist/intervention recording sheets (see Appendix A). The primary researcher began each session by asking the student participant if they had all materials needed for the ESBs. First, the student placed an object below each of the three boxes for a total of three objects. The researcher said a word slowly, used it in a sentence, and placed objects in the correct box as each sound of the word was articulated, then said the whole word. The student then mimicked this series of steps and placed objects in each box as they said each sound and then the whole word.

Next, the objects were replaced with written letters of each sound in each box then the participant read the whole word. The student articulated each sound of the word as he/she wrote the letter in the correct box. If a student needed prompts for placing objects or wrote an incorrect letter it was counted as zero. Some students struggled with flipping their letters, such as "b/d" and "p/q". Each flipped letter was counted incorrectly or zero as many of those flipped letters would make the words a different word.

Prior to the first day of each student's intervention phase, the primary researcher reviewed the ESB intervention procedures, recording sheet, and ESB materials to the doctoral students. The participants and their parents would be prepared with their materials prior to our ZOOM™ meeting. At the conclusion of each session, the primary researcher asked them to take a picture of their results and email it to the primary researcher. The primary researcher then printed these and placed them into the individual student's data collection folder. During the intervention phase, data collectors observed each student participant until at least three data points were collected or until the data points proved to be stable, at which point the ESB was discontinued. At the end of each session, the primary researcher would ask if they were still interested in participating in the study and they all stated yes each time.The primary researcher would then ask that their device, a phone, computer or tablet was facing them and their boxes and objects. Each time we started they used items to push into the boxes as the primary researcher read the word and used it in a sentence. After each letter was sounded out and the objects were pushed into the boxes the student would then write each letter in the box. Lastly, read the whole word. The primary researcher was able to observe each word and give feedback or praise as needed. These sessions were all recorded for validity and additional data analysis purposes.

Maintenance Phase

The researchers began administering maintenance probes after the ESB intervention instruction ended. In this phase, probes mirrored those in the ESB intervention phases. The maintenance probes consisted of eight randomly selected words out of the pool of 113 CVC words that were used in the ESB intervention phase, eight words randomly chosen for each

session. The start of each treatment condition or phase was staggered. By systematically staggering introduction of the ESB intervention across participants, basic integrity is maintained while remaining statistically sound. This phase used the same randomly chosen words yet the sessions were further apart to ensure the student had maintained the skill of reading and writing these words correctly, especially without reversals or flipping letters.

Treatment Fidelity

Prior to the beginning of this study, the primary researcher conducted 30-minute training sessions with each doctoral student. During the training the primary researcher and doctoral students: (a) reviewed the definition and providing examples of "letter sound"; (b) reviewed the definition and provide examples of "word identification"; (c) practiced collecting data on letter sound and word identification using ESBs (i.e., through video or other simulation); and (d) practiced documenting intervention integrity using the eight-item intervention integrity checklist. At the conclusion of each student's baseline phase, the primary researcher met with the student to review the expectations of the intervention sessions. Videos were watched for both moving objects into the boxes and writing letters into the boxes. After watching the videos, the primary researcher also modeled both moving objects and writing letters/phonemes into the boxes. The primary researcher consistently explained that a word is only counted correct if the student can read a word correctly and places the correct letter representing a phoneme in each box. The researcher circled one only if the student read the word correctly without prompts and wrote the correct phoneme in each sound box.

Prior to beginning each student's intervention condition, the primary researcher scheduled a short 15–20 minute training session with each student and their parent. During each individual training session, the primary researcher described the ESB intervention and modeled

the steps after watching two videos demonstrating the intervention. During each observation/session in the intervention and maintenance conditions or phases, the doctoral students and the primary researcher completed the intervention procedures integrity checklist.

Data Analysis

Data were visually analyzed to determine whether there are changes within and between phases in each student's responses. Visual analysis was used to assess whether increases in students' accuracy of letter sound and word identification occurred with the introduction of the ESB intervention. If the introduction of the ESB intervention coincided with the students' accuracy of letter sound and word identification, further visual analysis was used to determine whether those increases continued throughout the intervention and maintenance phases. Each student has an average of their scores during the study. Simply add all the numbers, then divide by how many numbers there are total, it is the sum divided by the count. At the conclusion of this proposed study, it was expected that participants would demonstrate an increase in overall word identification and more fluid reading skills. By using this research design, the treatment or ESB intervention would not be removed, therefore demonstrating a progression of skills obtained by one particular intervention.

The primary researcher conducted 86 direct observations/sessions with the five participants, 30 of them with two data collectors to establish IOA, and were calculated for 35% (i.e., 30/86) of observations/sessions.

Data Collectors, Interobserver Agreement, and Treatment Integrity

Data collectors were three TWU special education doctoral students (including the primary researcher). All data collectors completed the Social and Behavior Research-Basic/Refresher and Social and Behavioral Responsible Conduct of Research online training

courses provided through CITI Program™. This was followed by successful completion of the IRB approval process at TWU as well as approval from the school district where the ISIP™ data was provided.

Data collectors received training in how and what to observe prior to this study to ensure accurate data collection. The primary researcher showed two videos for each part of the intervention, one addressing letter sound and the other addressing spelling. Then, the data collectors engaged in a mock session using a few words to demonstrate the steps of the intervention. The training consisted of (a) reviewing the definition and providing examples of "letter sound"; (b) reviewing the definition and providing examples of "word identification"; (c) practice collecting data on letter sound and word identification using ESBs (i.e., through video or other simulation); and (d) practice documenting intervention integrity using the intervention procedures integrity checklist (see Appendix A). Data collectors received training until an interobserver agreement (IOA) of 90% or higher was achieved across three consecutive observations prior to beginning the study. IOA was determined by dividing the number of agreed-upon observations by the total number of intervals observed.

During this study, there were 86 direct observations/sessions, 30 of them with two data collectors to establish IOA, which was calculated to 35% (i.e., 30/86) of observations/sessions. The primary researcher and two other doctoral students used the eight-item checklist (see Appendix A), noting each sound box intervention step and used the checklist to score while observing the sessions. Using the intervention integrity checklist (see Appendix A), the intervention integrity was calculated by adding the number of steps completed correctly. The three doctoral students collected data for each word read correctly, they recorded each verbal and written response as correct or incorrect (i.e., zero or one). Using a scored-interval IOA, data

sheets were analyzed after each session during the intervention and maintenance phases. The primary researcher and an additional doctoral student would remain on the ZOOM™ call after the parent and student participant left in order for us to review our data.

Social Validity

Using a 5-point Likert-type scale, (ranging from 1 = *strongly disagree* to 5 = *strongly agree*), the primary researcher and two data collectors rated social validity based on five statements. The five statements were: (a) the student(s) showed progress in letter identification after using sound boxes, (b) using the sound boxes was easy, (c) I recommend that others use the sound boxes, (d) students liked the sound boxes, and (e) I will use sound boxes in the future (Appendix B).

Social validity for participants was assessed by asking each student participant to respond to five statements. Using a similar 5-point Likert-type scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*), each statement was read aloud to the participant who then circled a smiley face with teeth if they strongly agreed with the statement, a smiley face if they agreed with the statement, a neutral face if they are neutral, a sad face if they disagreed with the statement, or a crying face if they strongly disagreed with the statement. The statements were: (a) I like using sound boxes, (b) sound boxes helped me know the sounds of the letters, (c) sound boxes helped me sound out words, (d) I will sound out words I do not know, and (e) I think my friends would like to use sound boxes (see Appendix C).

Social validity for the parents was assessed by giving five statements to which they responded using a 5-point Likert-type scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*). The five statements were (a) the student(s) showed progress in letter identification after using sound boxes, (b) using the sound boxes was easy, (c) I recommend that others use the

sound boxes, (d) students liked the sound boxes, and (e) I will use sound boxes in the future (see Appendix D).

CHAPTER IV

RESULTS

The data presented represent student reading and spelling changes as a result of implementing the ESBs intervention. ESBs is phonics reading intervention developed to increase letter sound accuracy and word identification with first grade students who are at-risk for dyslexia or other reading deficits. Results include information from baseline, intervention, and maintenance phases. Baseline and intervention data were collected two to three times per week. Maintenance data were collected weekly until a stable trend was developed. During each session, trained data collectors used an accuracy count data sheet to track the number of words spelled and read correctly. This same data sheet reflected an intervention integrity checklist, that was completed each session during intervention and maintenance phases. Six students were recruited for this study, yet one student asked to leave the study due to confidential circumstances. Therefore, data will only be reported for five participants. Intervention data were graphed to demonstrate the effect of implementation of ESBs for each student. Social validity results are also presented to indicate the intervention acceptability as determined by the student, parent and doctoral student. The following section will discuss the results of the five students, beginning with a brief explanation of MBD then an overview of the data and lastly a detailed examination of the results for each individual participant.

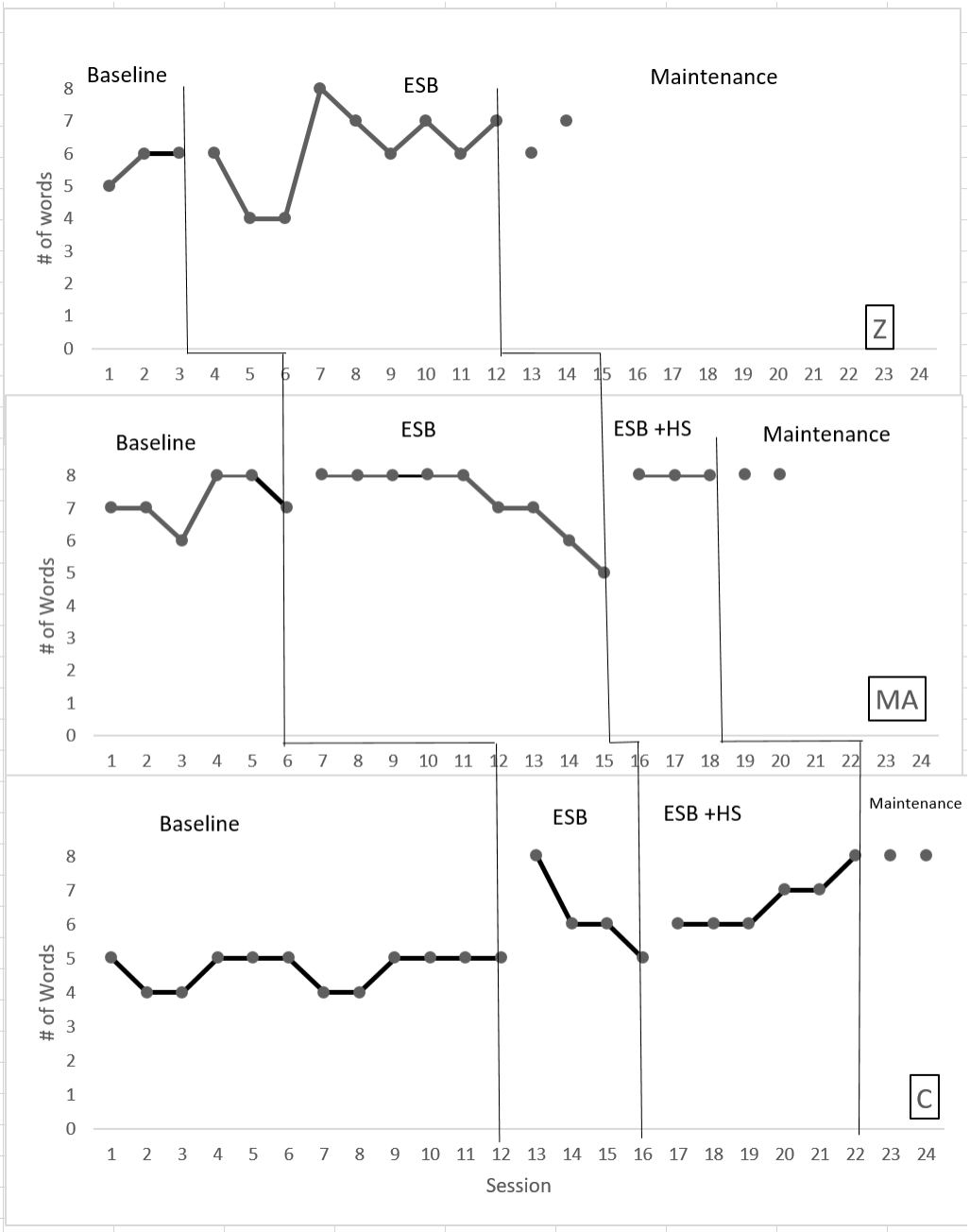
Overview of the Results

Figure 2 shows a graphic representation of the number of correct words read aloud and written of three out of the five students who completed the study. Visual analysis of Figure 2 indicated a gradual increase of the number of words written and read correctly with these three participants. While some of their scores stayed steady, decreased then increased again the

ultimate goal of correctly reading and writing the eight words was mastered with these three participants. Throughout the study several of the students struggled with flipping letters when they were asked to write the words. Consequently, any flipped letter was counted incorrectly and ultimately their scores dropped. After noticing two student participants' consistent decline in scores despite intervention, the primary researcher reviewed the data in more detail, modeling more words and adding in a visual hand sign. It was determined more assistance was needed with a few students due to flipping a few letters. The primary researcher realized a more concrete and visual reminder was needed. Two student participants were struggling with flipping the "p/q" and "b/d" and by adding the hand sign, which is both a visual and tactile reminder of those letters (i.e., putting both hands in a thumbs up shape and putting knuckles together with thumbs on top each hand represents a letter, the left "b" and the right "d", the student's scores improved. If you turn the thumbs down they then represent the "p" and "q"). This visual reminder, plus more modeling was beneficial and consequently their scores increased to a stable higher score.

Figure 2

Participants' Number of Correct Responses Using ESB



**ESB= Elkonin Sound Boxes *HS= Hand Symbols*

Out of the 30 sessions that data was collected with another doctoral student, there was only one occasion with a discrepancy, after the researchers communicated and reviewed the data

it was concurred that the primary researcher had scored the answer correct when in fact the student was given a prompt and should have counted the word incorrect as this was part of the ESB scoring parameters that were established. Therefore, the IOA was at a rate of 100% over the 30 sessions.

Student Z

Student participant Z had three baseline observations, the average was a score of 5.6 when reading and spelling of the eight CVC words. During the intervention phase, he was observed nine times and the average was 6.1 when reading and spelling of the eight CVC words. Student participant Z had two maintenance sessions/observations, during which his average was 6.5 when reading and spelling of the eight CVC words. Visual analysis indicated a slight dip in the beginning of the intervention phase, but he quickly maintained an average score of six out of eight words. While he only mastered all eight once during intervention he maintained an average score of six or eight words correct or 75% accuracy. Student participant Z's data is presented in Figure 2. Student participant Z's scores on spelling probes during baseline ranged from five to six words correct out of eight total. Upon implementation of ESBs, Z's scores ranged from four to eight and his level of letter-sound and spelling accuracy increased to an average of 100% during the intervention phase.

Student Ma

Student participant Ma had six baseline observations, the average was a score of 7.2 when reading and spelling of the eight CVC words. During the intervention phase, she was observed 12 times and the average was 7.4 when reading and spelling of the eight CVC words. Student participant Ma had two maintenance sessions/observations, during which her average was eight when reading and spelling of the eight CVC words. Visual analysis indicated a slight

dip in the middle of the intervention phase, but after reviewing the instructions in more detail, modeling more words and adding in a visual hand sign she was able to finish the intervention and mastered scores as well as in the maintenance phase. Student participant Ma's data is presented in Figure 2. Student participant Ma's scores on spelling probes during baseline ranged from six to eight words correct out of eight total. Upon implementation of ESBs, Ma's scores ranged from five to eight and her level of letter-sound and spelling accuracy increased to an average of 60% during the intervention phase.

Student C

Student participant C had 12 baseline observations, the average was a score of 4.6 when reading and spelling of the eight CVC words. During the intervention phase, she was observed 10 times and or average was 6.5 when reading and spelling of the eight CVC words. Student participant C had two maintenance sessions/observations, during which her mean or average was eight when reading and spelling of the eight CVC words. Visual analysis indicated a difficulty during baseline with flipping letters and omitting letters. Regardless, the data remained stable and there was little. if any, increase in her score. The first session of the intervention was a perfect score of eight; however, there was a steady decline with subsequent sessions. Once the ESBs intervention dipped by three words, the primary researcher implemented reviewing the instructions in more detail, modeling more words, and adding in a visual hand sign and C was able to finish the intervention and mastered scores as well as in the maintenance phase. Student participant C's data is presented in Figure 2. Student participant C's scores on spelling probes during baseline ranged from four to five words correct out of eight total. Upon implementation of ESBs, C's scores ranged from five to eight and her level of letter-sound and spelling accuracy increased to an average of 60% during the intervention phase.

Student Mi

Student participant Mi had four baseline observations, the average was a score of 4.7 when reading and spelling of the eight CVC words. During the intervention phase, she was observed seven times and the average was 4.6 when reading and spelling of the eight CVC words. Student participant Mi had two maintenance sessions/observations, during which her average was five when reading and spelling of the eight CVC words. Visual analysis indicated a drop at the end of baseline due to flipping letters, omitting letters and hearing “a” instead of “e”. While the first two sessions of the intervention were steadily increasing, she began to drop her scores, mainly due to flipping “b/d”, “p/q”, reversed the “j”, “c” and “r”, and heard “e/a”, “k/c” sounds. Once we were able to gain stability within intervention, even though a lower score, her scores became stable even during the maintenance phase. Student participant Mi’s data is presented in Figure 3. Student participant Mi’s scores on spelling probes during baseline ranged from four to six words correct out of eight total. Upon implementation of ESBs, Mi’s scores ranged from one to six and her level of letter-sound and spelling accuracy increased to an average of 500% during the intervention phase.

Student G

Student participant G had seven baseline observations, the average was a score of seven when reading and spelling of the eight CVC words. During the intervention phase, she was observed six times and the average was 7.6 when reading and spelling of the eight CVC words. Upon further analysis of G’s data, the primary researcher should not have started the intervention because there was an upward trend. It was reported by the parent that this student practiced these words before and after the research sessions. The ESB intervention should not have been implemented with an upward baseline trend. Student participant G had two maintenance

sessions/observations, during which her average was eight when reading and spelling of the eight CVC words. As the study went into the intervention phase, she maintained high scores throughout the end of intervention and into the maintenance phase. Student participant G's data is presented in Figure 3. Student participant G's scores on spelling probes during baseline ranged from six to eight words correct out of eight total. Upon implementation of ESBs, G's scores ranged from seven to eight and her level of letter-sound and spelling accuracy increased to an average of 14% during the intervention phase.

Figure 3
Participants' Number of Correct Responses Using ESB

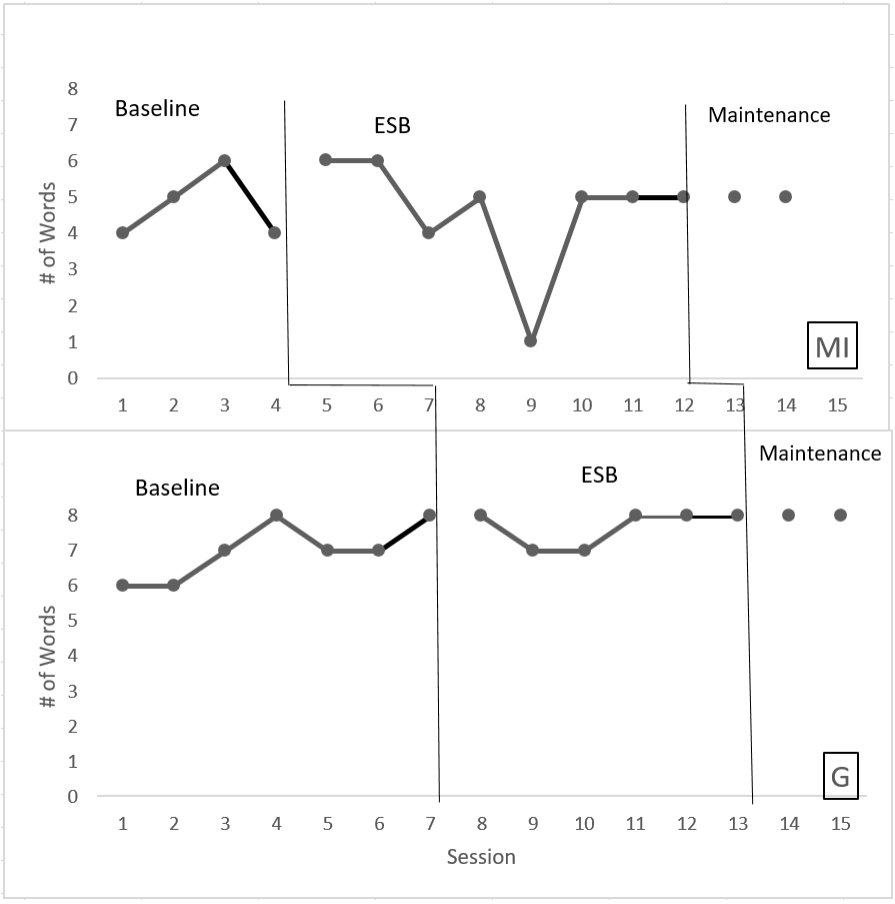


Figure 3 shows a graphic representation of the number of correct words read aloud and written for the last two out of the five students who completed the study. Visual analysis of Figure 3 indicates a gradual increase of the number of words written and read correctly with one of the two participants. Even though Mi data were not steady during the intervention phase until the last three sessions and into the maintenance phase, she was able to maintain an average score of five out of eight for three of the intervention sessions.

Intervention Fidelity

All students were observed during each training sessions by the primary researcher. All data collectors were trained in how and what to observe prior to this study to ensure data were collected accurately. The primary researcher showed two short videos of each part of the intervention, the letter-sound and word identification/spelling. Then a mock session was completed using a few words to demonstrate the steps of the intervention. The training consisted of: reviewing the definition and providing examples of letter sound, reviewing the definition and providing examples of word identification, watched video of each part of the ESB intervention, practicing collecting data on letter sound and word identification using ESBs (i.e., mock session), and practicing documenting intervention integrity using the checklist. The ESB intervention procedures integrity checklist (see Appendix A) provided spaces to check off when the following steps occurred: researcher clearly explains directions; researcher/parent gives student the sound box materials (paper, writing utensil, pennies or other objects); researcher models moving pennies or objects into each box while saying each phonemes; “say it/move it,” student moves the pennies or objects into each box while saying each phoneme; researcher provides corrective feedback or praise; researcher models writing a letter in each box while saying each phoneme; student writes letters into each box while saying each phoneme; and

researcher provides corrective feedback or praise. Fidelity steps were met by 100% as recorded by the additional doctoral observers.

Prior to the start of each student's intervention phase, a brief 3 to 5 minute training/review of directions took place to remind both the student and the parent of the expectations. During these individual training sessions, the researcher reminded the student of each ESB procedure, showed two short videos, and modeled each step with the student and parent. The ESB intervention procedures integrity checklist was completed for each session with all student participants during both intervention and maintenance phases. Fidelity was 100% for the student/parent training sessions.

Treatment Integrity

During each ESB intervention and maintenance phases, additional data collectors completed the ESB intervention procedures integrity checklist during each session to determine if each step was completed by both the researcher and the student. Of the 86 total direction observations/sessions, 54 occurred during the ESB intervention and maintenance phases. For the 54 total direction observations/sessions taking place after baseline, data collectors completed the integrity checklist 100% (ie., 54/54) of the observations/sessions. Student participant Z used the ESB intervention steps 100% of the time observed (i.e., nine intervention sessions and two maintenance sessions). Student participant Ma used the ESB intervention steps 100% of the time observed (i.e., 12 intervention sessions and two maintenance sessions). Student participant C used the ESB intervention steps 100% of the time observed (i.e., 10 intervention sessions and two maintenance sessions). Student participant Mi used the ESB intervention steps 100% of the time observed (i.e., seven intervention sessions and two maintenance sessions). Student

participant G used the ESB intervention steps 100% of the time observed (i.e., six intervention sessions and two maintenance sessions).

There were 86 total direct observations/sessions with the five student participants, 30 of these sessions were with two data collectors to establish IOA and were calculated for 35% (i.e., 30/86) of observations/sessions. To further analyze this information it is broken down per participant: G had 15 total sessions, five were with another doctoral student, calculating to 33%; Mi had 13 total sessions, seven were with another doctoral student, calculating to 53%; C had 24 total sessions, six were with another doctoral student, calculating to 25%; Ma had 20 total sessions, seven were with another doctoral student, calculating to 35%; and Z had 14 total sessions, five were with another doctoral student, calculating to 36%. For each session the interraters and we were in agreement and calculated accuracy at 100% except one session. During Ma's sixth session of ESB intervention, the primary researcher had scored the answer correctly yet did not realize had given the student a prompt that according to the ESB scoring parameters, this should have meant that it was as an incorrect word (taking this into consideration the total calculation for IOA was 99% accuracy).

Social Validity-Student Participants

In order to evaluate the efficiency and effectiveness of using ESB to increase letter-sound accuracy and word identification with a student who is at-risk for dyslexia or other reading deficits, each student participant was asked to complete the Elkonin Sound Boxes Social Validity Survey: Student Version (see Appendix C). Each student participant was asked to complete the survey when their maintenance phase concluded. This five-question survey used a 5-point Likert scale of smiley faces, with 5 representing *strongly agree* and 1 representing *strongly disagree*, to determine the satisfaction level of using the ESB intervention. The results are listed in Table 2.

Table 2

Social Validity Rating by Student Participants

Survey Questions	Strongly Agree	Agree	Neutral
I like using sound boxes	3	2	0
Sound boxes helped me know the sounds of the letters	5	0	0
Sound boxes helped me sound out words	4	0	1
I will sound out words I do not know	2	2	1
I think my friends would like to use sound boxes	5	0	0

Almost all five student participants chose 4 *agree* or 5 *strongly agree* for all five survey questions indicating that (1) they like using sound boxes, (2) sound boxes helped them know the sounds of the letters, (3) sound boxes helped them sound out words, (4) they will sound out words they don't know, and (5) they think their friends would like to use sound boxes. One student participant did answer question three with a neutral yet his data reflect the EBS did help him read and write the words during the study. Another student participant answered question four with a neutral response. Overall, the student participant responses were positive and ESB is an intervention they will continue to use.

Social Validity-Researchers

Both doctoral students were asked to complete the Elkonin Sound Boxes Social Validity Survey: Doctoral Student Version (see Appendix D). They were asked to complete this survey at the conclusion of the maintenance phase. The five-question survey used a 5-point Likert scale with 5 representing *strongly agree* and one representing *strongly disagree,* to determine the doctoral student's satisfaction with the ESB intervention. One doctoral student chose 4 *agree*, while the other doctoral student chose 5 *strongly agree* for all five survey questions: (1) the student participants showed progress in letter identification after using sound boxes, (2) using sound boxes was easy, (3) they would recommend that others use the sound boxes, (4) they thought the student participants liked the sound boxes, and (5) they will use sound boxes in the future. Results are shown in Table 3 below.

Table 3

Social Validity Rating by Two Doctoral Students

Survey Questions	**Strongly Agree**	**Agree**
The student(s) showed progress in letter identification after using sound boxes	1	1
Using sound boxes was easy	1	1
I recommend that others use the sound boxes	1	1
The students liked the sound boxes	1	1
I will use sound boxes in the future	1	1

Social Validity-Parents

All five parents were asked to complete the Elkonin Sound Boxes Social Validity Survey: Parent Version (see Appendix D). Parents were asked to complete this survey at the conclusion

of the study. The five-question survey used a 5-point Likert scale with 5 representing *strongly agree* and 1 representing *strongly disagree*, to determine the parent's satisfaction with the ESBs intervention. While the parent's answers are reflected in the table below, no one scored the study below a neural and one parent chose 5 *strongly agree* for all five survey questions: (1) the student participants showed progress in letter identification after using sound boxes, (2) using sound boxes was easy, (3) they would recommend that others use the sound boxes, (4) they thought the student participants liked the sound boxes, and (5) they will use sound boxes in the future. Results are shown in Table 4 below.

Table 4

Social Validity Rating by Parents

Survey Questions	**Strongly Agree**	**Agree**	**Neutral**
The student(s) showed progress in letter identification after using sound boxes	4	0	1
Using sound boxes was easy	5	0	0
I recommend that others use the sound boxes	3	2	0
The students liked the sound boxes	4	1	0
I will use sound boxes in the future	3	1	1

CHAPTER V

DISCUSSION

ESBs have been an effective intervention for many years for improving letter sound and word identification with young children who might be at-risk for dyslexia. The following section will discuss the results of the five students, beginning with a brief explanation of MBD then an overview of the data and lastly a detailed examination of the results for each individual participant.

In MBD, a behavior is measured across either multiple participants, behaviors, or settings. The multiple baseline starts with the baseline (Phase A), then proceeds with the intervention (Phase B). MBD across participants was chosen for this study to show that first graders who had below average scores on the nationally normed ISIP screening tool will improve their letter sound recognition and their spelling of CVC words while using ESBs as an intervention. The MBD allows the intervention (i.e., ESBs) to be implemented in a staggered fashion across participants so that changes in performance during instructional sessions are directly comparable to non-instruction (i.e., baseline) conditions (Joseph, 1998).

This study used a multiple baseline single-subject research design across participants to examine the effects of ESB on letter sound and word identification with first grade students who are at-risk for dyslexia or other reading difficulties. Due to COVID-19, all sessions for this study were completed via ZOOM™ and recorded for further analysis. The ESBs intervention is a supplement to reading instruction and is used to target sequential one-to-one letter-sound correspondences in words (Alber-Morgan et al., 2016). The MBD across participants was chosen for this study to determine if ESB is an effective intervention.

For all five student participants who completed this study, the introduction of ESB intervention resulted in positive outcomes in their reading, writing and spelling skills. Although the student participants progressed at different rates, all five student participants were able to maintain or increase these skills at rates above baseline. While some student participants were unable to reach a perfect score of mastering all eight words, each student participant made progress and resulted in a steady gain.

The ESBs were an effective intervention for student participant Z. Possibly with more repetition and review of printed letters he will decrease the amount of flipping of certain letters. Moving forward, it would be interesting to see what his score on his ISIP™ screener is at the beginning of his second grade school year, to compare where he was when this study began. Due to COVID-19 and the shut down of the schools, the data might not be valid as it would have been had students been allowed to continue attending school and focusing on deficits such as these.

During that decline in the middle of the intervention phase it was noted that while she flipped “b/d” a few times there were two sessions where she flipped a total of six words with the letter “p” making them look like “q”. Due to these words being randomly selected, there were sessions that might have been heavy with words with “b/d” and “p”. Again, this student participant caught on quickly once shown the hand signs for those letters, as the data illustrates, the primary researcher believes the ESBs and hand signs have been beneficial to Ma.

It was noted during intervention she flipped “b/d”, “p/q”, reversed the “s”, “c” and “z”, and heard “j/g”, “k/c” sounds. This could be a visual concern but also a phonemic awareness concern. There were also signs of distractions during the sessions by her brother, dog, or other items on the table. But C enjoyed this intervention and once the primary researcher showed the

hand signs for those letters, there was a steady increase with her scores, as the data illustrates, the primary researcher believes the ESBs and hand signs have been beneficial for her.

The reasons why Mi could not maintain a score higher than six is possibly due to a family history of dyslexia according to her mother. This parent has been concerned with her Mi's phonics, reading and writing skills since kindergarten. She wanted to participate in this study to learn about other interventions that might be helpful for Mi. She plans to have her assessed in the school district for dyslexia when school is back in session. Mi seemed to enjoy the ESB intervention during the sessions and later in the intervention phase there was a stable trend with her scores, as the data illustrates.

Overall, it is believed the ESBs were an effective intervention for student participant G; she enjoyed the moving of the objects into the boxes and later writing the letters in the boxes then reading the words aloud. The parent expressed that G liked the intervention so much she would practice on her own, using new words.

The two graphs show the visual analysis of MBD of this study. Visual analysis includes looking at data trends, consistencies, and immediacy of effects within baseline and intervention phases. The visual analysis of the graphs show the functional relationship between the ESB intervention and improved reading and spelling of the student participants. Analysis shows that overall, ESBs were beneficial to increase student responses with reading and spelling CVC words. While not all of the students had a gradual trend upward as some would dip down due to flipping or reversals of some letters. Graphing in this manner creates a way to easily read and interpret these data.

Limitations

The current study does have limitations that should be considered when interpreting the findings. First, a limitation was the inability to control the environment, due to conducting the ESB sessions from each student participant's home via ZOOM™ due to COVID-19. There were several environmental factors that could not be controlled (e.g., dogs barking, siblings interrupting, phones ringing, and inattentive student participants). For example, there was one session with a particular female student participant where her older sibling was working on his remote learning at the same table. At one point, he came over and began speaking with the primary researcher via ZOOM™. The session was briefly paused as the sibling asked about the ESBs, once explained what the researcher and participant were doing and when he returned back to his work, the session continued.

A second limitation was the inability to monitor parent involvement with each student participant; thereby potentially giving a student an unfair advantage. For example, there was an instance in which the parent prompted their child to write a certain letter and did not allow the child to problem solve independently. Additionally, another parent would practice the same words with their child after the session, using the words in a spelling test to ensure the child would be able to correctly spell the words during the next session. Upon further analysis of this student's data, the primary researcher should not have started the intervention because there was an upward trend. The ESB intervention should not have been implemented with an upward baseline trend. These situations were resolved after having a brief conversation with both parents asking they discontinued their prompting or assisting and practicing with their children during the study.

The third limitation influencing student data were the errors in reversals or flipping letters; they were counted incorrectly during intervention and maintenance yet not during baseline due to the instrument used. While *Words Their Way Primary Spelling Inventory*™ assessment was used during baseline, it clearly states that reversed letters are not to be counted incorrectly, but noted for later review. Yet, when using ESBs intervention reversed or flipped letters must be counted incorrectly as many times this could spell a different word, such as "bid". If a letter is reversed the word would change to "did", "bib" or "dib". This is a preventative strategy that could have been reviewed and practiced before the study began or another step added in the training process. Adding this strategy prior to the baseline phase or step in the training could have changed the outcome of this study and may have resulted in an increase of correctly spelled words by the student participants.

A fourth limitation was the amount of words per session during all three phases (baseline, intervention, and maintenance). Using *Words Their Way*™ spelling inventory assessment material this study was restricted to using only the first eight words as the subsequent words were not CVC words. This made it difficult to have more than eight words in the intervention and maintenance phases. If this study was to be replicated or utilized more, it is recommended to potentially use different assessment materials and use more than only eight words. The primary researcher would recommend 10–15 but no more than 20 words, as this may become too long of a session with six or seven year olds. The primary researcher would have extended the student participants knowledge and used consonant, consonant, vowel, consonant (CCVC) words such as trap and consonant, vowel, consonant, consonant (CVCC) words like milk. Three boxes would still be used since each phoneme (sound) is what goes into the boxes. This would be a beneficial extension to this study.

One last limitation is the small sample size of students. Initially there were six student participants yet ultimately only five completed the study. If this study were to be replicated it is recommended that a larger study size be examined.

Implications

The findings of this study supports the use of ESB as they provide teachers and parents an effective, simple, time efficient and inexpensive strategy to teach young children phonemic awareness. This study proved similar results to the study completed by Keesey et al., in 2015, which suggests that word box intervention was effective in increasing segmenting letters and spelling skills of three kindergartners.

Implications for Researchers

An evidence-based early intervention for students at-risk for dyslexia is the ESB (Keesey et al., 2015). ESB is a specific instructional method used primarily with early elementary students. ESBs help students build phonemic awareness by segmenting words into individual sounds or syllables (Durst & Joseph, 2016). One important goal of this study was to add to and strengthen the literature base surrounding this topic and such intervention. Extensive evidence supports the use of early screening and early intervention with students who have undiagnosed literacy-related disabilities, including dyslexia (IDA, 2018b). ESB is an effective and simple intervention that allows researchers, teachers, and parents the ease of working with young students and quickly seeing the results.

One implication is how this study sought to increase letter sound and word identification skills in first graders, it should be noted that motivation and interest in reading and spelling of four of the student participants increased with the implementation of the ESB intervention. These students were excited to begin each session, they continued using ESB when working on school

work at home over the summer break, and they enjoyed the positive feedback during the sessions. Another implication for the field of special education, ESBs are beneficial as an early intervention for struggling readers at any age. This intervention uses a multisensory approach which is helpful for many students who might have difficulties with letter-sound relationship and spelling of words. Teachers can use this intervention with a small group, large group or one-on-one with students who need a supplemental activity to assist with segmenting letters and making words. Future studies should explore the use of ESB to increase letter sound and word identification skills as well as increase the overall attitude and/or motivation of students when using this intervention. It was clear during this study that several of the student participants increased their scores based on their enjoyment and personal progress while using ESB. It would also be interesting to examine the effects of ESB on student performance with other types of word patterns, not just CVC pattern words for future studies. Adding in blends (i.e., shed, plan, etc.), silent letters (i.e., hope and wait), or suffixes (i.e., dreamed, clapping, etc.) would expand the amount of boxes and strengthen the student's skills when using ESBs.

Implication for Teachers

Finding effective and simple reading intervention is critical, especially when thinking about early intervention with young struggling readers. Results from this study indicate that ESB is an effective intervention to address letter-sound and word identification with young students who might be at-risk for dyslexia and other reading difficulties. ESB is a specific instructional method used primarily with early elementary students; ESBs help students build phonemic awareness by segmenting words into individual sounds or syllables (Durst & Joseph, 2016).

ESB can be embedded within a comprehensive early literacy program to teach students beginning, middle, and ending sounds in words. For those students who are at-risk of not

acquiring phonemic awareness skills, ESB can be used as an intensive intervention procedure that supplements the general early literacy curriculum. Once students acquire the skill of phonetically spelling words correctly their fluency and confidence of reading will increase.

As stated earlier, ESB can be very economical to create and use. Card stock can be laminated to provide a durable word box sheet for each student in a small group or large class. Poker chips or other small classroom objects work well as counters that can be pushed into the boxes. During this study, student participants were observed using uncooked beans, pennies, candy pieces, and multicolored plastic bears when moving objects into the boxes. Some student participants used multiple sheets of paper and pencil to draw the boxes, move objects and spell out the words. Dry erase boards and markers were used during this study and proved to be very easy to manipulate with both steps; pushing the objects into the boxes and writing the letters inside the boxes. Students can also manipulate ESB by using technology, such as an electronic tablet, laptop or even cellular phone applications. When using such devices, the student can simply touch the screen to drag and drop letters into the respective sections of the sound/word boxes. Using technology for ESBs could be beneficial as many students are choosing to stay home and work remotely for the 2020–2021 school year due to COVID-19 concerns. The supportive visual, auditory, and physical prompts that are inherent with ESB can gradually be faded as students master phonological skills. Tracking students progress while using ESBs can help teachers and parents determine when to fade these supports. Once students have mastered moving objects into the boxes, they can simply write the letters/words while saying the sound. Also, once they understand the sounds of each phoneme, they can remove verbally stating the sounds and words.

Conclusion

In this study, a MBD across participants was used to investigate the effects of using ESB to improve letter sound and word identification with young children who might be at-risk for dyslexia. Results from the study strongly suggest that ESBs can improve first grader's letter sound and word identification and ultimately reading and spelling skills within a short amount of time and effort. All student participants showed improvements in their letter-sound and word identification when taught the ESB intervention, while some had more immediate and sustained progress, all five student participants were able to demonstrate an upward trend in their data. This positive response to ESB intervention was consistent with the literature.

The current study also has several implications for researchers and practitioners. Future studies should examine the effects of ESB intervention on letter-sound and word correspondence along with adding a step to teach and remind students about reversal or flipping of letters such as; "b/d", "p/q". It was concluded that adding in this step to the current study may have changed the amount of correct responses and ultimately the student participants could have had a more immediate and positive upward trend. Practitioners can easily use the ESB intervention with young students who are struggling with letter sounds and segmenting words together. The ESB intervention is an inexpensive and effortless strategy for teachers and parents to implement with students who need further practice with segmenting sounds into words. Given the positive results of this study, there is an obvious benefit for implementing ESB with young students (preferably pre-k, kindergarten, and first graders) who are struggling with phonics and reading.

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APPENDICES

APPENDIX A

Intervention Integrity Checklist/Recording Sheet

Elkonin Sound Box Intervention Procedures Integrity Checklist/Recording Sheet

Student: _____ Date: _____

_____1. Researcher clearly explains directions

_____2. Researcher/Parent gives student the sound box materials (paper, writing utensil, pennies or other objects)

_____3. Researcher models moving pennies or objects into each box while saying each phonemes; "Say it/move it"

_____4. Student moves the pennies or objects into each box while saying each phoneme

_____5. Researcher provides corrective feedback or praise

_____6. Researcher models writing a letter in each box while saying each phoneme

_____7. Student writes letters into each box while saying each phoneme

_____8. Researcher provides corrective feedback or praise

A word is counted as correct when the student can read a word correctly, placing the correct letter, representing one phoneme in each box

Word	**Score:** **Circle 1 only if the student has read the word correctly within 3 seconds, without prompts and written only one and correct phoneme in each sound box**	
1.	**0**	**1**
2.	**0**	**1**
3.	**0**	**1**
4.	**0**	**1**
5.	**0**	**1**
6.	**0**	**1**
7.	**0**	**1**
8.	**0**	**1**

Total Score (add 1's) = _____

APPENDIX B

Elkonin Sound Boxes Intervention Social Validity: Doctoral Student Version

Elkonin Sound Boxes Social Validity Survey: Doctoral Student Version

Please fill out the survey based on using the Elkonin Sound Boxes that you were asked to do as a data collector in this research study. Please indicate whether you strongly disagree, disagree, neutral, agree, and strongly agree with the following statements. Thank you for your time.

1. The student(s) showed progress in letter identification after using sound boxes

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

2. Using the sound boxes was easy

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

3. I recommend that others use the sound boxes

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

4. The students liked the sound boxes

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

5. I will use sound boxes in the future

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

APPENDIX C

Elkonin Sound Boxes Intervention Social Validity: Student Version

Elkonin Sound Boxes Social Validity Survey: Student Version

Please fill out the survey based on using the Elkonin Sound Boxes that you were asked to do as a participant in this research study. Please indicate whether you strongly disagree, disagree, neutral, agree, and strongly agree with the following statements. Thank you for your time.

1. I like using sound boxes

2. Sound boxes helped me know the sounds of the letters

3. Sound boxes helped me sound out words

4. I will sound out words I do not know

5. I think my friends would like to use sound boxes

APPENDIX D

Elkonin Sound Boxes Intervention Social Validity: Parent Version

Elkonin Sound Boxes Social Validity Survey: Parent Version

Please fill out the survey based on using the Elkonin Sound Boxes that you were asked to do with your child for this research study. Please indicate whether you strongly disagree, disagree, neutral, agree, and strongly agree with the following statements. Thank you for your time.

1. The student(s) showed progress in letter identification after using sound boxes

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

2. Using the sound boxes was easy

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

3. I recommend that others use the sound boxes

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

4. The students liked the sound boxes

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

5. I will use sound boxes in the future

5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree

Appendix E

Words Their Way Primary Spelling Test

Words Their Way Primary Spelling Inventory Feature Guide

Student's Name _____ Teacher _____ Grade _____ Date _____

Words Spelled Correctly: _____ */ 26* *Feature Points:* _____ */56* *Total:* _____ */82* *Spelling Stage:* _____

SPELLING STAGES→	EMERGENT LATE		LETTER NAME—ALPHABETIC EARLY	MIDDLE	LATE	WITHIN WORD PATTERN EARLY	MIDDLE	SYLLABLES AND AFFIXES LATE	EARLY	
Features →	Consonants Initial	Final	Short Vowels	Digraphs	Blends	Common Long Vowels	Other Vowels	Inflected Endings	Feature Points	Words Spelled Correctly
1. fan	f	n	a							
2. pet	p	t	e							
3. dig	d	g	i							
4. rob	r	b	o							
5. hope	h	p				o-e				
6. wait	w	t				ai				
7. gum	g	m	u							
8. sled			e		sl					
9. stick			i		st					
10. shine				sh		i-e				
11. dream					dr	ea				
12. blade					bl	a-e				
13. coach				ch		oa				
14. fright					fr	igh				
15. chewed				ch			ew	-ed		
16. crawl					cr		aw			
17. wishes				sh				-es		
18. thorn				th			or			
19. shouted				sh			ou	-ed		
20. spoil							oi			
21. growl							ow			
22. third				th			ir			
23. camped								-ed		
24. tries					tr			-ies		
25. clapping								-pping		
26. riding								-ding		
TOTALS	/7	/7	/7	/7	/7	/7	/7	/7	/56	/26

APPENDIX F

Word List by Level

APPENDIX B

Word Lists by Level

Word lists for each skill and level to use with word study activities

Levels B & C CVC Words for Sound Boxes					Level D Digraphs
A	O	I	U	E	sc/ch/th
cab	hog	bin	hum	fed	mash
dad	jog	fin	gum	beg	dash
cat	fog	pin	bum	yet	cash
sad	log	tin	mug	led	wish
cap	top	dip	tub	wed	dish
can	dot	win	cub	red	fish
had	got	did	fun	jet	ship
ham	cot	hid	sun	let	shop
hat	lot	bid	yum	pet	shot
mad	not	kid	gun	met	shed
man	hot	lid	mud	wet	rush
zap	pot	big	rug	set	mush
map	hop	dig	rut	net	hush
ram	mob	pig	gut	get	shut
rag	mop	rig	run	leg	
rap	pop	wig	nut	ten	chat
van	bob	dim	hut	hen	chin
rat	job	him	rub	peg	chop
bad	rob	rid	sub	bet	such
ran	sob		bus	pen	much
wag	dog			den	
tab	cob			bed	that
mat				bet	this
jam					then
pat					them
pan					thud
pad					path
yam					math
has					bath
					with