EXAMINING THE IMPACT OF A SELF-AWARENESS INTERVENTION ON THE READING ACCURACY AND SELF-MONITORING SKILLS OF STUDENTS WITH READING DIFFICULTIES

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ABSTRACT

Students with reading difficulties often struggle to monitor their reading, which limits their ability to become independent readers. To foster development of self-monitoring skills in the process of reading, strategies for monitoring one's own reading performance should be incorporated into existing reading interventions. However, there is a lack of comprehensive interventions that support both reading and self-monitoring. The purpose of this study was to examine the impact of a video self-monitoring intervention on the word reading accuracy, oral reading accuracy, and self-monitoring skills of students with reading and self-regulation difficulties. The theory of change on which the study was based is that, by improving self-awareness and the ability to self-monitor their reading, students with reading difficulties will make fewer errors as they read, which will allow them to become more independent, accurate readers.

A multi-component, multiple baseline across individuals design was used to test whether a novel video self-awareness intervention could improve the reading accuracy and self-monitoring of students with reading and self-regulation difficulties. Three students participating in an evidence-based reading intervention program received a self-monitoring intervention in which they were recorded as they read aloud a list of decodable real words, pseudowords, and a reading passage. Participants were then asked to listen to the recording while marking their own errors and self-corrections. Finally, students participated in feedback discussions in which they reflected upon their performance on the reading tasks and received researcher feedback.

Data were evaluated using visual analysis, percentage of non-overlapping data, and individual Tau-U and weighted Tau-U effect sizes. Data analysis revealed that the video self-awareness intervention improved the passage reading accuracy of all three participants. Data analysis also indicated that the self-awareness intervention did not significantly improve participant's real and pseudoword accuracy, or self-monitoring skills. There are a number of possible interpretations of these findings, which are discussed.

This study adds to the literature by testing a novel self-monitoring intervention designed to support both reading and self-regulation processes. Because integrated interventions can be more robust than either self-regulation or reading instruction in isolation (Denton et al., 2020), combined intervention approaches should be explored to support students who do not adequately respond to reading intervention alone. There is still more to be learned about how to support students with reading and self-regulation difficulties to improve their accuracy and monitoring during the reading process.

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CHAPTER ONE: INTRODUCTION

Reading is the invaluable skill that allows individuals to gain information from text, and therefore it is fundamental for learning (Castles et al., 2018). Students with reading difficulties, including those at risk of identification with reading disabilities, may struggle with a variety of reading skills, including decoding, fluency, and/or comprehension (Cirino et al., 2013). Researchers have demonstrated that students who do not develop proficient reading skills in the primary grades are at risk of identification with disabilities that may have otherwise been prevented (Wanzek et al., 2018), and these students will most likely continue to experience difficulties with reading throughout school (Austin et al., 2017; Foorman et al., 1997). Reading disabilities present along a continuum of severity rather than a definitive cut point of achievement (Fletcher et al., 2018; Miciak et al., 2014). Across studies, various criteria are used to distinguish between reading difficulties and reading disabilities, and often times there are few meaningful differences between these groups (Bryant et al., 2000). Therefore, for purposes of clarity and precision, the term "RD" will be used hereafter to denote students with reading difficulties, including those with and at-risk for reading disability.

Many older students with RD in fourth grade and above demonstrate the most significant reading deficits, as these students often struggle with word reading accuracy, oral reading fluency, and reading comprehension (Cirino et al., 2013). If these students are to catch up with their typically-developing peers, their rate of improvement must be

accelerated, as learning at a normal rate would simply maintain the deficit (Vaughn et al., 2010). Students with persistent RD require interventions that are intensive enough to not only improve their performance, but that would progress their performance at rates faster than the learning rates of average students (Wanzek et al., 2010). Therefore, students with RD that persist in the fourth grade and above require even more intensive and individualized interventions (Cirino et al., 2013; Deshler & Hock, 2007).

In addition to their academic struggles, students with RD often also have self-regulation deficits (Cutting et al., 2009). Self-regulation refers to the intentional and automatic processes of regulating and adjusting one's own thoughts, feelings, and behaviors in order to accomplish one's goals (Boekaerts & Corno, 2005; Zimmerman, 2000). The development of strong self-regulation is fundamental to an individual's functioning, and successful self-regulation development in childhood is often considered an early indicator of later life successes (Baumeister & Vohs, 2004; Diamond, 2014; Zelazo et al., 2016). Self-regulation is crucial to academic success, as deficits in self-regulation skills may negatively affect numerous areas of a student's learning, including their ability to pay attention, observe social norms, set goals and make a plan to achieve them, and apply previously-learned skills and strategies (Dignath & Büttner, 2008; Zimmerman, 2008; Zumbrunn et al., 2011).

Both reading and self-regulation are critical for successful learning outcomes, yet many students with RD have deficits in both of these areas (Korinek & DeFur, 2016). One learning approach that has demonstrated effectiveness in improving both reading and self-regulation is explicit instruction in strategies that promote self-awareness, one of which is the strategy of self-monitoring (Crabtree et al., 2010; Menzies et al., 2009; Pratt

& Urbanowski, 2016). Self-monitoring involves determining where one is in their learning process and adjusting their behavior accordingly (Jacobs & Paris, 1987). Self-monitoring in reading means being aware of successfully deciphering the author's message, and noticing when something is incorrect with the meaning, structure, or graphophonic information (i.e., letter-sound relationship) of what has been read (Anderson & Kaye, 2017; McGee et al., 2015). Self-monitoring involves behaviors such as stopping after an error, commenting about an error, and going back to reread (Lee & Schmitt, 2014).

Because students with RD tend to commit most of their attentional resources toward word decoding during their reading process, they may have few resources left for the self-monitoring skills that would enable them to read proficiently and independently (Kim et al., 2017). Therefore, students with RD may need additional explicit instruction and practice in self-monitoring strategies if they are to become independent, strategic readers (Kanani et al., 2017; Pratt & Urbanowski, 2016). Research has shown that, with instruction and practice, students with RD are capable of developing strategies for self-monitoring their reading, which improves their overall reading skills (Guzman et al., 2018; Joseph & Eveleigh, 2011; Pratt & Urbanowski, 2016).

The present study sought to explore the effects of integrating a self-awareness intervention into evidence-based reading instruction. This introduction will describe a rationale for the study. This chapter first examines the process of reading and how it develops. Then, a discussion on the importance of supporting students to become more aware of their reading errors and to notice and correct their own errors when reading independently is included. The significance of integrating self-regulation strategies with

reading instruction for students with reading and self-regulation difficulties is also emphasized in this introduction. Finally, the research questions and an overview of the study are provided.

The Process and Development of Reading

Without mastering the foundational skills of reading, comprehension capabilities can be compromised (Torgesen, 2000). Proficient reading comprehension refers to the understanding and interpretation of what is read (Snow, 2002). It can be defined as, "the ability to understand a text, to analyze the information, and to interpret correctly what the writer is stating" (Mckee, 2012, p. 46). Several seminal models and frameworks have identified some of the foundational skills necessary for proficient reading comprehension, as well as the receptive and expressive language abilities required for reading and comprehension. The models discussed in the review of literature include (a) the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990), (b) Perfetti's Lexical Quality hypothesis (Perfetti, 2007), (c) Chall's stages of reading development (Chall, 1983), and (d) Ehri's phases of word learning (Ehri, 1995).

Developers of each of these models all emphasize one basic skill that is essential for successful reading: decoding. Decoding is the ability to apply knowledge of letter patterns and letter-sound relationships to determine the correct pronunciation of a word. Mastering lower-level skills such as decoding and word recognition is important because these allow for the higher-level processes of fluency and text comprehension (Cummings et al., 2011). The key characteristic of proficient reading is highly developed comprehension skills, which is dependent upon automatic word-recognition and decoding skills (Spear-Swerling & Sternberg, 1994). When proficient readers encounter an

unknown word, they quickly and efficiently decode the word, pronounce it correctly, and attach meaning to the word. This ability to decode automatically is important because this allows readers to focus their attention and energy on the more cognitively demanding task of comprehending what is being read (Cunningham & Stanovich, 1997; Stanovich, 2009).

The Importance of Skilled Word Reading

As outlined above, decoding and word identification abilities are consistently cited in models of reading comprehension. Conversely, difficulties with word reading and decoding, along with frequent decoding errors can be so significant that reading comprehension is negatively affected. This is typical among students with RD. Decoding is a skill that involves relying on phonetic decoding and automatic word recognition to access a mental representation of words (Vaughn et al., 2020). The ability to decode words quickly and accurately has been linked to successful development of reading comprehension skills (Stevens et al., 2017).

Research demonstrates that students with RD typically spend a disproportionate amount of time decoding unknown words, and are then left with insufficient cognitive resources to understand what has been read (Albers & Hoffman, 2012; Kim et al., 2017). For students with RD, the process of reading is often slow and laborious; they display behaviors such as re-reading lines and phrases, losing their place on a page, guessing often, and omitting and substituting words, sounds, and phrases (McCray et al., 2001). Moreover, students with RD often fail to recognize and correct these errors, further compromising comprehension (Kim et al., 2017). The goal of reading is to comprehend and gain meaning from text (Oakhill et al., 2019). For this reason, the ability to decode

quickly, read accurately, and attend to one's errors are critical skills for successful, independent reading. Unfortunately, these reading problems among students with RD may compound over time if they are not adequately addressed early on (Perry et al., 2017). For this reason, it is important that these students with RD are identified as early as possible and offered intervention support.

The Role of Self-Awareness in the Learning Process

Although mounting empirical evidence spanning several decades supports the idea that self-regulation is strongly linked to successful academic achievement and educational outcomes (Boekaerts & Cascallar, 2006; Dignath & Büttner, 2018), many students still struggle to develop the self-regulation skills that would enable them to be successful in and beyond the classroom. Deficits in self-regulation may negatively affect numerous aspects of students' learning, including their ability to pay attention, set goals and make a plan to achieve them, apply skills and strategies previously learned, and observe social norms, among many others (Diamond, 2014). For students with RD, deficits in self-regulation can further hinder their ability to benefit from reading instruction (Korinek & DeFur, 2016).

Learners do not become self-regulated automatically or independently (Zimmerman, 2000). Instead, they develop self-regulation skills and strategies through exposure to multiple and diverse learning experiences in a variety of contexts (Pintrich, 1999). Results of numerous intervention studies indicate that, with practice, feedback, and observation, students can learn methods for regulating their own learning over time (Dignath & Büttner, 2018; Ennis et al., 2018; Menzies et al., 2009). To support students with RD who may be further hindered by insufficient self-regulation skills, educators

should support the development of these skills by explicitly teaching self-regulation strategies in their instruction. One important component of self-regulation is metacognition, which is often considered the ability to consciously monitor and regulate one's ongoing thoughts and activities while engaging in a task (Toglia & Kirk, 2000; Zimmerman, 2002). There is a considerable degree of similarity and overlap in regard to metacognition and self-awareness (Toglia & Kirk, 2000). Similar to metacognition, self-awareness is a broad concept that refers to an individual's ability to understand their unique learning strengths and needs, and identify the learning approaches and habits that are most effective for them (Lindblom-Ylänne, 2004).

As it relates to reading, self-aware students are active, strategic, and proficient comprehenders who use cognitive and metacognitive skills before, during, and after reading (van Kraayenoord, 2010). These students are aware of what they are reading and why, and they have strategies for monitoring their comprehension and for managing problems as they arise (Mokhtari & Reichard, 2002). Although self-awareness is an essential component of proficient reading, many students who struggle with reading also lack sufficient self-awareness skills that would allow them to actively self-monitor their reading performance. To support these students, educators can promote self-awareness by teaching effective problem-solving strategies, and modeling cognitive characteristics of thinking that would enable them to independently monitor their own learning (Mokhtari & Reichard, 2002). By increasing self-awareness, students become more mindful of and engaged in their learning process (Ennis et al., 2018), and evidence also suggests that supporting the development of self-awareness skills among students with learning difficulties can lead to higher accuracy (Kolić-Vehovec, 2002).

Statement of the Problem

Reading interventions for students with RD are relatively consistent in practice, as the accumulation of decades of research has led educators to effective techniques and approaches that are now considered standard practice in supporting student reading development (National Reading Panel, 2000; Rayner et al., 2001). Intensive reading interventions generally consist of recommended approaches such as direct, explicit instruction in phonics, combined with instruction in word recognition, spelling, reading fluency, and comprehension (Fletcher et al., 2019). While these learning approaches are effective for the majority of students with RD, a relatively large population of students with RD do not respond adequately to these same reading intervention methods (Suggate, 2016; Vaughn et al., 2010; Wanzek et al., 2020). Indeed, even with an assortment of evidence-based reading interventions available, mounting evidence suggests that a significant population of students with significant RD do not respond to these standardized intervention practices (Compton et al., 2014; Torgesen, 2000). This may be, in part, because students with RD often also have self-regulation deficits (Cutting et al., 2009). As such, these learners require more intensive intervention to address both their reading and self-regulation needs.

One instructional approach that has demonstrated effectiveness in improving both reading and self-regulation is explicit instruction in strategies that promote self-awareness, an example of which is self-monitoring (Crabtree et al., 2010; Menzies et al., 2009; Pratt & Urbanowski, 2016). Within the domain of reading, instruction in self-monitoring has demonstrated effectiveness in increasing the self-monitoring of reading performance among students with and without disabilities in grades K-12 (Crabtree et al.,

2010; Guzman et al., 2018; Joseph & Eveleigh, 2011). While self-monitoring is a strategy that is typical of proficient readers (Guzman et al., 2018), students with RD may find the higher-level skill of self-monitoring even more demanding as they struggle with lower-level reading skills such as decoding and word recognition (Kim, 2017). Therefore, researchers suggest that self-monitoring strategies should be taught explicitly to students with RD (Pintrich, 2002).

Research suggests that self-monitoring strategy instruction is more effective in improving reading outcomes when incorporated as part of an intervention package, and that combined interventions can be more effective than either self-regulation or reading intervention alone (Guzman et al., 2018; Konrad et al., 2007; Reid et al., 2005). For this reason, self-monitoring may be an appropriate strategy to incorporate into reading intervention for students with RD, in order to increase reading accuracy and self-awareness. However, existing research on self-monitoring in reading has largely focused on fluency and comprehension monitoring skills (Anderson & Kaye, 2017; Joseph & Eveleigh, 2011; Stevens et al., 2017). Yet, older students with RD often struggle with reading at the word-level (i.e., word recognition, automatic decoding), which in turn affects fluency and automatic word reading, and finally comprehension (Vaughn et al., 2019). Indeed, many students with RD in fourth grade and above demonstrate the most significant reading needs, often with deficits in decoding, fluency and comprehension (Cirino et al., 2013; Perry et al., 2017; Vaughn et al., 2020). Therefore, more research is needed to explore the effects of integrating self-monitoring strategy instruction into reading intervention to support the reading accuracy and self-monitoring skills of older students with RD (Pratt & Urbanowski, 2016).

Purpose of the Study

The purpose of the present study was to investigate the effectiveness of a video self-awareness intervention on the word reading accuracy, oral reading accuracy, and self-monitoring skills of students with reading and self-regulation difficulties. Reading accuracy was targeted because students with RD often fail to recognize and correct their reading errors, which limits their ability to read independently with proficient accuracy and comprehension (Anderson & Kaye, 2017; D'Agostino et al., 2019; Kim, 2017). Teaching students self-monitoring strategies has been shown to help close academic gaps between students with RD and their typically-developing peers (Schmitt, 2003). To support the development of the self-awareness skills that would allow students to identify and correct their errors independently, researchers should explore methods for integrating self-monitoring instruction into evidence-based reading intervention among students with RD. The present study sought to address this need.

Research Questions

To address the purpose of this study, the following research questions were investigated:

RQ1: Does a video self- awareness intervention improve word-level reading (real words and pseudowords) accuracy for students with reading and self-regulation difficulties?

RQ2: Does a video self- awareness intervention improve oral reading accuracy for students with reading and self-regulation difficulties?

RQ3: By undergoing a video self- awareness intervention, do students improve in their ability to recognize their reading errors?

The study employed a multi-component, multiple baseline across individuals design to evaluate the impact of a novel self-awareness intervention on reading abilities. It was hypothesized that the self-awareness intervention would lead to improved word-level reading, higher oral reading accuracy, and improvement in participant's ability to recognize their own reading errors, as compared to reading intervention alone.

Overview of Research Design

A multi-component, multiple baseline across individuals single-case design (SCD) was used to test whether a video self-awareness intervention could improve the reading accuracy and self-monitoring behaviors of students with reading and self-regulation difficulties. The experimental conditions consisted of baseline and two treatment phases. Table 1 below provides an overview of the activities implemented in the baseline and intervention phases. Once baseline was complete, the participant who exhibited the most stable baseline proceeded to the intervention first. A baseline was considered stable once a clear pattern of behavior was established. Baseline occurred until the observed pattern of responding was adequately consistent to allow for prediction of future responding (Horner et al., 2005). Once the second and the third students demonstrated a stable baseline, they also began the intervention. Data collection for all students lasted a total of 15 weeks.

Table 1 Table of Self-Awareness Intervention Procedures Activities

Phase	Activity				
	Reading intervention	Record student as they read	Listen to video two times	Student marks errors and self-corrections	Debrief and feedback from researcher
Baseline			-	-	-
Phase I					-
Phase II					

Definitions of Terms

Decoding: The ability to quickly and accurately access a mental representation of text relying on phonetic decoding and automatic word recognition (Vaughn et al., 2019).

Error: Mispronunciations, additions, transpositions, and omissions of a word (Leslie & Caldwell, 2011).

Oral Reading Accuracy: The ability to orally while not being timed (Cain et al., 2001). Oral reading accuracy was calculated by dividing the number of reading errors by the total words read on each passage, recorded as a percentage of accuracy.

Pseudoword Reading Accuracy: The ability to orally read a list of pseudowords without making errors while not being timed (Habib & Giraud, 2013).

Real Word Reading Accuracy: The ability to orally read a list of real words without making errors while not being timed (Vaughn et al., 2020).

Self-correction: The automatic correction of an error made while reading aloud (Clay, 2001).

Self-regulation: The ability to adjust cognition, emotions, and behaviors in pursuit of goals (Edossa et al., 2018; Schunk & Zimmerman, 2011).

CHAPTER II: REVIEW OF LITERATURE

The ultimate goal of reading is comprehension, or getting meaning from text (Oakhill et al., 2019). This skill is achieved only after mastering all other components of reading, including the awareness that words are made up of individual sounds that form words (i.e., phonemic awareness), forming the relationship between letters and sounds (i.e., phonics), understanding the meaning of words (i.e., vocabulary), and the ability to read text accurately and smoothly (i.e., fluency; National Reading Panel, 2000). Older students in grade four and above with reading difficulties and/or disabilities (RD) may have deficits in any number of these components (Cirino et al., 2013) Although researchers and educators have historically emphasized developing students' reading proficiency in the primary school years, targeted reading instruction for older students with RD has been less prevalent (Edmonds et al., 2009). In the literature on reading intervention, there has been a focus on early reading intervention in the past few decades, such that the research on instructional approaches for older students is lacking (Suggate, 2010). Therefore, more research is needed to explore alternative intervention approaches that would support the reading needs of older students with RD.

Extensive research demonstrates that well-implemented reading intervention using evidence-based reading instruction benefits the majority of students with RD (Suggate, 2016; Vaughn et al., 2010; Wanzek et al., 2020). Researchers have also identified several approaches for increasing intervention intensity to support these

students with significant RD (e.g., instructional delivery, group size, learning time; Vaughn et al., 2010). However, up to 10% of the general population of students (O'Connor & Fuchs, 2013) and up to 50% of students with disabilities do not benefit as expected from these generally-effective reading interventions (Fuchs & Fuchs, 2015). Consequently, after experiencing multiple years of reading failure, many students with RD in fourth grade and above demonstrate the most significant reading needs, often with deficits in decoding, fluency *and* reading comprehension (Cirino et al., 2013; Perry et al., 2017; Vaughn et al., 2020). Even so, reading instruction in basic reading skills fades by these grades because students are expected to be able to decode automatically, read fluently, and comprehend increasingly challenging material by this time (Oakhill et al., 2019).

Reading is a highly complex process. It requires the interaction of a variety of skills and strategies that are applied consciously and sub-consciously as an individual determines the meaning of text (Shaywitz & Shaywitz, 2008). Deficits in self-regulation can further complicate this process (Korinek & DeFur, 2016). Self-regulated learning involves the cognitive, metacognitive, behavioral, and emotional components of learning (Panadero, 2017). These processes allow students to manage their thoughts, feelings, and behaviors in order to successfully navigate their learning experiences and reach their goals (Zimmerman, 2008). The development of strong self-regulation is essential to an individual's functioning, and successful self-regulation development in childhood is often considered an early indicator of later life successes (Baumeister & Vohs, 2004; Diamond, 2014; Zelazo et al., 2016).

Both reading and self-regulation are critical for successful learning outcomes, yet many students with RD have deficits in both of these areas (Korinek & DeFur, 2016). One instructional approach that has demonstrated effectiveness in improving both reading and self-regulation is explicit instruction in strategies that promote self-awareness, one of which is self-monitoring strategies (Crabtree et al., 2010; Menzies et al., 2009; Pratt & Urbanowski, 2016). Self-monitoring in reading means being aware of successfully deciphering the author's message, and noticing when something is incorrect with the meaning, structure, or graphophonic information (i.e., letter-sound relationship) of what has been read (Anderson & Kaye, 2017; McGee et al., 2015), and it involves behaviors such as stopping after an error, commenting about an error, and going back to reread (Lee & Schmitt, 2014). Much of the research on integrating self-monitoring strategies into reading instruction have targeted reading fluency and comprehension (Guzman et al., 2018; Joseph & Eveleigh, 2011). However, as discussed previously, older students with RD often struggle with reading at the word-level, which in turn affects fluency and automatic word reading, and finally comprehension (Perfetti, 2007). Therefore, more research is needed to explore the effects of integrating self-monitoring strategy instruction into reading intervention to support the word-reading accuracy and self-monitoring skills of older students with RD.

The purpose of this literature review is to discuss what is known about the process of reading and reading development, and how proficient independent reading is derailed for many students (e.g., RD, self-regulation deficits). Additionally, several ways in which self-regulation impacts students' response to reading intervention, and approaches for supporting both reading and self-regulation in an intervention setting are also reviewed.

The chapter begins with an overview of the reading process and how reading develops, as well as approaches for implementing effective reading intervention for students with RD. Next, the research on self-regulation and how components of self-regulation, and specifically self-awareness, impact the process of reading is reviewed. Finally, as this study seeks to identify intervention approaches that support both reading and self-regulation, a review of research on current approaches is presented.

Influential Theories on the Process of Reading

When determining how to provide effective reading intervention, it is important to understand the highly complex processes of reading and reading development. The purpose of reading is to comprehend the text. Researchers have identified the skills required for proficient reading comprehension and have demonstrated that, without mastering basic reading skills, comprehension abilities are compromised (Hoover & Gough, 1990; Oakhill et al., 2019; Vaughn et al., 2019). This section first examines two influential models that present several foundational skills required for proficient reading. These include the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990), and Perfetti's Lexical Quality hypothesis (Perfetti, 2007). Then, this section discusses two significant theories on the ways in which reading develops among beginning readers. These includes Chall's stages of reading development (Chall, 1983), and Ehri's phases of learning to read (Ehri, 1995). The present study focused on one foundational reading component that is emphasized in each of these models: decoding.

The Simple View of Reading

One influential model of reading for developing readers is the of Reading (SVR), first presented by Gough and Tunmer (1986). The SVR offers an organizing framework

for understanding how individual components of reading, such as word reading and comprehension, contribute to overall reading comprehension. The SVR presents two central claims: (a) reading consists of two primary components, decoding and language comprehension, and (b) both decoding and linguistic comprehension are necessary for reading proficiency, and neither is sufficient by itself (Gough & Tunmer, 1986; Hoover & Gough, 1990). According to the SVR, reading skills can be predicted by a combination of these interdependent processes, such that reading equals the product of decoding (D) and comprehension (C), or $R = D \times C$.

Decoding is the process of translating print into speech by rapidly matching a letter or combination of letters to their sounds and recognizing the patterns that make syllables and words. Words can be read by applying decoding or word attack strategies. A decoding strategy enables readers to read unfamiliar words, and it involves identifying the sounds of individual letters, holding them in mind, and blending them into pronunciations that are understood as real words. The SVR recognizes decoding as one of the essential skills required for reading comprehension, and it posits that a student who has virtually no decoding skill will be a non-reader.

However, Gough and Tunmer (1986) posit that decoding alone is not sufficient for reading, as listening comprehension is also an essential skill to read proficiently. Listening comprehension is a broad construct that includes “parsing, bridging, and discourse building” (Hoover & Gough, 1990, p. 128). In essence, a student who can decode print but is unable to comprehend is not actually reading; likewise, a student who has high language comprehension cannot be considered a proficient reader if they cannot decode. Despite the seeming simplicity of the framework, the authors of the SVR

underscore that both word reading and listening comprehension involve complex processes. The authors do not imply that reading or reading development is a simple process. Rather, Gough and Tunmer (1986) suggest that differences in reading ability can (simply) be captured by variation within these two fundamental reading skills (i.e., decoding and language comprehension).

Gough and Tunmer (1986) invited subsequent researchers to investigate the validity of the claim that $R = D \times C$. Though some theoretical frameworks in later research have altered or investigated components of reading in addition to those of the SVR, many researchers among various fields have and continue to validate the notion that the primary components of the SVR (i.e., listening comprehension and decoding skill) adequately describe the foundational processes of reading (Hoover & Tunmer, 2018; Joshi & Aaron, 2000; Landi & Ryherd, 2017; Savage et al., 2015; Tilstra et al., 2009). While the SVR is a valuable framework for capturing the most fundamental reading components essential for reading comprehension, the framework only goes so far. The scope of the SVR does not account for how self-regulatory behaviors, such as monitoring and self-correction, impact successful, independent reading comprehension.

Lexical Quality Hypothesis

The Lexical Quality Hypothesis by Perfetti and colleagues (Perfetti, 2007; Perfetti & Hart, 2002), like the SVR, assumes that word recognition and word knowledge are central to successful reading. Perfetti (2007) defines lexical quality as the extent to which a stored mental representation of a word specifies its form and meaning in a way that is both precise and flexible. Precision of the representation, or knowledge of the exact spelling of a word, is significant in reading because it enables a reader to distinguish a

written word from similar-looking words. This allows the reader to accurately decipher the word and link the word form to its meaning (e.g., to differentiate pace from pact, pale, and face). Additionally, flexibility of the representation is necessary for the reading process because this enables the reader to adapt their word recognition to the context in which they encounter a given word (e.g., reading about surfing on a wave versus a wave goodbye).

Overall, lexical quality affects the accuracy and fluency of word recognition (Rayner et al., 2001), and lexical quality is especially important in the transition from novice to proficient reading (Perfetti, 2007). As lexical quality expands and more words become automatic, readers are then able to focus their cognitive resources on comprehending text (Castles et al., 2018). In turn, when a reader has high lexical quality, their cognitive resources can be directed toward the complex task of comprehension because individual words are recognized quickly, automatically, and with minimal cognitive effort. In contrast, when lexical quality is low, the reader must direct valuable cognitive resources to the more fundamental task of word recognition and decoding, and comprehension is compromised in the process. Low-level skills (e.g., word recognition and decoding) provide an essential foundation for the high-level process of reading comprehension (Rayner et al., 2001). Automatic word recognition processes are strengthened as students gain experience with various print and as they experience repeated and consistent exposure to words (Rayner et al., 2001). With this practice and exposure, a student's average quantity and quality of the words in their lexicon progressively increases over time (Perfetti & Hart, 2002).

Influential Theories on Typical Early Reading Development

Chall's Stages of Reading Development

Chall, who was among the first researchers to describe reading as a developmental process, introduced a theory in which reading development occurs in a hierarchy patterned after Piaget's cognitive development stages (Chall, 1983). Influenced by the works of developmental theorists and moral and social developmentalists, Chall's model includes six stages of reading development through which beginning readers proceed. The first is Stage 0: Pre-reading, which typically occurs from six months to six years old. In this stage, children pretend to read, or "play read". By age six, children can understand thousands of spoken words, but can read few, if any, of them. The next stage is Stage 1: Initial reading and decoding, which occurs from six to seven years old and the first and beginning of second grade. In this stage, children begin to become aware of and understand the alphabetic principle, or the relationship between letters and sounds, and spoken and printed words. In Stage 2: Confirmation and fluency (ages seven to eight years old, grades 2 and 3), typically developing readers can read simple, familiar stories and can begin applying features of fluency. Students do this by consolidating the basic decoding elements, sight vocabulary, and context in the reading of familiar stories and text.

It is at Stage 3: Reading for learning the new (ages 9 to 13, grades 4 through 8), that instruction shifts from learning to read to reading to learn. Here, students read a variety of materials to learn new ideas and information, to gain new feelings, and to learn new attitudes, typically from a single perspective. In Stage 4: Multiple viewpoints (ages 15 to 17, grades 10 through 12), students read widely from a broad variety of complex

materials, both expository and narrative, that contain different viewpoints. Finally, in stage 5: Construction and reconstruction (ages 18 and older, college and beyond), reading is used for one's own needs and purposes, professional and personal. Reading serves to integrate one's own ideas with those of others, and it allows one to develop new schema and create new knowledge. Reading at this stage is automatic, rapid, and efficient.

For typically-developing readers, the ability to read fluently progresses during Chall's (1983) Stage 2 of reading: Confirmation and fluency, which occurs around second to third grade. This is the last stage where students are developing skills related to 'learning to read', and after this stage, they are required to shift to an emphasis on 'reading to learn'. However, many students struggle with automatic word-reading beyond the third grade (Vaughn et al., 2019), which can impact fluency and comprehension development (Lyon & Moats, 1997; Torgesen et al., 2001). Therefore, older students with RD should be provided with intervention approaches that support the word-reading skills necessary to become fluent (i.e., phonological processing, word recognition, automatic decoding).

Ehri's Phases of Learning to Read

Building on the work of Chall (1983), Ehri and colleagues (Ehri, 1995; Ehri & McCormick, 1998) proposed another influential theory on reading that describes how beginning readers proceed through phases of reading development: the phases of learning to read. This framework captures the significant milestones that occur as children learn to read words by sight. The four phases include the pre-alphabetic, partial alphabetic, full alphabetic, and consolidated alphabetic phases (Ehri, 1995). Ehri (2005) labeled the phases to reflect the type of alphabetic knowledge connections that are formed in that

particular phase. Each phase within the model is categorized by students' working knowledge of the alphabetic system, which is essential for acquiring word reading skills (Ehri & McCormick, 1998).

Ehri's theory is important because the characteristics of each phase have significant practical implications for instruction, as teachers monitor and modify their lessons to match the reading stage of their students (Moats & Brady, 2000). Similar to the SVR (Gough & Tunmer, 1986) and the Lexical Quality Hypothesis (Perfetti, 2007; Perfetti & Hart, 2002), Ehri's theoretical framework emphasizes the importance of supporting students in their development of proficient decoding and word recognition skills (Ehri, 2005). According to Ehri and McCormick (1998), a goal of reading instruction should be to help students learn to read words in four ways: decoding, analogy, prediction, and sight. One goal of the current study was to test a self-awareness intervention designed to support students' development of the skills required for accurate, independent decoding.

Limitations of Traditional Theories of Reading

The frameworks reviewed in this section have been greatly influential in reading research, as they have provided the foundation on which a formidable body of subsequent research has been based. These four models all capture and situate some of the foundational skills widely considered essential for proficient reading (e.g., sound and letter knowledge, decoding, vocabulary. Although they are significant frameworks in the field, the scope of these sequential and simplified theories of reading is limited in that they do not account for other factors that can impact reading performance, such as attention, working memory, and/or other self-regulatory processes that are also essential

in the reading process (Zelazo et al., 2016). Additionally, the models do not account for how students monitor, identify and solve decoding and comprehension issues that arise in their reading. Overall, proficient, independent reading demands the coordination of multiple reading and language processes, and this intricate orchestration may require additional skills beyond those within the linguistic realm for an individual to reach successful, independent reading.

Implications: The Importance of Skilled Word Reading

Chall's stages of reading (1983), and Ehri's phases of learning to read (1995) both underscore the importance of foundational reading skills (i.e., phonological processing, word recognition, automatic decoding) in reading development. Given that RD is a language-based deficit, the challenge among students with RD lies in the skills required for decoding, including phonological awareness, rapid naming, and phonological recoding (Habib & Giraud, 2013; Lyon et al., 2003; Peterson & Pennington, 2012). Deficits in phonological processing and failure to automatize the relationships between graphemes and speech sounds are central features of RD (Habib & Giraud, 2013; Peterson & Pennington, 2012). For these reasons, many students with significant RD demonstrate difficulties at the word-level, especially when reading isolated words that are presented out of context (Fletcher et al., 2019; Peterson & Pennington, 2012).

Although phonological awareness and decoding skills are central objectives of early reading instruction, many students in the United States experience difficulties with developing proficient word reading skills during these crucial periods in their academic careers (Ok et al., 2021). These lasting phonological processing deficits make it challenging for early readers with RD to master and automatize decoding skills, as they

limit students' ability to read whole words and establish the automatic associations required for fluent decoding (Perfetti & Stafura, 2014). This is a problem because students are expected to have largely mastered automatic word decoding skills by fourth grade; their reading fluency, or their ability to read grade-appropriate text accurately and efficiently, should also be largely well-established by this time (Ehri, 2005). Based on Chall's (1983) model, students should be progressing to the 'reading to learn' stage by fourth grade. Automatic decoding is important because it enables readers to dedicate their attention to the more cognitively demanding task of comprehension (Cunningham & Stanovich, 1997; Stanovich, 2009). Indeed, researchers have long established that difficulties in automatic word recognition and decoding significantly affect a student's ability to efficiently comprehend what they read (Lyon & Moats, 1997; Rayner et al., 2001; Torgesen, 2000).

Word Reading Difficulties and Their Lasting Impact

For students with RD who struggle with decoding and word recognition, the process of reading is often slow and laborious. They tend to read slowly and deliberately, re-read words, lines, and phrases, guess often and omit, insert, or substitute sounds, words, and phrases, all of which can impede comprehension (Habib & Giraud, 2013; Spear-Swerling, 2019). As students with RD spend attentional resources in their struggle to decode words, they have little attention and energy left over for comprehension (Shaywitz & Shaywitz, 2008). Even minor difficulties in word recognition can draw attentional resources away from identifying the meaning; it can reduce reading speed, and it can create the need to reread in order to determine the meaning (Hook & Jones, 2002). Far from diminishing or disappearing, difficulties with basic reading skills often persist

and intensify beyond early schooling and reading instruction (Torgesen, 2000). Indeed, researchers have found that students' decoding skills in early grades can be a predictor of their reading comprehension performance in future years, as well as a significant indicator of students' high school success and beyond (Kendeou et al., 2009; Vaughn et al., 2019). If students with RD do not develop proficient basic reading skills in the primary grades, they will likely struggle with reading throughout following years, and they will also be at risk of identification with disabilities that may have otherwise been prevented (Wanzek et al., 2018).

Closing the Gap: Evidence-Based Practices to Support Students with RD

Reading is a highly complex process that requires multiple skills: developing an awareness that spoken language can be segmented into smaller elements (i.e., phonemic awareness), identifying letters, learning how print maps onto sound, recognizing whole words accurately and rapidly (i.e., automatically), developing vocabulary and extracting meaning from printed text (Shaywitz & Shaywitz, 2008). Students with RD may have difficulties in multiple areas, including decoding, fluency, and comprehension (Cirino et al., 2013). To support students with RD, instructional approaches on effective reading intervention have been studied extensively over the last several decades.

Key Features of Evidence-Based Reading Interventions

The National Reading Panel (2000) identified five instructional targets to enhance proficiency in reading: phonemic awareness, phonics (decoding), comprehension, fluency, and vocabulary. Studies show that students improved most when given explicit, systematic instruction in both foundational reading skills (i.e., phonological processing,

word recognition, automatic decoding), as well as higher-level skills, such as fluency and comprehension (National Reading Panel, 2000).

In their meta-analysis on 25 intensive reading interventions for early readers with RD, Wanzek et al. (2018) found that standardized, explicit instruction in foundational reading skills led to positive gains in reading performance for these students. For older students, research has demonstrated positive reading outcomes when providing explicit, systematic instruction in (a) word study strategies to decode words, (b) word meaning and strategies for deriving the meaning of unknown words, and (c) comprehension strategy instruction (Edmonds et al., 2009; Roberts et al., 2008). Incorporating these elements of instruction has demonstrated positive outcomes in reducing the incidence of reading challenges among the majority of students with RD (Fletcher et al., 2019; Wanzek et al., 2010).

Inadequate Response to Evidence-Based Reading Interventions

Despite advances in the development of evidence-based reading interventions, and given what experts have learned about instructional best practices, many students with significant learning challenges do not benefit from these interventions, including 25% to 50% of students with learning disabilities (Fuchs & Fuchs, 2015). Indeed, many students with significant RD fail to make the accelerated progress necessary to reduce the performance gap (Austin et al., 2017; Fuchs & Fuchs, 2015). For this population of students to catch up to their grade-level peers, they must be provided with reading interventions implemented with a level of intensity high enough to not only be effective, but to promote accelerated growth (Wanzek et al., 2010). Researchers have explored the plausible explanations behind students' inadequate response to instruction. Vaughn et al.

(2012) noted that students may start school lacking the language proficiency, background knowledge, or education-related experiences that would allow them to successfully access the academic content.

Fuchs and colleagues (Fuchs & Fuchs, 2015; Fuchs et al., 2018a) offered five additional explanations for students' insufficient responsiveness to evidence-based reading intervention: (a) instructional programs fail to address the difficulty students experience when transitioning from the primary grades to the intermediate grades; (b) programs lack sufficient comprehensiveness in the strategies or the skills they address, (c) interventions often fail to teach for transfer of skills, (d) they do not adequately address the linguistic and cognitive limitations of many students with academic difficulties, and (e) they do not make use of implementation features that can optimize the intensity of instruction. Researchers have found that the heterogeneity of skill profiles among adolescent students with RD may also account for inconsistent intervention outcomes (Clemens et al., 2017; Miciak et al., 2014). Interventions targeted to these students may not be fully effective because they do not provide the foundational reading skills and knowledge that allow for higher order comprehension processes. Students who do not make adequate progress in this level of intervention are typically provided with more intensive intervention and/or are referred for special education (Vaughn et al., 2010).

Approaches to Intensifying Reading Intervention for Students with Significant RD

For readers with significant RD, learning at an average rate will only maintain the deficit over time (Peterson & Pennington, 2012; Rayner et al., 2001). Therefore, in order for students who are reading below grade level to catch up with their typically-

developing peers, their rate of growth must be *accelerated*, or progressing at a rate faster than that of average students (Vaughn et al., 2010).

For learners who do not adequately benefit from the intervention approaches discussed above, research has indicated that reading interventions can be further intensified by adjusting several features. These typically include (a) increasing opportunities for feedback, (b) increasing instructional time, (c) reducing group size, (d) monitoring students' progress and adjusting instruction accordingly, and most relevant to the current study, (e) supporting both reading and cognitive processes and individualizing this instruction to meet student needs (Fuchs et al., 2018b; Vaughn et al., 2010). In a synthesis on intensive reading interventions for students with severe reading difficulties in early elementary grades, Austin et al. (2017) found that studies that intensified reading interventions by adjusting one or more of these features (i.e., group size, opportunities for feedback, etc.) produced positive results among these students.

In addition to their reading difficulties, students with significant RD often encounter a broad range of challenges with learning or performing academic skills across a variety of environments and tasks (Shimabukuro et al., 1999). Indeed, students with RD tend to have impaired self-regulation that may further exacerbate existing academic difficulties and interfere with their reading and overall academic success (Cutting et al., 2009; Korinek & DeFur, 2016). After reviewing the research for effective teaching methods, the National Reading Panel (2000) identified evidence-based strategies such as comprehension monitoring, the use of graphic organizers, and question generation and answering to improve reading (National Reading Panel, 2000). Most of these strategies are designed to support students' self- regulated behavior during their reading process so

that they are actively monitoring their understanding of the text. (Guzman et al., 2018). The effectiveness of intensive interventions for students with RDs might be increased by integrating self-regulation instruction (Denton et al., 2020), and the current study seeks to contribute to the literature base by testing the effectiveness of a video self-awareness intervention designed to support students' self-regulation.

How Self-Regulation Further Impacts Learning

Self-regulation is a highly complex set of functions that is located at the intersection of several fields of psychological research, including research on cognition, problem-solving, decision making, metacognition, conceptual change, motivation, and volition (Boekaerts & Cascallar, 2006; Mace et al., 2001; Pintrich, 1999). The construct of self-regulation has been examined by researchers across various fields of study through the lenses of their respective paradigms, as they focus and study different aspects and functions of the self-regulation process. For this reason, researchers over the last several decades have found it difficult to conceptualize and operationalize self-regulation competencies, finding no simple or straightforward way of defining the construct of self-regulation (Boekaerts & Corno, 2005). However, many researchers consider self-regulation to be the intentional and automatic process of regulating and adjusting one's thoughts, feelings, and behaviors, as well as features of one's environment, in order to change the likelihood of a future consequence or attainment of a goal (Barkley, 2011; Baumeister & Vohs, 2003; Boekaerts & Corno, 2005; Zimmerman, 2000). Self-regulation involves multiple processes that work together to allow a person to maintain, observe, record, and assess their inner state and behaviors (Zelazo et al., 2016). As it relates to schooling, self-regulation is an essential educational skill that has been shown

to impact a wide range of academic, behavioral, social and emotional outcomes (Vohs & Baumeister, 2016).

Although mounting evidence spanning several decades supports the idea that self-regulation is strongly linked to successful academic achievement and educational outcomes (Boekaerts & Cascallar, 2006; Dignath & Büttner, 2018), many students still struggle to develop the self-regulation processes that would enable them to be successful in and beyond the classroom. Deficits in self-regulation skills may negatively affect numerous aspects of students' learning, including their ability to pay attention, set goals and make a plan to achieve them, apply skills and strategies previously learned, and observe social norms, among many others (Diamond, 2014). Learners do not develop self-regulation skills automatically or independently. Instead, they develop self-regulation skills and strategies through exposure to multiple and diverse learning experiences in a variety of contexts (Pintrich, 1999). Results of numerous intervention studies indicate that, with practice, feedback, and observation, students can learn methods for regulating their own learning over time (Dignath & Büttner, 2018; Ennis et al., 2018; Menzies et al., 2009). For students with RD, self-regulation difficulties can further hinder their ability to benefit from reading instruction (Shaywitz & Shaywitz, 2008). As such, it is important to further explore the ways in which educators can provide support targeting both reading and self-regulation.

Incorporating Self-Regulation Instruction into Reading Intervention

Interventions that combine self-regulation and executive function components with academic intervention are more intensive than programs that do not incorporate these supports (Fuchs et al., 2018b). Yet, many of the current interventions designed to

support students with self-regulation difficulties are focused on only one component of self-regulation, often involving some form of reward system to target challenges in behavior and self-control (Reid et al., 2005). However, several lines of research show promising results for combined interventions that target other components of self-regulation and reading. A recent study was conducted by Denton et al. (2020) to inform the development and feasibility of a combined intervention designed to support reading and self-regulation for students with significant RD. The combined intervention targeted word study, text reading, reading comprehension, and self-regulation. The self-regulation component of the intervention consisted of instruction and activities designed to support a growth mindset, emotional self-regulation, and self-regulated strategy use, and it included training in the use of positive self-talk, goal-setting, and self-monitoring. The authors collaborated with special education and reading intervention teachers over a 2-year period to develop the integrated intervention. While results of the study suggested that teacher feedback provided strong support for the inclusion of self-regulation instruction with reading intervention, researchers concluded there were no significant differences between gains made by students who received the integrated intervention and students in the business-as-usual group (Denton et al., 2020).

Supporting Self-Awareness to Increase the Effects of Reading Intervention

One important component of self-regulation is self-awareness of one's own thoughts, feelings, and behaviors (Panadero, 2017). Self-awareness is a broad concept that refers to an individual's ability to understand their unique learning strengths and needs, and identify the learning approaches and habits that are most effective for them (Lindblom-Ylänne, 2004). As it relates to reading, self-aware students are active,

strategic, and proficient comprehenders who use cognitive and metacognitive skills before, during, and after reading (van Kraayenoord, 2010). These students are aware of what they are reading and why, and they have strategies for monitoring their comprehension and for managing problems as they arise (Mokhtari & Reichard, 2002). Although self-awareness is an essential component of proficient reading, many students with RD also lack sufficient self-awareness processes that would allow them to actively self-monitor their reading performance (Korinek & DeFur, 2016). To support these students, educators can promote self-awareness by teaching effective fix-up strategies and modeling cognitive characteristics of thinking that would enable them to independently manage their own reading (Mokhtari & Reichard, 2002). Another instructional approach that has demonstrated effectiveness in improving both reading and self-regulation outcomes is explicit instruction in strategies that promote self-awareness, such as self-monitoring strategies (Crabtree et al., 2010; Menzies et al., 2009; Pratt & Urbanowski, 2016), which are discussed in the next section.

Self-Monitoring: An Essential Self-Regulation Strategy for Independent Reading

One primary characteristic of self-regulation is assuming ownership over one's achievement and learning outcomes. Self-regulated learners do this by actively and independently monitoring their individual learning process and performance (Zumbrunn et al., 2011). One of the common types of self-regulation strategies is self-monitoring, which encompasses these skills (Mooney et al., 2005). Self-monitoring is based on the principle of metacognition, which involves "thinking about thinking" (Jacobs & Paris, 1987). Self-monitoring is sometimes referred to as "self-correcting" or "self-management", and involves determining where one is in their learning process and

adjusting their behavior accordingly (Jacobs & Paris, 1987). In reading, the strategy of self-monitoring means being aware of successfully deciphering the author's message, and noticing when something is incorrect with the meaning, structure, or graphophonic information (i.e., letter-sound relationship) of what has been read (Anderson & Kaye, 2017; McGee et al., 2015). Self-monitoring involves behaviors such as stopping after an error, commenting about an error, and going back to reread (Lee & Schmitt, 2014). These behaviors are indicators of a readers' inner control, and are critical metacognitive strategies that should be included in reading intervention (Pratt & Urbanowski, 2016).

Although self-monitoring is a strategy that is typical of proficient readers (Guzman et al., 2018), students with RD may find the higher-level skill of self-monitoring even more demanding as they struggle with lower-level reading skills such as decoding and word recognition (Kim, 2017). The development of proficient reading has to occur within a supportive learning environment that focuses on students developing the skills necessary to self-monitor and self-correct independently, rather than relying on teachers or peers for support (Pratt & Urbanowski, 2016). Therefore, self-monitoring strategies should be taught explicitly to students with RD, in order to support independent self-monitoring (Joseph & Eveleigh, 2011).

Within the domain of reading, instruction in self-monitoring strategies has demonstrated effectiveness in increasing the self-monitoring of reading performance among students with and without disabilities in grades K-12 (Crabtree et al., 2010; Guzman et al., 2018; Joseph & Eveleigh, 2011). Research also demonstrates that self-monitoring instruction is more effective in improving reading outcomes when incorporated as part of an intervention package, and combined interventions can be more

powerful than either self-regulation or reading instruction alone (Guzman et al., 2018). Still, research on combined intervention approaches that support self-monitoring and reading accuracy is limited. Existing research on self-monitoring in reading has largely focused on fluency and comprehension monitoring for students with RD (Guzman et al., 2018; Joseph & Eveleigh, 2011). However, students with RD often struggle with reading at the word-level (i.e., decoding, word-recognition), which ultimately affects comprehension abilities (Rayner et al., 2001). For this reason, more research is needed to explore the effects of integrating self-monitoring strategy instruction into reading intervention to support the word-reading accuracy and self-monitoring skills of older students with RD.

Summary

Reading acquisition has consistently been linked to successful school and achievement outcomes (Cunningham & Stanovich, 1997; Duncan et al., 2007). Poor comprehension impacts a student's ability to learn in school and after school, and it negatively affects overall academic achievement (Fuchs & Fuchs, 2015). Despite the fact that RD is the most common and most carefully studied of the learning disabilities, it remains a persistent, chronic condition that stays with the individual his or her entire life (Gilmour et al., 2019). Unfortunately, the myth that learners will outgrow reading disability contributes to the numerous children who fall through the cracks and do not receive appropriate support in adequate time.

There are several ways in which the reading process and reading development can be derailed, and the etiology of these reading problems is also quite complex. Word reading skills (i.e., decoding) are one important foundational skill that, if not mastered in

early reading development, can often be detrimental to successful reading. Although phonological awareness and decoding skills are central objectives of early reading instruction, many students with RD do not master these skills when they are learning to read (Fuchs & Fuchs, 2015). These difficulties in basic reading skills often persist and intensify beyond early reading instruction (Vaughn et al., 2010).

Despite what we have learned about effective instructional approaches, there continues to be a significant population of students who are not receiving the level of academic support needed to meet grade-level expectations in reading (Fuchs & Fuchs, 2015). Complicating this issue even further is the finding that many students with RD often also struggle with self-regulation challenges in addition to their reading difficulties (Cutting et al., 2009).

More research is needed to understand how interventions can be combined to effectively support older students with reading and self-regulation difficulties. As outlined in this chapter, both reading and self-regulation are each highly complex areas of study in and of themselves. For this reason, identifying meaningful methods to support both processes among individual students, given their own highly unique strengths and areas of need, is quite the undertaking for researchers and educators, as evidenced in the extensive literature on both topics.

CHAPTER III: METHOD

The purpose of this chapter is to introduce the research methodology for this SCD study on reading and self-awareness skills. This approach allowed for a deeper understanding of how supporting students' self-awareness may increase reading accuracy and self-monitoring of their reading process. This chapter will include the research plan, methodology, participant selection, procedures, and analysis method used in this study.

Participant Recruitment and Selection

Recruitment took place at a learning center that offers 1:1 academic intervention services to children and adults with learning challenges in several academic areas. This learning clinic was selected because it allowed access to students who fit the specific student profile being evaluated in the current study, namely students with comorbid reading and self-regulation needs. Practices at the clinic are driven by a comprehensive self-regulated learner framework that was developed by a multidisciplinary team of practitioners and researchers at the learning center (Johnson et al., 2021). Delivering services through this comprehensive framework has enabled the clinic to serve students with learning, attention, and self-regulation difficulties. It was within this population of students that recruitment for the current study took place.

Participants met the following criteria for consideration: (a) in Grades 4 through 12; (b) non-responsive to Tiers 1 and 2 of reading instruction, as indicated by the need for Tier 3 reading intervention at the learning center, (c) receiving evidence-based reading

instruction through the learning center, and (d) exhibiting self-regulation deficits, as reported by parents and teachers on both formal and informal measures.

Inclusion criteria was set at Grade 4 through 12 because, according to Chall's (1983) stages of reading development, it would be assumed that these students have mastered the foundational reading skills that are the focus of early reading instruction. By the fourth grade, students should be entering the "reading to learn" stage, and foundational reading skills are no longer the focus of instruction (Chall, 1983). Participant criteria were set at a minimum of fourth grade to ensure that students had received foundational reading instruction prior to receiving reading intervention at the center. Students in Grade 4 and above were considered for participation because, as discussed in the previous chapter, difficulties with basic reading skills often persist and intensify beyond early schooling and reading instruction (Vaughn et al., 2010), and comprehension challenges among adolescents may be attributed to the insufficient foundational reading skills (Clemens et al., 2017). Students attending the learning center who met these criteria were considered for study participation, which resulted in the eligibility of six participants.

Exclusionary criteria included (a) students who were non-native English speaking, and (b) a diagnosis of a developmental or cognitive disorder, autism spectrum disorder, or emotional/behavior disorder. These exclusionary criteria were included to prevent the confound of English learning with reading, and because the self-regulation intervention was not designed for students with more significant behavioral needs or exceptionalities. However, students with a diagnosis of ADHD were considered eligible for the study because of the high comorbidity between reading disabilities and ADHD (Shaywitz &

Shaywitz, 2008), and because individuals with ADHD and reading disability typically have greater needs in self-regulation (Schunk & Bursuck, 2012).

The six students who met the eligibility requirements underwent additional screening measures to qualify for participation in the study. Subtests of the Test of Word Reading Efficiency, Second Edition (TOWRE-2; Torgesen et al., 2012) were used as an additional screener for participation. The TOWRE-2 subtests were appropriate screening measures because these assessments require students to read both real words and pseudowords. These tasks align with those required in the self-awareness intervention under investigation, and thus the TOWRE-2 provides a reliable indication of participant's abilities on these tasks.

The researcher administered the TOWRE to the six eligible participants. Those who scored at or below the 30th on the TOWRE-2 Total Word Reading subtest were recruited to participate. Consistent with previous studies that used the TOWRE-2 as a screening measure for inclusion (Torgesen et al., 2006; Wanzek et al., 2020), the 30th percentile was the identified cut score for two reasons. First, this composite score is generally one standard deviation below the mean (i.e., less than 85), demonstrating word reading accuracy and/or fluency difficulties (Torgesen et al., 2012). Additionally, many of the students at the learning center are twice exceptional, and as a result, their learning and attention needs are sometimes masked by their exceptional strengths. These students can sometimes be more impaired in their reading than they appear.

Of the six students screened for inclusion, three met all of the above criteria and were recruited for participation. One of the six students was not recruited because his parents had previously indicated their preference to be excluded from any and all

research opportunities at the learning center. The other two students were not recruited because they did not demonstrate self-regulation needs that would necessitate more intensive intervention in that area. Table 2 lists demographic data and individual assessment results for the participants. Each participant has been given a pseudonym. The mean age of the participants was 12.6 years old, with a range between 9 years, 9 months to 16 years, 11 months.

Table 2 Participant Information

Student	Gender	Age	Grade	TOWRE-2 Total Word Reading grade-level percentile	TOWRE-2 Sight Word Efficiency percentile	TOWRE-2 Phonemic Decoding Efficiency percentile
Otis	Male	11.8	5th	16th	30th	9th
Nick	Male	16.11	10th	8th	13th	6th
Connor	Male	9.9	4th	25th	30th	23rd

Note: TOWRE-2 = Test of Word Reading Efficiency

Otis

Otis is 11 years old and a 5th grader at a local suburban elementary school. Otis is a very personable and friendly boy with a great sense of humor, if not slightly sarcastic and witty. Otis is bright and he works hard at school and in his reading sessions at the learning center. His parents are supportive and active in his education, and he makes positive connections with his teachers and peers relatively easily. The researcher had worked with Otis at the learning center for one year before the start of data collection for

the current study. Otis and the researcher have established a positive, trusting connection during their time working with one another.

Otis enjoys reading for pleasure and he has developed some strong reading skills, including a fast rate and comprehension and vocabulary abilities. While Otis possesses the foundational skills and word reading strategies to read accurately and decode unknown words, his reading challenges can often be attributed to self-regulation difficulties. Otis displays impulsive behaviors when reading which results in lowered accuracy. Behaviors include guessing at unknown words instead of using learned reading strategies, reading quickly and not attending to punctuation, and neglecting to monitor his reading rate. Otis also has difficulty self-monitoring his reading and recognizing his errors, and he often requires prompting to go back to reread when he has made an error.

Nick

Nick is a 16-year-old 10th grader at a local suburban private school. Nick is a polite and sociable young man who enjoys playing sports and spending time with friends. He develops positive relationships with his peers and teachers, and his family is actively involved in the tight-knit school community. His private school offers a rigorous curriculum that requires a great deal of effort and engagement from students. While the school provides high-quality instruction and small class sizes, the extensive amount of required reading led Nick's family to seek out reading intervention from the learning center, in order to provide Nick with additional support for his reading and attention difficulties. Nick tends to read slowly, and because many of the words he encounters are not yet automatic, he must put forth considerable effort to decode words as he reads. Nick's accuracy is also variable when reading passages. He has difficulty recognizing

unknown words and therefore he often misses opportunities to use known reading strategies. Instead, he changes the unknown word to a familiar word, and often fails to notice if the incorrect word does not make sense within the given context. For this reason, Nick requires prompting to correct errors and to monitor his reading progress.

Connor

Connor is 9 years old and a 4th grader at a local public elementary school. Connor is a clever and spirited boy who has a lively sense of humor and has been described as "the life of the party". He enjoys school and especially enjoys playing football with his friends at recess. Connor makes connections with his peers and teachers at school, and his parents are supportive and attentive to his academic success. Connor's family sought reading intervention at the learning center because of their concern over his reading and self-regulation difficulties, which have negatively impacted his confidence and success in school. While Connor possesses average comprehension skills when reading a passage, he struggles to use reading strategies and monitor his accuracy when reading isolated words and when reading passages independently. He tends to read quickly and he lacks reading strategies that would allow him to tackle unknown words. When faced with an unknown word in a passage or in isolation, Connor responds in several different ways, including mumbling his best pronunciation so as to prevent the researcher from hearing, guessing at the word and quickly moving on, or skipping the word altogether. Consistent with his parent's concern that his confidence has declined in the area of reading, Connor frequently becomes discouraged, gives up, and shuts down when he is asked to persevere through a challenging word.

Setting

This study took place at a learning center located in the Mountain West. The researcher is an educational specialist for the learning center and a doctoral student at a state university in the area. Educational specialists provide 1:1, evidence-based academic intervention services to children and adults with learning difficulties in reading, writing, and mathematics. Students receiving services at the center have various diagnoses, including learning disabilities such as dyslexia and dysgraphia, as well as attention and self-regulation difficulties and diagnoses. The center serves approximately 200 students each year across all services, which include academic intervention, psychoeducational evaluations, counseling, and academic coaching. The learning center was targeted for the study for a number of reasons. First, it provided access to the population of interest in the study, namely students with reading and self-regulation difficulties. Additionally, by conducting the study in a 1:1 intervention setting, as opposed to a traditional classroom or small group setting, this allowed the researcher to better control for internal validity by further ensuring the reading intervention was implemented with fidelity. Finally, the learning center was ideal for the current research because the 1:1 intervention structure provided a regular opportunity to work with participants in a setting relatively free of outside distractions.

Data collection lasted approximately 15 weeks for each participant. One-to-one academic intervention sessions were held at the learning center for the first 5 weeks of data collection. With the onset of the COVID-19 pandemic in March 2020, all in-person intervention services were transitioned to an online distance learning format, which continued online for the remaining 10 weeks of the study. Extensive efforts were taken to

ensure distance learning sessions were modeled after typical in-person intervention sessions, with no significant changes to the structure or routine of services, in order to mitigate disruptions in student learning and data collection. This change to an online format is noted in the graphs (see Figures 1-5) to evaluate the response and to ensure the change did not impact the variables under evaluation.

Independent Variable

The independent variable for this study was a self-awareness intervention designed to promote and support students' self-monitoring of their reading processes. Steps of the self-awareness intervention were implemented in three phases. The intervention involved video recording students as they read a list of 20 real and 20 pseudowords. The video was then replayed twice as participants listened and read along. Participants were asked to identify and mark any errors and self-corrections they noticed on the word list as they listened to their reading on the video. As students progressed through the steps of the self-awareness intervention, they were eventually given feedback on their accuracy and guided to self-reflect on their performance on the reading and self-monitoring tasks. The self-awareness intervention included four key steps: (a) record the participant as he or she reads a list of words, (b) listen to the video without marking, (c) listen to the video while marking errors and self-corrections on the word list, and (d) debrief/feedback. The steps of the self-awareness intervention are further detailed in the procedures section below.

Dependent Variables

The dependent variables for this study included (a) real word reading accuracy, (b) pseudoword reading accuracy, (c) oral reading accuracy, (d) self-awareness of reading

performance on real word reading tasks, and (e) self-awareness of reading performance on pseudoword reading tasks. See Table 3 below for definitions of dependent variables.

Table 3 Definitions of Dependent Variables

Dependent Variable	Definition
Real Word Reading Accuracy	The ability to orally read a list of real words without making errors while not being timed.
Pseudoword Reading Accuracy	The ability to orally read a list of pseudowords without making errors while not being timed.
Oral Reading Accuracy	The ability to orally read a passage without making errors while not being timed.
Self-Awareness of Reading Performance on Real Word Reading Tasks	The ability to identify one's own errors and self-corrections on a real word-reading task.
Self-Awareness of Reading Performance on Pseudoword Reading Tasks	The ability to identify one's own errors and self-corrections on a real word-reading task.

Word Reading Accuracy

Word reading accuracy was measured through the use of real and pseudowords. Word lists consisted of 20 real, phonetically regular, decodable words, and 20 phonetically regular, decodable pseudowords. Prior to beginning data collection, the researcher developed an archive of approximately 500 real words and 500 pseudowords for each participant. Words were gathered from the instructional materials (e.g., Wilson Reading System [Wilson Language Training Corporation, 2011]; REWARDS® [Archer et al., 2000)]) of each student and were selected based on students' placement in their respective reading program. Two spreadsheets were created for each participant, one of

real words and one of pseudowords, with a total of six spreadsheets. An example spreadsheet can be found in Appendix A. Words in each spreadsheet were assigned a randomly generated number. Each list was then shuffled and words were sorted into lists of 20 real words and 20 pseudowords. An example word list is included in Appendix B.

Real and pseudoword reading accuracy was defined as the ability to orally read a list of words without making errors while not being timed. Errors were defined as any word read incorrectly or a word that was not attempted. Words that were self-corrected were not counted as an error. Self-corrections were defined as any word read correctly after an initial incorrect pronunciation. This included the repetition of a word initially read incorrectly, resulting in the successful pronunciation of the word. Word reading accuracy was calculated by dividing the number of reading errors by the total words read on each word list. Two scores were computed for word reading accuracy, one for accurate real word reading, and one for accurate pseudoword reading.

Oral Reading Accuracy

Oral reading accuracy was defined as the ability to orally read a passage without making errors while not being timed. Errors included mispronunciations, additions, transpositions, and omissions (Leslie and Caldwell, 2011). Although miscues include other types of errors, errors were constrained in this study to only include those that could easily be recorded, in order to increase validity and reliability. Oral reading accuracy was calculated by dividing the number of reading errors by the total words read on each passage, generating a percentage of accuracy. Participants read one passage during each session throughout the duration of the study.

Prior to beginning data collection, the researcher gathered a number of grade- or Lexile-level passages for each participant. Dynamic Indicators of Basic Early Literacy Skills (DIBELS 8; University of Oregon, 2018) passages were used to measure the oral reading accuracy variable for Otis and Connor. DIBELS 8th Edition Oral Reading Fluency (ORF) passages were selected from the University of Oregon Center on Teaching and Learning probes (retrieved from https://dibels.uoregon.edu/assessment/index/material/). ORF is a standardized set of grade-level passages and administration procedures designed to identify children at-risk for RD and to monitor student progress toward instructional goals. The DIBELS ORF passages have undergone rigorous validation efforts and have established strong reliability and validity of measures (University of Oregon, 2018).

Because DIBELS ORF passages were unavailable for students in grade 10, passages for Nick were searched based on Lexile rating. The researcher gathered reading passages from CommonLit (commonlit.org), an online resource that provides educators with a free collection of thematically-organized supplemental texts for grades 3-12. The researcher conducted a search for passages ranging from 1095L to 1250L, consistent with the band of Lexiles for Grades 9 to 10 (1080L to 1305L; downloaded from www.lexile.com). Search criteria was also constrained to (a) expository texts and (b) content material for students in grade 10. This search yielded over 100 results. The first 25 articles in the search were copied and inserted into individual word processing documents, in order to edit the length of the text and to delete extraneous photos or information originally included on the website. The researcher reduced each passage to the first 200 to 300 words of the article, ensuring the end of the passage stopped at a

logical point (i.e., the end of a complete paragraph). The text was edited to match the font and style of the DIBELS passages being used with the other participants. Each passage was then assigned a number, and a random number generator was used to determine the order in which each passage would be read. An example reading passage is included in Appendix C.

Self-Awareness of Reading Performance

Self-awareness of reading performance on word-reading tasks was defined as the ability to identify one's own errors and self-corrections on a word-reading task. Errors were defined as any word read incorrectly or a word that was not attempted. Self-corrections were identified as any word read correctly after an initial incorrect pronunciation. This included the repetition of a word initially read incorrectly, resulting in the successful pronunciation of the word. Both the participant and the researcher marked errors and self-corrections on our individual copies of the word list. Errors were marked with a diagonal line through the word, and self-corrections were marked with an underline beneath the word. Self-awareness of reading performance was calculated by comparing my tally of self-corrections and errors to those of the student. This measure indicated participants' ability to correctly and accurately identify their own reading errors on real and pseudoword lists.

An observation rubric developed by the researcher (found in Appendix D) was used to document self-awareness of reading performance on real and pseudoword reading tasks. The researcher and the participant used this rubric to record errors and self-corrections observed during each session of the experiment. Prior to conducting the present study, the researcher tested a previous version of this observation rubric in a pilot

study. After testing the original version of the rubric, changes were made to reduce the items included on the rubric and to increase validity and reliability of the tool. The pilot study revealed that the previous version included too many items, which made the observation process tedious and overly complex. This also resulted in reduced agreement between the primary investigator and the participant.

Social Validity

Social validity was assessed following the completion of the study. Once data collection concluded, each participant was asked to complete a participant satisfaction survey pertaining to specific aspects of the study. The survey included two yes/no questions and asked for an explanation for their response (see Appendix E). The survey asked participants if they enjoyed listening to themselves read, and if they found it helpful to listen to themselves read. Results are discussed further in the following chapter.

Interrater Reliability

To establish interrater reliability, a staff member from the learning center independently code the self-awareness intervention procedures for ten percent of the reading sessions. The staff member was completing a graduate degree in school counseling and worked at the learning center as a research assistant. She had experience in collecting and analyzing data through her graduate assistantship and her work at the learning center. The researcher trained the staff member in the self-awareness intervention procedures, as well as how to complete the checklist and how to code the two items being observed (i.e., errors, self-corrections). Once data collection was completed, the staff member was provided access to the recordings of the sessions and

the word lists corresponding to each recording. Responses from the staff member were used to calculate the percentage of agreement. Interrater reliability was calculated separately for each checklist category (i.e., errors, self-corrections). Interobserver agreement was calculated by dividing the number of agreements observed by the number of agreements plus number of dis- agreements and multiplying by 100. Reliability by this method was calculated as 83% for errors and 82% for self-corrections.

Procedural Reliability

To verify procedural reliability, the researcher completed a procedures checklist during each session of the study (found in Appendix F). The researcher used the checklist to record the occurrence of individual components of the reading intervention across every session, including baseline and intervention phases for all three participants. Additionally, ten percent of recorded reading sessions were randomly selected and independently coded by two specialists who work at the learning center. The original goal was for the additional specialists to code 20% of sessions, but due to unforeseen circumstances, only 10% of sessions were coded. Both coders have extensive education, training and experience in explicit instruction and the reading programs used in the study. The researcher trained the coders to use the implementation checklist to tally the occurrence of the reading components observed during each lesson. Once data collection was completed, the two specialists were provided access to the recordings of the sessions and the word lists corresponding to each recording. Responses from the specialists were used to calculate the percentage of agreement. Interrater reliability was calculated separately for each checklist category (i.e., errors, self-corrections). Procedural reliability for Otis averaged 66% with a range of 10% to 91%. Nick averaged 78% accuracy with a

range of 30% to 100%. Connor averaged 83% with a range of 73% to 100%. Reliability between the researcher and the other coders across participants averaged 86% with a range of 69% to 100%.

Several sessions showed lower procedural reliability, primarily due to extenuating circumstances that cut into the time of the reading session. For example, the researcher conducted regularly scheduled progress monitoring assessments that took time out of the session, participants were sometimes scheduled for a shorter session based on their school schedule, and participants sometimes signed into the online meeting late. However, the procedural reliability checklist was created based on what is typically included in one full hour of instruction. These irregular circumstances totaled eight sessions out of 65 total sessions across all three participants. When fidelity was computed with those eight data points omitted, procedural reliability for Otis averaged 74%, Nick averaged 81%, and Connor averaged 88%. No significant changes in the variables were found when data for these eight sessions were reviewed by the researcher.

Intervention Materials

In addition to the word lists and reading passages described in the dependent variables section above, the following intervention materials were used as part of this study.

Video Recording Device

An iPad tablet was used to record participants as they read the word list and passage during each intervention session. The iPad captured video and audio of participants as they read aloud. The recording of the word list was then played back twice as the participant and the researcher listened to the audio.

Intervention Scripts

Three intervention scripts were developed for this study, all of which can be found in Appendix G. First, an implementation script for each phase of the intervention was used during each session throughout the baseline and both intervention phases. This script included instructions that were read to participants during each step of the intervention procedure. Next, a debrief/feedback script was used to guide students' self-awareness on word-reading errors and self-corrections. Finally, a third script was used to provide students with instructions for the passage-reading portion of the intervention procedures.

Procedures

Three participants from the initial six were recruited for the study. These three students were administered subtests of the TOWRE-2 (Torgesen et al., 2012) as an additional screening measure for participation in the study. All three students scored in the 30th percentile or below on the TOWRE-2 Total Word Reading subtest (see Table 2 for individual percentiles), and thus were eligible for participation. The researcher then called the parents of each candidate to explain the experiment and gauge interest in allowing their child to participate. Parents of all three students communicated interest in participation, so a follow-up cover letter and written consent form was then emailed to parents. The parents of these three children consented to participation per university institutional review board requirements for human subjects and each child assented to participation. Data collection for each participant began once parents returned signed consent forms. Data collection for this study took place over a 15-week period. The first five weeks of the study occurred in person at the learning center. Sessions for the

remaining 10 weeks were conducted online due to the COVID-19 pandemic. During that time, each participant attended 1:1 reading intervention sessions twice per week for 60 minutes.

Experimental Design

A multi-component, multiple baseline across individuals design was used to determine whether a video self-awareness intervention could improve the reading accuracy and self-monitoring of students with reading and self-regulation difficulties. SCDs are useful for monitoring responses to an intervention under specific conditions among small populations (Kratochwill et al., 2010). In SCD, an individual "case" refers to the unit of intervention and the unit of data analysis. A case may be an individual participant or a group of participants. In the current study, the case referred to the individual participants. Within this design, individual participants provide their own control for purposes of comparison (Horner et al., 2005). The outcome variables can be measured prior to the intervention (i.e., baseline) and compared with measurements taken during the intervention. This comparison allows the researcher to monitor individual performance and discrete data changes as a result of the intervention (Riley-Tillman et al., 2020). For these reasons, SCD was the most appropriate method to evaluate whether a functional relationship existed between the self-awareness intervention and the dependent variables under investigation.

The experimental conditions consisted of baseline and two treatment phases. Once baseline was complete, the participant with the most stable baseline proceeded to the intervention first. A baseline was considered stable once a clear pattern of behavior was established. Baseline occurred until the observed pattern of responding was

adequately consistent to allow for prediction of future responding (Horner et al., 2005). Once the second and the third students demonstrated a stable baseline, they began the intervention. Data collection lasted 15 weeks.

Baseline Phase

During baseline, participants (a) received 40 minutes of explicit, systematic, individualized reading instruction using a Tier 3 evidence-based reading program, (b) were video recorded as they read an untimed word list, and (c) were video recorded as they read an untimed passage. At the beginning of each reading session, the participant was asked to read a list of 20 real and 20 pseudowords aloud while the researcher recorded them reading. The researcher presented the single-sided word list to the student, and then proceeded through the prompts corresponding to Step One of the self-awareness intervention script (found in Appendix G). After reading the word list, the participant was then asked to read a passage aloud as the researcher video recorded. The researcher reviewed each video later for any errors and self-corrections made on the word list, and any errors made on the passage. Observations were tallied on the observation rubric and a percentage of accuracy for word and passage reading were calculated. Participants proceeded to the first treatment phase once a stable baseline pattern was evident.

Treatment Phase

The self-awareness intervention was introduced in stages over two treatment phases. The stages of intervention are described below.

Treatment Phase One: Self-Reflection without Feedback

During Stage One, participants (a) received 40 minutes of reading instruction, (b) were video recorded as they read an untimed word list, (c) listened to the video recording

without marking observations, (d) listened to the video while marking their errors and self-corrections on the word list, and (e) were video recorded as they read an untimed passage.

Treatment Phase Two: Self-Reflection with Feedback

During Stage Two, participants (a) received 40 minutes of reading instruction, (b) were video recorded as they read an untimed word list, (c) listened to the video recording without marking observations, (d) listened to the video while marking their errors and self-corrections on the word list, (e) were guided to self-reflect on their reading accuracy in a debrief/feedback discussion, and (f) were video recorded as they read an untimed passage. See Table 4 below for a description of the self-awareness intervention procedures.

Table 4 Description of Self-Awareness Intervention Procedures

Phase	Description
Baseline	Reading intervention + record the student as they read a list of words (no review of the video, no debrief or feedback)
Phase I	Reading intervention + record the student as they read a list of words + listen to video twice + student marks errors and self-corrections (no debrief or feedback from the researcher)
Phase II	Reading intervention + record the student as they read a list of words + listen to video twice + student marks errors and self-corrections + debrief and feedback from the researcher

Data Analysis

Data were evaluated using visual analysis, which is the signature method of data analysis in SCD (Horner et al., 2005; Riley-Tillman et al., 2020). Five dependent

variables were tested in the present study: real word reading accuracy, pseudoword reading accuracy, oral reading accuracy, self-awareness of reading performance on real word reading tasks, and self-awareness of reading performance on pseudoword reading tasks. Real word reading accuracy, pseudoword reading accuracy, oral reading accuracy were evaluated using visual analysis, percentage of non-overlapping data (PND), and Tau-U effect sizes. The self-awareness variables were analyzed using visual analysis and PND only.

The level, trend, and variability of performance were assessed throughout the baseline and treatment phases, in order to inform phase change decisions. A minimum of three data points were collected per phase to establish experimental control (Horner et al., 2005; Kratochwill et al., 2013). Participants proceeded to the next phase once a stable pattern was observed in the previous condition. Data collected in baseline were compared to intervention data in order to document changes in reading accuracy and self-monitoring over time.

In addition to comparing the level, trend, and variability of outcome measures within each phase, data patterns across phases were measured by examining the immediacy of the effect and overlap in similar phases. *Immediacy of change* was used to examine the impact of the onset and/or withdrawal of the intervention between phases. Immediacy of change refers to the change in level between the last three data points in one phase and the first three data points of the next (Horner et al., 2005; Kratochwill et al., 2010).

Visual Analysis

Visual analysis can be used to evaluate (a) evidence of a relation between an independent variable and an outcome variable, and (b) the strength or magnitude of that relation (Kratochwill et al., 2010). The researcher uses visual analysis to compare data in the baseline and intervention phase(s), evaluating patterns or changes to determine the effectiveness of the intervention (Riley-Tillman et al., 2020). To evaluate effects within SCDs, six features are used to examine within- and between- phase data patterns: level, trend, variability, immediacy of the change, overlap, and consistency of data patterns across similar phases (Horner et al., 2005; Kratochwill et al., 2010; Lobo et al., 2017). Changes in level, trend, and variability of performance were analyzed for both baseline and intervention conditions.

Level refers to the mean performance during a single phase of the study (Horner et al., 2005). In SCD research, the most straightforward way to interpret outcome data is to compare the level of the data during the baseline phase with the level of the data in the intervention phase (Riley-Tillman et al., 2020). The goal of intervention research is to alter a predefined behavior, so a SCD researcher would anticipate changes in time to result in changes in level between the phases. In the present study, it was hypothesized that the implementation of the independent variable (i.e., the self-awareness intervention) would result in an increase in level in baseline, Phase I, and Phase II. The immediacy of the effect was also observed in the study. The immediacy or latency of change in level refers the change in level between the last three data points in one phase and the first three data points of the next phase (Kratochwill et al., 2010). The immediacy of the effect indicates the amount of time it takes for an intervention to have an impact on the target

behavior. Intervention effects can be immediate or delayed, but the more immediate the change in outcome data after the intervention has been introduced, the easier it is to attribute any change to the intervention (Riley-Tillman et al., 2020).

Trend refers to the rate of increase or decrease of the data points along a best-fitting straight line for the dependent variable within a phase (Horner et al., 2005). Trend indicates how participant performance is changing within a phase, and is characterized by slope (i.e., steepness of change) and direction (Maggin et al., 2018). Trend is described in terms of direction and magnitude, or size of the observed slope. It is expected in SCD research that the outcome data would be increasing, decreasing, or remaining stable over time (Riley-Tillman et al., 2020). In the current study, it was hypothesized that the implementation of the self-awareness intervention would result in an increasing trend in baseline, Phase I, and Phase II.

Variability refers to the degree to which performance deviates from the overall mean or slope within a phase (Horner et al., 2005; Kennedy, 2005). Depending on the level in which the deviation occurred, variability is described as being high, moderate, or low within each phase. If there are visible changes in these results, it is reasonable to conclude that the intervention is effective. In the present study, it was assumed that data would reveal typical day-to-day variability in performance, as innumerable extenuating circumstances can affect student performance on a given day. This was especially true during the present study with the onset of the COVID-19 pandemic.

Percentage of Non-Overlapping Data

Overlap was measured to determine the proportion of data from one phase that overlaps with data from the previous phase. Recording the proportion of overlap across

phases allows one to demonstrate evidence of a relationship between the independent variable (the self-awareness intervention) and the dependent variables (reading accuracy and self-monitoring skills; Kratochwill et al., 2010). Percentage of non-overlapping data (PND) was calculated by counting the number of intervention points that did not overlap with points in the previous phase, dividing by the total number of the total number of points, and multiplying by 100 (Scruggs et al., 1987; Vannest & Ninci, 2015). For example, if the researcher recorded 10 total data points within baseline, and seven of the data points in the following phase are recorded above the line, one would calculate PND by dividing seven by 10 for a PND score of 7/10, or 70%. This would mean that 70% of the collected data points were not overlapping with the data points in the previous phase. PND can range from 0% to 100%, with the following interpretation guidelines offered by its authors: greater than 70% for effective interventions, 50% to 70% for questionable effectiveness, and less than 50% for no observed effect (Scruggs & Mastropieri, 1998). According to this guidance, the greater the percentage of PND, the stronger the treatment effect. PND is a useful method to utilize when the researcher anticipates an increase in the outcome variables (Lobo et al., 2017), as was the expectation in the current study (i.e., an increase in reading accuracy and self-monitoring). PND can also be a beneficial metric in SCD because it is a simple calculation that provides data that are immediately meaningful and simple to interpret (Scruggs & Mastropieri, 2001).

It should be noted that the PND measure also has some disadvantages that became apparent through data analysis in the current study. PND is an accurate metric of overlap when the data demonstrate stability, *devoid of trend or outliers* (Vannest & Ninci, 2015). PND is thrown off by outlier scores, and since it is based on only one data point, it is less

reliable than analyzing groups of data (Riley-Tillman et al., 2020). Additionally, PND has a ceiling-and-floor effect that does not allow it to discriminate between differences at the higher and lower ranges. Ceiling or floor effects occur when a substantial proportion of the scores are recorded at either the highest or lowest limits, which can cause difficulties in data analysis (Vannest & Ninci, 2015). In the current study, PND was calculated across all participants and dependent variables under investigation. However, because of the incidence of outlier scores, scores at the highest and lowest ranges, and the highly variable trends in several graphs, results of PND data in this study showed weak to no effects in most cases. These results are reviewed in later chapters.

Tau-U Effect Size

In addition to PND, Tau-U (Parker et al., 2011) was calculated to determine whether the intervention had a statistically significant treatment effect on three variables: real word reading accuracy, pseudoword reading accuracy, and oral reading accuracy. Tau-U is a nonoverlap index of effect that is useful for handling smaller data sets and controlling for a positive baseline trend, producing modest but sometimes meaningful changes to the effect sizes (Vannest & Ninci, 2015). Tau-U was calculated for only the real word reading accuracy, pseudoword reading accuracy, and oral reading accuracy variables because these were the three variables that included a baseline phase, and visual analysis revealed positive baseline trends in several cases among these variables. The Tau-U effect size calculation was appropriate in the current study because this method has greater power and precision as compared to other nonoverlapping effect size calculation methods (Parker et al., 2011).

Tau-U was calculated using the following free web tool: http://www.singlecaseresearch.org/calculators/tau-u (Vannest et al., 2016). Once raw data were entered into the calculator, the effect size calculation proceeded in the following sequence. First, it was determined whether there was significant trend in the baseline phase for each of the three variables. As recommended by Vannest and Ninci (2015), a $p < .20$ was used to make this determination. Next, the Tau-U was calculated for each baseline and intervention phase contrast in the real word reading accuracy, pseudoword reading accuracy, and oral reading accuracy variables. Trend was controlled if significant trend in a baseline phase for a particular contrast was observed. Finally, the online calculator was used to calculate a weighted mean of all baseline and intervention phase contrasts into a single Tau-U for the three variables in question.

Tau-U values range from 0 to 1 and are interpreted as proportion of nonoverlap or improvement in data across baseline and intervention phases. For example, a Tau-U of .30 indicates 35% of data showed improvement between baseline and intervention phases after controlling for significant trends in intervention phases. A Tau-U of 0–0.65 is considered evidence of a weak intervention effect, 0.66–0.92 a medium effect, and 0.93–1.00 a strong effect (Parker et al., 2011).

Data in the current study were evaluated using visual analysis, PND, and Tau-U effect sizes. While PND and Tau-U are useful statistical method for analyzing data in SCD research for a number of reasons, it is recommended that formal statistical approaches to data analysis in SCD be used as a supplement to visual analysis, and should not serve as a replacement (Horner et al., 2005).

CHAPTER IV: RESULTS

Overall Effects

Real Word Reading Accuracy

The combined Tau-U for the real word reading accuracy variable across all three participants for Baseline compared to Phase I was -0.32 (SE = .05, 95% confidence interval [CI] [-0.71, 0.05]). The aggregate effect size is consistent with a weak intervention effect (Parker et al., 2011) and indicates 32% of data across Baseline and Phase I decreased with the onset of Phase I. The combined Tau-U for the real word reading accuracy variable across all participants for Phase I compared to Phase II was .40 (SE = .05, 95% confidence interval [CI] [0.05, 0.75]). The aggregate effect size is consistent with a weak intervention effect (Parker et al., 2011), but the positive increase indicates 40% of data across Phase I and Phase II improved with the onset of Phase II.

Pseudoword Reading Accuracy

The weighted Tau-U for the pseudoword reading accuracy variable across all participants for baseline compared to Phase I was .14 (SE = .05, 95% confidence interval [CI] [-0.10, 0.65]). This combined effect size indicates 14% of data across baseline and Phase I improved after controlling for a positive trend in baseline, which is considered a weak intervention effect (Parker et al., 2011). The combined Tau-U for the pseudoword reading accuracy variable across all participants for Phase I compared to Phase II was .21 (SE = .05, 95% confidence interval [CI] [-0.14, 0.56]). This combined effect size indicates 21% of data across baseline and Phase I improved after correcting for a positive

trend in baseline, which is a positive increase but is considered a weak intervention effect (Parker et al., 2011).

Oral Reading Accuracy

The weighted Tau-U for the oral reading accuracy variable across all participants for baseline compared to Phase I was .56 (SE = .05, 95% confidence interval [CI] [0.19, 0.94]). This combined effect size indicates 56% of data across baseline and Phase I improved after controlling for a positive trend in baseline for Nick. This is considered a weak intervention effect (Parker et al., 2011). The combined Tau-U for the pseudoword reading accuracy variable across all participants for Phase I compared to Phase II was .79 (SE = .05, 95% confidence interval [CI] [0.40, 1]). This combined effect size indicates 79% of data across baseline and Phase I improved after correcting for a positive trend in baseline for Nick. This is considered a medium intervention effect (Parker et al., 2011).

Individual Results

Real Word Reading Accuracy

The real word reading accuracy variable represented the participant's oral reading accuracy on a list of 20 real, phonetically regular words. This variable was calculated by dividing the number of reading errors by the total real words read on each word list, generating a percentage of accuracy. A summary of the real word reading accuracy results can be found in Table 5 below.

Table 5 Summary of Real Word Reading Accuracy Results

Participant	BL	Phase One	Phase Two		
	M (Range)	M (Range)	M (Range)	PND	Tau-U ES
Otis	77% (60-85%)	75% (55-85%)	88% (75-100%)	60%	68
Nick	91% (70-100%)	80% (65-90%)	87% (80-95%)	0%	47
Connor	80% (55-95%)	78% (60-85%)	74% (60-90%)	0%	20

Note: BL = Baseline; PND = Overlap expressed in percent data overlap between baseline and Phase II; Tau-U ES = Individual Tau-U effect size expressed in percentage.

Interpretation of PND = >70% for effective interventions, 50% to 70% for questionable effectiveness, and <50% for no observed effect (Scruggs & Mastropieri, 1998).

Interpretation of Tau-U ES = Tau-U of 0–0.65 is considered evidence of a weak intervention effect, 0.66–0.92 a medium effect, and 0.93–1.00 a strong effect (Parker et al., 2011).

Otis

Baseline for Otis consisted of five data points (see Figure 1), with a range of 60-85% and an average of 77% accuracy. Baseline data demonstrated a moderate level of variability and a flat trend, which suggests no significant change in real word reading accuracy with reading intervention only. Otis advanced to Phase I once a stable pattern was observed in baseline. Visual analysis of the data demonstrated an immediate intervention effect was observed during the first session of intervention (85% accuracy) compared to the last session of baseline (75% accuracy), which exceeds the baseline average of 77%. Phase I consisted of nine data points, with a range of 55-85% and an

average of 75%. Phase I data demonstrated moderate variability and a slightly upward trend. The PND data between Baseline and Phase I was 0%, indicating Phase I of the intervention was ineffective in increasing real word reading accuracy for Otis (Scruggs & Mastropieri, 1998). A minor yet immediate increase in the dependent variable was observed upon introduction of Phase II (85% accuracy), as compared to the last session of baseline (80% accuracy), which exceeds the overall average of Phase I (75% accuracy). Phase II for Otis consisted of nine data points, with a range of 75-100% and an average of 88% accuracy. The PND between baseline and Phase II was 60%, indicating Phase II of the intervention was questionable in increasing real word reading accuracy for Otis (Scruggs & Mastropieri, 1998). The PND between Phase I and Phase II was also 60%, which suggests Phase II of the intervention yielded questionable effects in increasing real word reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

The Tau-U for the real word reading accuracy variable for baseline compared to Phase I was -0.16 (SE = .10, 90% confidence interval [CI] [-0.70, 0.39]). This effect size suggests 16% of data declined after the implementation of Phase I as compared to baseline. Parker et al. (2011) consider this a weak intervention effect. The Tau-U for baseline compared to Phase II for Otis was .68 (SE = .10, 90% confidence interval [CI] [0.14, 1]). This effect size suggests 68% of data improved after the implementation of Phase II as compared to baseline, which is considered a medium intervention effect (Parker et al., 2011). Finally, The Tau-U for Phase I compared to Phase II was .74 (SE = .10, 90% confidence interval [CI] [0.30, 1]). This effect size suggests 74% of data

improved after the implementation of Phase II as compared to Phase I. Parker et al. (2011) consider this a medium intervention effect.

Nick

Baseline for Nick consisted of five data points, with a range of 70-100% and an average of 89% reading accuracy (see Figure 1). Baseline data demonstrated a downward trend and a moderate level of variability. Visual analysis of the data demonstrated an immediate decrease in the dependent variable during the first session of intervention (70% accuracy), as compared to the last session of baseline (95% accuracy), which falls below the baseline average of 91% and is the second lowest data point in this phase. Phase I consisted of seven data points, with a range of 65-90% and an average of 80% accuracy. Phase I demonstrated a moderate level of variability and an upward trend. The PND between Baseline and Phase I was 0%, indicating Phase I of the intervention was ineffective in increasing real word reading accuracy for Nick. The downward trend observed in the last data point in Phase I predicted the minor decrease in level observed in the first data point of Phase II. Visual analysis of the data demonstrated an immediate decrease in the dependent variable during the first session of Phase II (80% accuracy), as compared to the last session of Phase I (85% accuracy). Phase II consisted of nine data points, with a range of 80-95% and an average of 87% accuracy. Data demonstrated low variability and a slightly upward trend. The PND between Baseline and Phase II was 0%, indicating Phase II of the intervention was ineffective in increasing real word reading accuracy for Nick. The PND between Phase I and Phase II was 22%, which suggests Phase II of the intervention yielded no observable effects in increasing real word reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

The Tau-U for the real word reading accuracy variable for baseline compared to Phase I was -0.69 (SE = .10, 90% confidence interval [CI] [-1, -0.11]). This effect size suggests 69% of data declined after the implementation of Phase I as compared to baseline. Parker et al. (2011) consider this a medium intervention effect. The Tau-U for baseline compared to Phase II for Nick was .47 (SE = .10, 90% confidence interval [CI] [-1, 0.08]). This effect size suggests 47% of data improved after the implementation of Phase II as compared to baseline, which is considered a weak intervention effect (Parker et al., 2011). Finally, The Tau-U for Phase I compared to Phase II was .40 (SE = .10, 90% confidence interval [CI] [-0.10, 0.89]). This effect size suggests 40% of data improved after the implementation of Phase II as compared to Phase I. Parker et al. (2011) consider this a weak intervention effect.

Connor

Baseline for Connor consisted of seven data points, with a range of 55-90% and an average of 80% accuracy (see Figure 1). Baseline demonstrated low variability and a downward trend. Data suggests Connor declined in real word reading accuracy with reading intervention only. Visual analysis of the data demonstrated an immediate intervention effect was observed during the first session of intervention (75% accuracy), as compared to the last session of baseline (55% accuracy). The first data point in Phase I exceeds the last point in baseline, but is lower than the overall Baseline average of 80%. Phase I consisted of seven data points, with a range of 60-85% and an average of 78% accuracy. Phase I demonstrated low variability and a flat trend. The PND between Baseline and Phase I was 0%, indicating Phase I of the intervention was ineffective in increasing real word reading accuracy for Connor. An immediate decrease in the

dependent variable (65% accuracy) was observed in the first session of Phase II, as compared to the last session of Phase I (85% accuracy), and which is lower than the Phase I average of 78%. Phase II consisted of five data points, with a range of 60-95% and an average of 74%. Phase II demonstrated low variability and an upward trend. The PND between Baseline and Phase I was 0%, indicating Phase II of the intervention was ineffective in increasing real word reading accuracy for Connor. The PND between Phase I and Phase II was also 0%, which suggests Phase II of the intervention yielded no observable effects in increasing real word reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

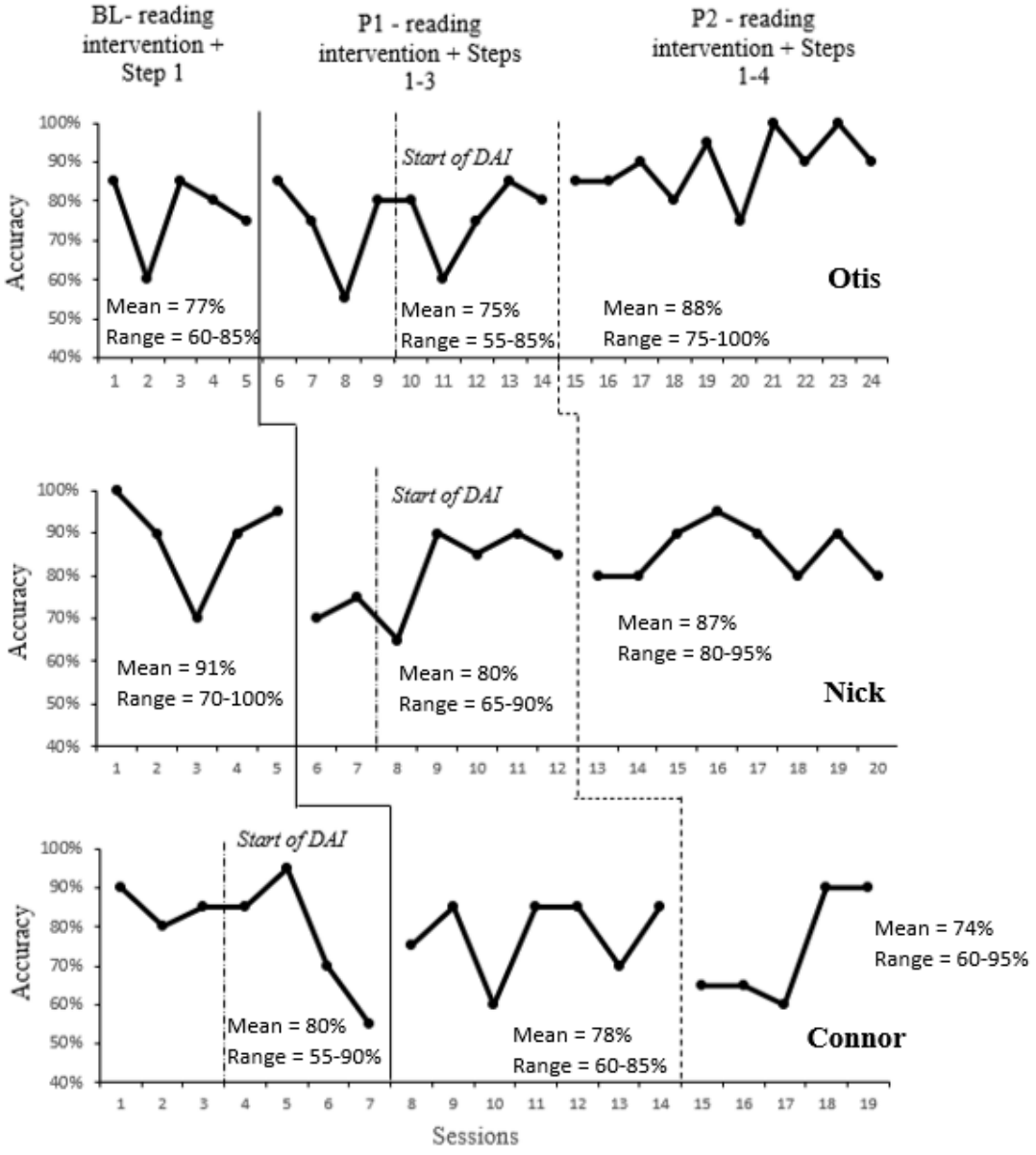

Figure 1 Real Word Reading Accuracy

Note. Real word reading accuracy was defined as the ability to orally read a list of real words without making errors. This variable was calculated by dividing the number of reading errors by the total real words read on each word list, generating a percentage of accuracy. DAI = Distance Academic Intervention. Real word reading accuracy on a list of 20 real words.

Pseudoword Reading Accuracy

The pseudoword reading accuracy variable represented the participant's reading accuracy on a list of 20 decodable non-words. This variable was calculated by dividing the number of reading errors by the total pseudowords read on each word list, generating a percentage of accuracy. A summary of the pseudoword reading accuracy results can be found in Table 6 below.

Table 6 Summary of Pseudoword Reading Accuracy Results

Participant	BL	Phase One	Phase Two		
	M (Range)	M (Range)	M (Range)	PND	Tau-U ES
Otis	56% (30-75%)	55% (35-60%	73% (60-85%)	30%	42
Nick	62% (40-75%)	77% (50-95%)	72% (55-85%)	22%	29
Connor	65% (40-80%)	74% (60-85%)	72% (60-85%)	20%	11

Note: BL = Baseline; PND = Overlap expressed in percent data overlap between baseline and Phase II; Tau-U ES = Individual Tau-U effect size expressed in percentage.

Interpretation of PND = >70% for effective interventions, 50% to 70% for questionable effectiveness, and <50% for no observed effect (Scruggs & Mastropieri, 1998).

Interpretation of Tau-U ES = Tau-U of 0–0.65 is considered evidence of a weak intervention effect, 0.66–0.92 a medium effect, and 0.93–1.00 a strong effect (Parker et al., 2011).

Otis

Baseline for Otis consisted of five data points, with a range of 30-75% and an average of 56% reading accuracy (see Figure 2). Baseline in the pseudoword reading variable demonstrated low variability and an upward trend, indicating Otis improved in pseudoword reading accuracy over time, even prior to the self-awareness intervention. No change in level was observed with the implementation of intervention. Phase I of intervention consisted of nine data points, with a range of 35-60% and an average of 55% reading accuracy. Phase I demonstrated low variability and a slightly downward trend. The PND between Baseline and Phase I was 0%, indicating Phase I of the intervention was ineffective in increasing pseudoword reading accuracy for Otis. Visual analysis of the data demonstrated an immediate intervention effect was observed during the first session of intervention (75% accuracy), as compared to the last session of Phase I (50% accuracy), which exceeds the Phase I average of 55%. Phase II consisted of nine data points, with a range of 60-85% and an average of 73%. Phase II demonstrated low variability and a slightly upward trend. The PND between Baseline and Phase II was 30%, indicating Phase II of the intervention was ineffective in increasing pseudoword reading accuracy for Otis. The PND between Phase I and Phase II was 60%, which suggests Phase II of the intervention yielded questionable effects in increasing pseudoword reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

The Tau-U for the pseudoword reading accuracy variable for baseline compared to Phase I, after correcting for a positive trend in baseline, was -0.27 (SE = .10, 90% confidence interval [CI] [-0.82, 0.28]). This effect size suggests 27% of data declined after the implementation of Phase I as compared to baseline. Parker et al. (2011) consider

this a weak intervention effect. The Tau-U for baseline compared to Phase II for Otis, after correcting for a positive baseline trend was .42 (SE = .10, 90% confidence interval [CI] [-0.12, 0.96]). This effect size suggests 42% of data improved with the implementation of Phase II as compared to baseline. Although this indicates positive improvements, this is considered a weak intervention effect (Parker et al., 2011). After correcting for positive baseline trend, the Tau-U for Phase I compared to Phase II was .94 (SE = .10, 90% confidence interval [CI] [0.5, 1]). This effect size suggests 94% of data improved after the implementation of Phase II as compared to Phase I, which is considered a strong intervention effect (Parker et al., 2011).

Nick

Baseline for Nick consisted of five data points, with a range of 40-75% and an average of 62% accuracy (see Figure 2). Baseline data demonstrated low variability and an upward trend, though the trend flattened out in the last three data points of the phase. Though the trend is upward, the last data points in Baseline suggested a plateau in pseudoword reading accuracy with reading intervention only. Visual analysis of the data demonstrated an immediate intervention effect was observed during the first session of intervention (88% accuracy), as compared to the last session of baseline (70% accuracy), which exceeds the baseline average of 62%. Phase I consisted of seven data points, with a range of 50-95% and an average of 77% accuracy. Phase I demonstrated a moderate level of variability and a slightly downward trend. The PND between Baseline and Phase I was 57%, indicating the effectiveness of Phase I of the intervention was questionable in increasing pseudoword reading accuracy for Nick. Visual analysis of the data demonstrated an immediate decrease in the dependent variable during the first session of

Phase II (55% accuracy), as compared to the last session of Phase I (70% accuracy). This initial data point is the lowest in Phase II and was predicted by the downward trend observed in the last three data points in Phase I. Data in Phase II consisted of nine data points, with a range of 55-85% and an average of 72% accuracy. Phase II demonstrated a slightly upward trend and low variability. The PND between Baseline and Phase II was 22%, indicating Phase II of the intervention was ineffective in increasing pseudoword reading accuracy for Nick. The PND between Phase I and Phase II was 0%, which suggests Phase II of the intervention yielded no observable effects in increasing pseudoword reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

The Tau-U for the pseudoword reading accuracy variable for baseline compared to Phase I, after correcting for a positive trend in baseline, was .49 (SE = .10, 90% confidence interval [CI] [-0.09, 1]). This effect size suggests 49% of data improved after the implementation of Phase I as compared to baseline. Though this shows encouraging improvements, this is considered a weak intervention effect (Parker et al., 2011). The Tau-U for baseline compared to Phase II for Nick, after correcting for a positive baseline trend was .29 (SE = .10, 90% confidence interval [CI] [-0.26, 0.84]). This effect size suggests 29% of data improved with the implementation of Phase II as compared to baseline, which is considered a weak intervention effect (Parker et al., 2011). After correcting for positive baseline trend, the Tau-U for Phase I compared to Phase II was -0.25 (SE = .10, 90% confidence interval [CI] [-0.75, 0.24]). This effect size suggests 25% of data declined after the implementation of Phase II as compared to Phase I, which is considered a weak intervention effect (Parker et al., 2011).

Connor

Baseline consisted of seven data points, with a range of 40-80% and an average of 65% accuracy (see Figure 2). Baseline demonstrated low variability and an upward trend, which suggest Connor steadily improved in pseudoword reading accuracy with reading intervention alone. Visual analysis of the data demonstrated an immediate decrease in the dependent variable during the first session of Phase I (70% accuracy), as compared to the last session of baseline (75% accuracy), though this was higher than the baseline average of 65%. Phase I consisted of seven data points, with a range of 60-85% and an average of 74% accuracy. Phase I demonstrated no variability and a slightly upward trend. The PND between baseline and Phase I was 43%, indicating Phase I of the intervention was ineffective in increasing real word reading accuracy for Connor. An immediate intervention effect was observed during the first session of Phase II (75% accuracy), as compared to the last session of baseline (70% accuracy). Phase II consisted of five data points, with a range of 60-85% and an average of 72% accuracy. Phase II demonstrated no variability and a slightly upward trend. The PND between baseline and Phase II was 20%, indicating Phase II of the intervention was ineffective in increasing real word reading accuracy for Connor. The PND between Phase I and Phase II was 0%, which suggests Phase II of the intervention yielded no observable effects in increasing pseudoword reading a(Scruggs & Mastropieri, 1998)I (Scruggs & Mastropieri, 1998).

The Tau-U for the pseudoword reading accuracy variable for baseline compared to Phase I was .20 (SE = .10, 90% confidence interval [CI] [-0.32, 0.73]). This effect size suggests 20% of data improved after the implementation of Phase I as compared to baseline. Though this shows encouraging improvements, this is considered a weak

intervention effect (Parker et al., 2011). The Tau-U for baseline compared to Phase II for Connor was .11 (SE = .10, 90% confidence interval [CI] [-0.47, 0.69]). This effect size suggests 11% of data improved with the implementation of Phase II as compared to baseline, which is considered a weak intervention effect (Parker et al., 2011). The Tau-U for Phase I compared to Phase II was -0.20 (SE = .10, 90% confidence interval [CI] [-0.78, 0.38]). This effect size suggests 20% of data declined after the implementation of Phase II as compared to Phase I, which is considered a weak intervention effect (Parker et al., 2011).

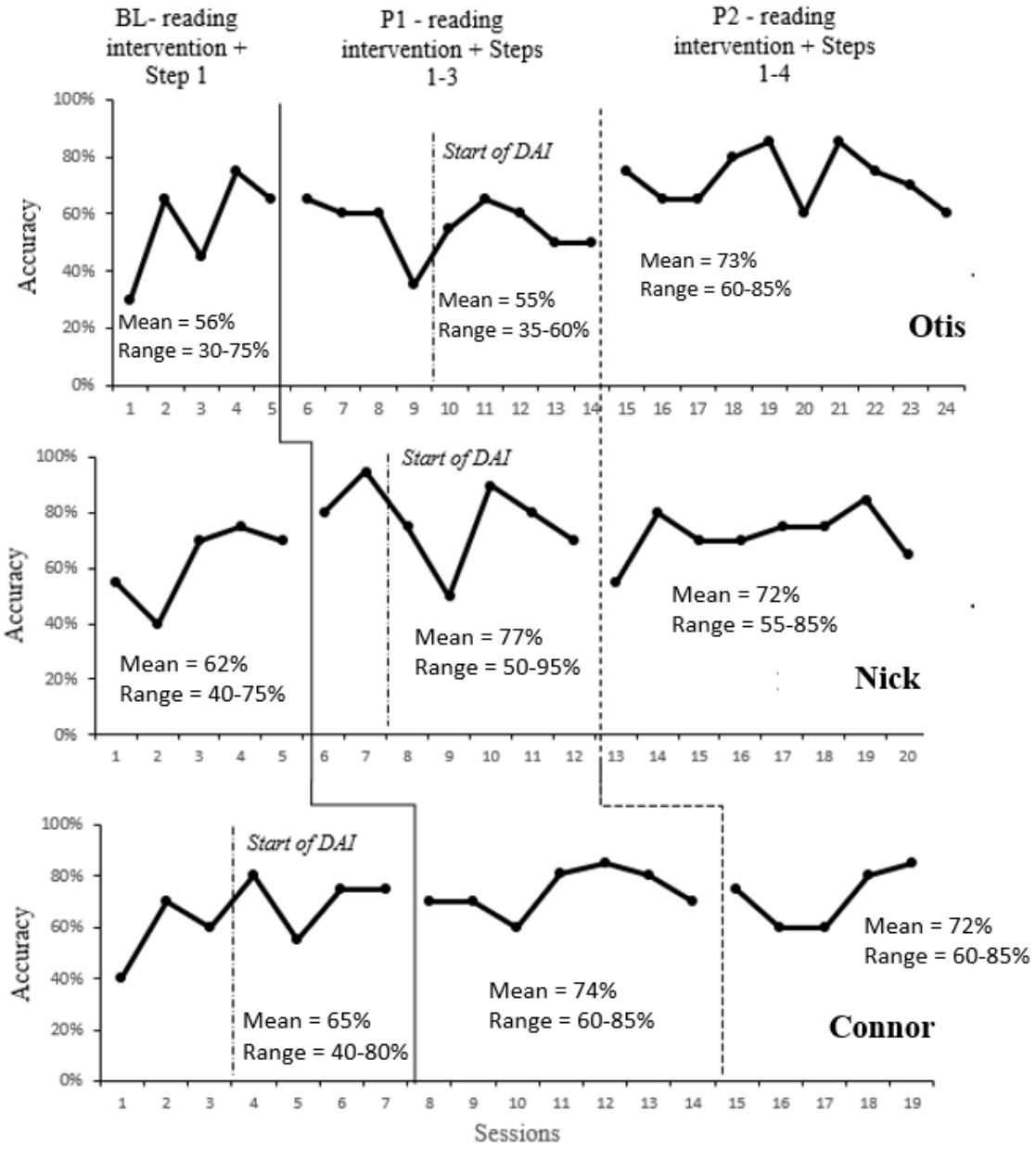

Figure 2 Pseudoword Reading Accuracy

Note. Pseudoword reading accuracy on a list of 20 pseudowords. Pseudoword reading accuracy was defined as the ability to orally read a list of pseudowords without making errors. This variable was calculated by dividing the number of reading errors by the total pseudowords read on each word list, generating a percentage of accuracy. DAI = Distance Academic Intervention.

Oral Reading Accuracy

The oral reading accuracy variable represented participant's reading accuracy on the first 100 words of an untimed passage. This variable was calculated by dividing the number of reading errors by the total words read on each passage, generating a percentage of accuracy. A summary of the real word reading accuracy results can be found in Table 7 below.

Table 7 Summary of Oral Reading Accuracy Results

Participant	BL	Phase One	Phase Two		
	M (Range)	M (Range)	M (Range)	PND	Tau-U ES
Otis	86% (79-90%)	93.7% (88-97%)	94.5% (92-97%)	90%	100
Nick	93% (91-94%)	97% (94-98%)	97% (93-100%)	88%	70
Connor	97% (94-99%)	97% (95-99%)	98% (97-99%)	0%	66

Note: BL = Baseline; PND = Overlap expressed in percent data overlap between baseline and Phase II; Tau-U ES = Individual Tau-U effect size expressed in percentage.

Interpretation of PND = >70% for effective interventions, 50% to 70% for questionable effectiveness, and <50% for no observed effect (Scruggs & Mastropieri, 1998).

Interpretation of Tau-U ES = Tau-U of 0–0.65 is considered evidence of a weak intervention effect, 0.66–0.92 a medium effect, and 0.93–1.00 a strong effect (Parker et al., 2011).

Otis

Baseline for Otis consisted of five data points, with a range of 79-90% and an average of 86% accuracy (see Figure 3). Baseline data demonstrated a moderate level of variability and a relatively flat trend. An upward trend was observed in the last three data points of baseline. Visual analysis of the data demonstrated no immediate intervention effect observed during the first session of intervention. Phase I consisted of ten data points, with a range of 88-97% and an average of 93.7%. Phase I demonstrated low variability and an upward trend. The PND between baseline and Phase I was 80%, indicating Phase I of the intervention was fairly effective in increasing oral reading accuracy for Otis. Visual analysis of the data demonstrated an immediate decrease in the dependent variable during the first session of Phase II (92% accuracy), as compared to the last session of Phase I (97% accuracy), which is slightly lower than the average of Phase I (93.7% accuracy). Phase II consisted of eight data points, with a range of 92-97% and an average of 94.5%. Phase II data demonstrated no variability and a flat trend. The PND data between baseline and Phase II was 90%, indicating Phase II of the intervention was fairly effective in increasing oral reading accuracy for Otis. The PND between Phase I and Phase II was 22%, which suggests Phase II of the intervention yielded no observable effects in increasing oral reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

The Tau-U for the oral reading accuracy variable for baseline compared to Phase I was .86 (SE = .10, 90% confidence interval [CI] [0.32, 1]). This effect size suggests 86% of data increased after the implementation of Phase I as compared to baseline. Parker et al. (2011) consider this a medium intervention effect. The Tau-U for baseline compared

to Phase II for Otis was 1.0 (SE = .10, 90% confidence interval [CI] [0.45, 1]). This effect size suggests 100% of data improved with the implementation of Phase II as compared to baseline, indicating a strong intervention effect (Parker et al., 2011). Finally, the Tau-U for Phase I compared to Phase II was .21 (SE = .10, 90% confidence interval [CI] [-0.24, 0.66]). This effect size suggests 21% of data improved after the implementation of Phase II as compared to Phase I, which is considered a weak intervention effect (Parker et al., 2011).

Nick

Baseline for Nick consisted of five data points, with a range of 91-94% and an average of 93% accuracy (see Figure 3). Baseline demonstrated minimal variability and a slightly upward trend, which suggests some improvement in oral reading accuracy prior to intervention. Visual analysis of the data demonstrated an immediate intervention effect was observed during the first session of intervention (98% accuracy), as compared to the last session of baseline (94% accuracy), which exceeds the baseline average of 93%. Phase I for Nick consisted of seven data points, with a range of 94-98% and an average of 97% accuracy. Phase I demonstrated a flat trend and low variability. The PND between baseline and Phase I was 86%, indicating Phase I of the intervention was fairly effective in increasing Nick's oral reading accuracy. Visual analysis of the data demonstrated an immediate decrease in the dependent variable during the first session of Phase II (96% accuracy), as compared to the last session of Phase I (98% accuracy), which is slightly lower than the Phase I average of 97%. Phase II for Nick consisted of seven data points, with a range of 93-100% and an average of 97% accuracy. Phase II demonstrated an upward trend and a moderate level of variability. The initial decline observed with the

onset of Phase II continues, with a downward trend occurring for the first three sessions of the phase and reaching a low of 93% accuracy. An abrupt increase is observed in the fourth data point (98% accuracy), and a flat trend was observed in the last five points. The PND between baseline and Phase II was 88%, indicating Phase II of the intervention was fairly effective in increasing Nick's oral reading accuracy. The PND between Phase I and Phase II was 25%, which suggests Phase II of the intervention yielded no observable effects in increasing oral reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

The Tau-U for the oral reading accuracy variable for baseline compared to Phase I after correcting for a positive baseline trend was .77 (SE = .10, 90% confidence interval [CI] [0.19, 1]). This effect size suggests 77% of data increased after the implementation of Phase I as compared to baseline. Parker et al. (2011) consider this a medium intervention effect. The Tau-U for baseline compared to Phase II for Nick after correcting for a positive baseline trend was .70 (SE = .10, 90% confidence interval [CI] [0.14, 1]). This effect size suggests 70% of data improved with the implementation of Phase II as compared to baseline, indicating a medium intervention effect (Parker et al., 2011). Finally, the Tau-U for Phase I compared to Phase II after correcting for a positive baseline trend was .16 (SE = .10, 90% confidence interval [CI] [-0.35, 0.67]). This effect size suggests 16% of data improved after the implementation of Phase II as compared to Phase I, which is considered a weak intervention effect (Parker et al., 2011).

Connor

Baseline for Connor consisted of seven data points, with a range of 94-99% and an average of 97% accuracy (see Figure 3). Baseline demonstrated a flat trend and low

variability. Data suggest Connor consistently read with relatively high oral reading accuracy given reading intervention alone, but no significant increase in accuracy was observed over time. An immediate intervention effect was observed during the first session of intervention (99% accuracy), as compared to the last session of baseline (96% accuracy), which was higher than the baseline average of 97% but was also the highest point of this phase. Phase I consisted of seven data points, with a range of 95-99% and an average of 97% accuracy. Phase I demonstrated a slightly upward trend and no variability. The PND between baseline and Phase I was 0%, indicating Phase I of the intervention was ineffective in increasing real word reading accuracy for Connor. No change in level was observed with the implementation of Phase II. Phase II consisted of five data points, with a range of 97-99% and an average of 98% accuracy. Phase II data demonstrated a flat trend and no variability. The PND between baseline and Phase II was 0%, indicating Phase II of the intervention was ineffective in increasing real word reading accuracy for Connor. The PND between Phase I and Phase II was also 0%, which suggests Phase II of the intervention yielded no observable effects in increasing oral reading accuracy as compared to Phase I (Scruggs & Mastropieri, 1998).

The Tau-U for the oral reading accuracy variable for baseline compared to Phase I was .08 (SE = .10, 90% confidence interval [CI] [-0.44, 0.61]). This effect size suggests 8% of data increased after the implementation of Phase I as compared to baseline. Parker et al. (2011) consider this a weak intervention effect. The Tau-U for baseline compared to Phase II for Connor was .66 (SE = .10, 90% confidence interval [CI] [0.08, 1]). This effect size suggests 66% of data improved with the implementation of Phase II as compared to baseline, indicating a medium intervention effect (Parker et al., 2011).

Finally, the Tau-U for Phase I compared to Phase II after correcting for a positive baseline trend was .63 (SE = .10, 90% confidence interval [CI] [0.05, 1]). This effect size suggests 63% of data improved after the implementation of Phase II as compared to Phase I. Though this suggests positive improvements with the implementation of Phase II, this is considered a weak intervention effect (Parker et al., 2011).

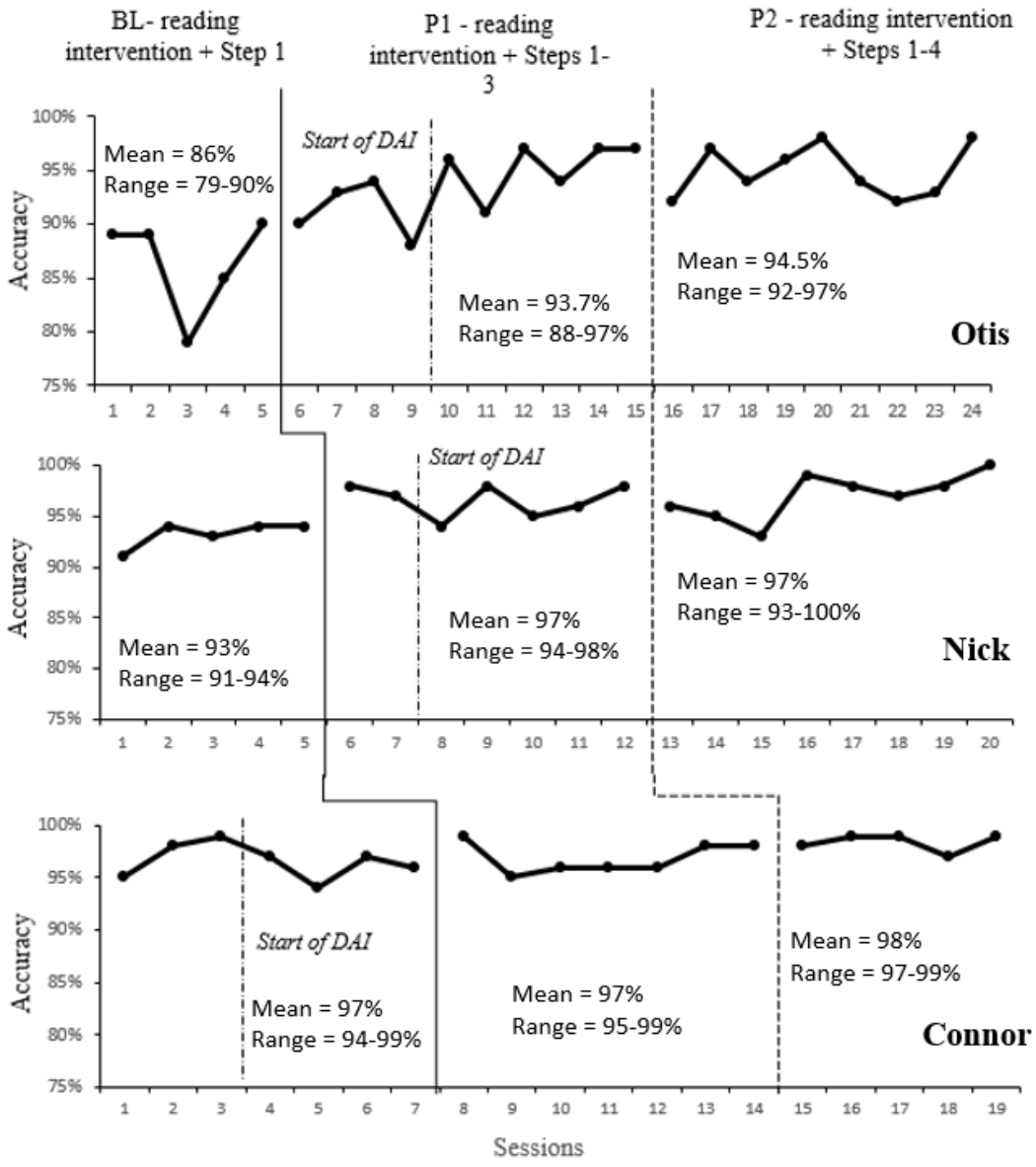

Figure 3 Oral Reading Accuracy

Note. Oral reading accuracy on an untimed passage. Oral reading accuracy was defined as the ability to orally read a passage without making errors. This variable was calculated by dividing the number of reading errors by the total words read on each passage, generating a percentage of accuracy. DAI = Distance Academic Intervention.

Self-Awareness of Reading Performance on Real Word Reading

Self-awareness of reading performance on real word reading represented the student's ability to identify their own errors on a list of 20 real words. The teacher's tally of errors served as an "answer key" to which the student observations were compared. This variable was measured starting in Phase I with the implementation of intervention. Self-awareness of reading performance was calculated by dividing the number of student-identified reading errors by the total errors on each real word list, generating a percentage of accurately identified errors. A summary of the self-awareness of reading performance on real word reading results can be found in Table 8 below.

Table 8 Summary of Self-Awareness of Reading Performance on Real Word Reading Tasks Results

Participant	Phase One	Phase Two	
	M (Range)	M (Range)	PND
Otis	65% (20-100%)	60% (0-100%)	0%
Nick	68% (29-100%)	64% (0-100%)	0%
Connor	54% (33-67%)	42% (0-100%)	0%

Note: PND = Overlap expressed in percent data overlap between Phase I and Phase II.

Interpretation of PND = >70% for effective interventions, 50% to 70% for questionable effectiveness, and <50% for no observed effect (Scruggs & Mastropieri, 1998).

Otis

Phase I for Otis consisted of ten data points, with a range of 20-100% and an average of 65% accuracy (see Figure 4). Phase I demonstrated moderate variability and a downward trend. The downward trend observed in the last data point in Phase I predicted the negative change in level that was observed following the change to Phase II (0% accuracy). Phase II consisted of ten data points, with a range of 0-100% and an average of 60% accuracy. Phase II demonstrated high variability and a downward trend. The PND between Phase I and Phase II was 0%, which suggests Phase II of the intervention yielded no observable effects in increasing self-awareness of reading performance on real word reading as compared to Phase I (Scruggs & Mastropieri, 1998).

Nick

Phase I for Nick consisted of seven data points, with a range of 29-100% and an average of 68% reading accuracy (see Figure 4). Phase I demonstrated a flat trend and moderate variability. A slight but immediate decrease in the dependent variable was observed in the first session of Phase II (50% accuracy), as compared to the last session of Phase I (67% accuracy), which was slightly lower than the average of Phase I (68% accuracy). Phase II consisted of nine data points, with a range of 0-100% and an average of 64% reading accuracy. Phase II demonstrated a downward trend and high variability. The PND between Phase I and Phase II was 0%, which suggests Phase II of the intervention demonstrated no observable effects in increasing self-awareness of reading performance on real word reading as compared to Phase I (Scruggs & Mastropieri, 1998).

Connor

Phase I for Connor consisted of seven data points, with a range of 33-67% and an average of 54% reading accuracy (see Figure 4). Phase I data demonstrated a flat trend and low variability. An immediate decrease in the dependent variable (14% accuracy) was observed with the implementation of Phase II, which was lower than the average of Phase I. Phase II consisted of five data points, with a range of 0-100% and an average of 42% accuracy. Phase II data demonstrated a slightly upward trend and moderate variability. The PND between Phase I and Phase II was 20%, which suggests Phase II of the intervention demonstrated no observable effects in increasing self-awareness of reading performance on real word reading as compared to Phase I (Scruggs & Mastropieri, 1998).

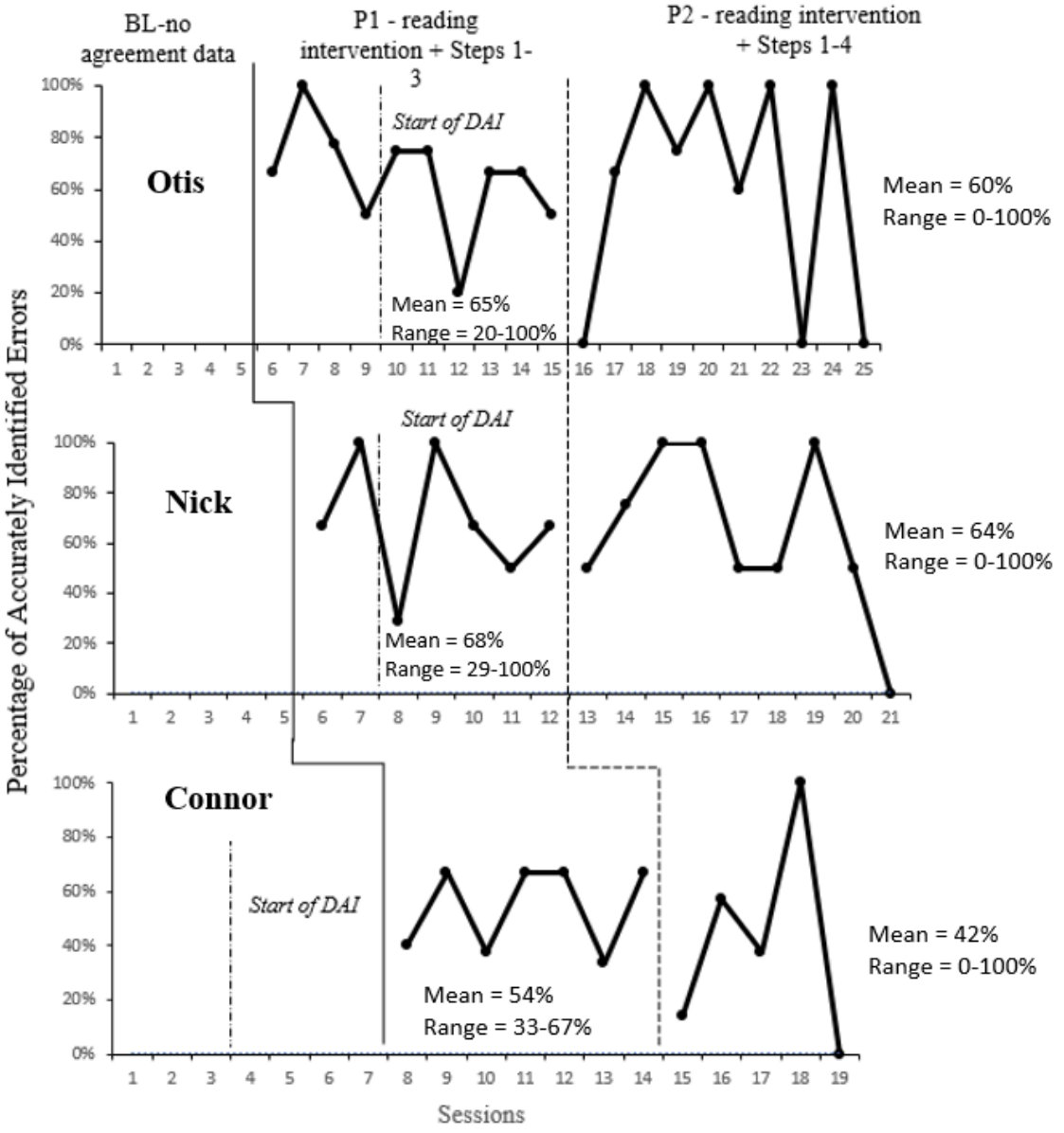

Figure 4 Self-awareness of reading performance on real word reading tasks

Note. Self-awareness of reading performance on real word reading tasks. This variable was defined as the ability to identify one's own errors on a real word reading task. This variable was calculated by dividing the number of reading errors identified by the student by the total errors on each real word lists, generating a percentage of accurately identified errors. DAI = Distance Academic Intervention

Self-Awareness of Reading Performance on Pseudoword Reading

Self-awareness of reading performance on pseudoword reading represented the student's ability to identify their own errors on a list of 20 pseudowords. This variable was calculated by dividing the number of reading errors identified by the student by the total errors on each pseudoword list, generating a percentage of accurately identified errors. Self-awareness of reading performance on pseudoword reading was measured starting in Phase I with the implementation of intervention.

Table 9 Summary of Self-Awareness of Reading Performance on Pseudoword Reading Tasks Results

Participant	Phase One	Phase Two	
	M (Range)	M (Range)	PND
Otis	34% (13-60%)	49% (33-86%)	30% (no effect)
Nick	45% (0-100%)	39% (0-83%)	0% (no effect)
Connor	18% (0-67%)	24% (0-63%)	0% (no effect)

Note: PND = Overlap expressed in percent data overlap between Phase I and Phase II.

Interpretation of PND = >70% for effective interventions, 50% to 70% for questionable effectiveness, and <50% for no observed effect (Scruggs & Mastropieri, 1998).

Otis

Phase I for Otis consisted of ten data points, with a range of 13-60% and an average of 34% accuracy (see Figure 5). Phase I data demonstrated low variability and an upward trend. Phase II consisted of ten data points, with a range of 33-86% and an average of 49% accuracy. Phase II demonstrated moderate variability and a slightly downward trend. The PND between Phase I and Phase II was 30%, which suggests Phase II of the intervention yielded no observable effects in increasing self-awareness of reading performance on pseudoword reading as compared to Phase I (Scruggs & Mastropieri, 1998).

Nick

Phase I for Nick consisted of seven data points, with a range of 0-100% and an average of 45% accuracy (see Figure 5). Phase I demonstrated high variability and an upward trend. An increase in the dependent variable was observed in the first session of Phase II (44% accuracy), as compared to the last session of Phase I (33% accuracy), which was slightly lower than the average of Phase I (45% accuracy). Phase II consisted of nine data points, with a range of 0-83% and an average of 39% accuracy. Phase II demonstrated a flat trend and a moderate level of variability. The PND between Phase I and Phase II was 0%, which suggests Phase II of the intervention demonstrated no observable effects in increasing self-awareness of reading performance on pseudoword reading as compared to Phase I (Scruggs & Mastropieri, 1998).

Connor

Phase I for Connor consisted of seven data points, with a range of 0-67% and an average of 18% reading accuracy (see Figure 5). Phase I demonstrated a downward trend

and moderate variability. No change in level was observed with the implementation of Phase II. Phase II consisted of five data points, with a range of 0-63% and an average of 24%. Phase II demonstrated an upward trend and moderate variability. The PND between Phase I and Phase II was 0%, which suggests Phase II of the intervention demonstrated no observable effects in increasing self-awareness of reading performance on pseudoword reading as compared to Phase I (Scruggs & Mastropieri, 1998).

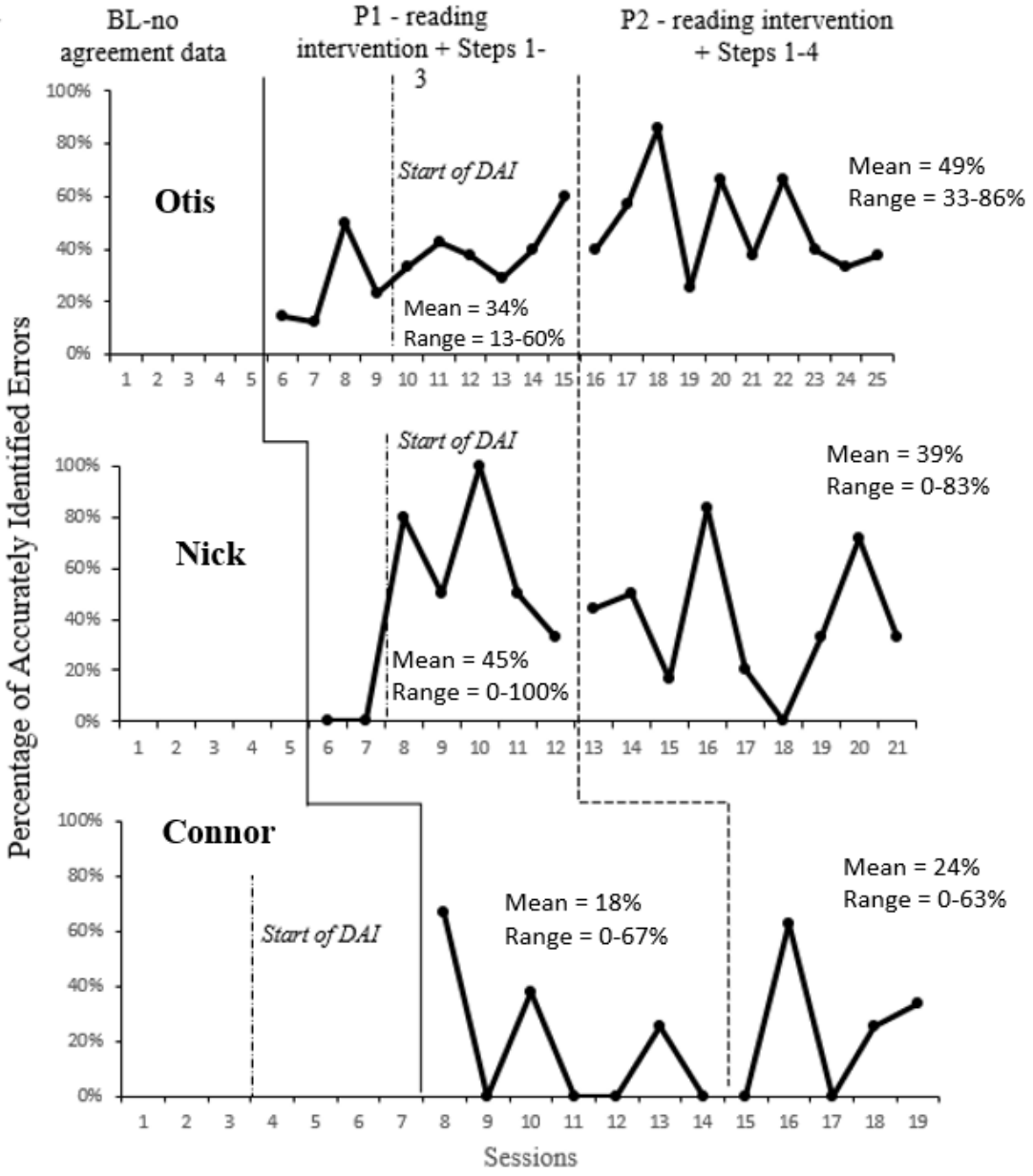

Figure 5 Self-Awareness of Reading Performance on Pseudoword Reading Tasks

Note. Self-awareness of reading performance on pseudoword reading tasks was defined as the ability to identify one's own errors on a pseudoword reading task. This variable was calculated by dividing the number of reading errors identified by the student by the total errors on each pseudoword lists, generating a percentage of accurately identified errors.

Social Validity

Each participant was asked to complete an electronic participant satisfaction survey once the study was completed. The survey included two yes/no questions and asked for an explanation for their response (see Appendix I). The researcher opted for an electronic survey that could be completed independently, so that participants could feel free to answer honestly. The researcher sent the survey to the parents of all participants and asked that they help their child complete the questionnaire. In response to question one, “Did you like listening to yourself read? Why or why not?”, Nick replied “Yes, I enjoyed listening to myself read because it made it so I could hear mistakes and remember them for the next time that I read to change for the next time.” To question one, Otis responded, “I kind of did not like listening to myself read because I did not like the sound of my voice.” In response to question two, “Was it helpful to listen to yourself read? Why or why not?”, Nick answered, “Yes, because it let me know what I sounded like, and so I could pronounce things better and also remembering the things I did well and things I needed to change”. To question two, Otis responded, “Yes, because I would know where I messed up when reading and could correct it”.

CHAPTER V: DISCUSSION

The purpose of the present study was to investigate the effectiveness of a video self-awareness intervention on the word reading accuracy, oral reading accuracy, and self-monitoring skills of students with RD and self-regulation difficulties. This chapter includes an interpretation of the major findings, a discussion of the limitations, and recommendations for future research.

A substantial body of research has determined that the ability to self-monitor one's reading process is an essential skill for proficient, independent reading (Clay, 1991; Guzman et al., 2018; Joseph & Eveleigh, 2011; Mokhtari & Reichard, 2002). Proficient readers use strategies to notice and correct their errors and to monitor their accuracy and understanding during their reading process (Anderson & Kaye, 2017). The video self-awareness intervention tested in the current study was designed to support these self-monitoring skills among students with reading and self-regulation difficulties. The theory of change on which the study was based was that, by improving self-awareness and the ability to self-monitor their reading, students with reading and self-regulation difficulties would make fewer errors as they read, which would allow them to become more independent, accurate readers.

Major Findings

The results of visual analysis and PND indicated that the video self-awareness intervention did not significantly impact students' isolated word reading accuracy or self-monitoring skills. While Otis' results showed medium effects on real and non-word

reading accuracy, Nick and Connor's data revealed a weak effect on word reading accuracy. Furthermore, results indicate the intervention had no effect on students' self-awareness of reading performance, on both real and pseudowords, across all three participants. However, data indicate that oral reading accuracy improved across all three participants when they engaged in the video self- awareness intervention. Although the self-awareness intervention required participants to evaluate their performance on word reading tasks, the largest effect was seen on the oral reading (i.e., a passage reading) task. Although this was a small finding, this result might suggest that the skills developed in the word reading task were generalized to passage reading tasks.

One major finding was the high degree of variability among all three participants on the self-awareness of reading performance variables, both on reading and pseudowords in both intervention phases. While a small degree of variability could be expected, given the extenuating circumstances occurring at the same time of the study, the high variability that was demonstrated across all three participants was unexpected. After reviewing the data, the researcher found that the probable explanation for this result was the way in which this variable was measured. Self-awareness of reading performance was calculated by dividing the number of reading errors identified by the student by the total errors on each word list, generating a percentage of accurately identified errors. This outcome relied on exact agreement between the researcher and the participant. Therefore, if a participant made only one error on a word list but failed to identify that one error, their percentage of accuracy would be 0% on that data point. This incident occurred on several occasions. For example, on the self-awareness of reading performance on real words variable, all three participants scored 0% on their final data point in Phase II (see

Figure 4). Yet, this may not provide a clear picture of their self-awareness on this task. On that particular word list, Otis and Connor made two errors each, and Nick made only one error. However, all three participants failed to identify their exact errors, which resulted in a percentage of accurately identified errors of 0%. Consistent with the literature on self-awareness and reading intervention, the findings in the current study suggest self-awareness is a difficult construct to accurately measure (Mokhtari & Reichard, 2002; van Kraayenoord, 2010). This data indicates that measuring student self-awareness by asking students to identify their own errors may not be the most accurate or reliable measurement.

Results also revealed that the use of PND was likely not an appropriate statistical measure in the current study. Scruggs and Mastropieri (2001) suggest that the best way to evaluate the PND outcome metric in SCD is by "examining the applications of these procedures and making determinations about the validity and utility of the conclusions derived from these procedures" (p. 231). In the current study, PND was calculated across all participants and dependent variables under investigation. However, because of the incidence of outlier scores, scores at the highest and lowest ranges, and the unstable trends in several graphs, results of PND data in this study showed weak to no effects in most cases. Because much of the PND data revealed scores at the highest and lowest ranges, PND was likely not an appropriate measure for the self-awareness variables.

Additionally, visual analysis indicated that the transition to online learning possibly had a temporary negative effect on Nick's performance on three variables: real word and pseudoword accuracy and self-awareness of reading performance on real word reading task. Data from these three variables revealed an immediate decrease on the first

data point after the switch to distance learning. However, immediacy of the change refers to the change in level between the last three data points in one phase and the first three data points in the next phase (Kratochwill et al., 2013). These data indicate that the negative change was temporary, as at least one data point in the three was at level closer to the data points in the previous phase. Visual analysis did not indicate that the transition to online learning impacted the output data of Otis or Connor.

There are a few possible interpretations of these findings, which are discussed in depth in the next sections. First, individual student characteristics and personal self-efficacy may have had an impact on students' ability to engage with and benefit from the self-awareness intervention. Additionally, it appeared that the level of connection between a student and the researcher may also affect students' academic performance and engagement in the learning process. Both of these observations are discussed in the sections below.

Individual Differences in Students' Personal Self-Efficacy

The current study on reading accuracy revealed differences in the way individual participants responded to the self-awareness intervention. One such difference that might have played a role in the present study is associated with students' personal beliefs about their own intelligence and potential for academic success. These internal beliefs about learning are commonly viewed as either inherent and fixed (i.e., a fixed mindset), or malleable and based on effort and perseverance (i.e., a growth mindset; (Dweck et al., 1995; Yeager & Dweck, 2012). Because growth mindset has been linked to self-regulatory processes, including academic self-monitoring (Burnette et al., 2013),

participants' views about their own potential for success may provide additional explanation for the varied results observed in this study.

The influence of individual beliefs about learning was most noticeable in Connor. Connor was considered an appropriate candidate for the study because of his self-awareness and self-monitoring difficulties during reading tasks. These self-awareness difficulties included failing to recognize the level of difficulty of a reading task, guessing at unknown words instead of using a known reading strategy, and failing to recognize when he made errors. Connor often attempted to mask these struggles by presenting as overly confident and as an expert reader. However, the nature and purpose of the self-awareness intervention was to give participants an opportunity to truly reflect on their reading process.

In participating in the intervention, Connor listened to video of himself tackling a challenging reading exercise, then he was asked to evaluate his own reading and engage in a feedback discussion about his performance. Throughout this process, Connor was confronted with the notion that he struggled with certain reading tasks, which he found disappointing and something that he had repeatedly attempted to conceal. He expressed this frustration verbally, through body language and with facial expressions. If his performance did not meet his expectations, Connor dismissed the task as unimportant and insisted he did not care about the task or the results. However, he would also be visibly excited when he felt he did well, and he expressed feelings of pride and success when his performance met his expectations. Overall, it seemed that Connor's lack of confidence in his reading abilities seemed to affect his response to the self-awareness intervention.

Consistent with the literature, participants in the current study responded to the self-awareness intervention in different ways. Connor's results revealed a medium effect on oral reading accuracy, but a weak to no effect on the other variables. Unlike Connor, Otis and Nick were not observed to show signs of disappointment or frustration with themselves during the intervention procedures. Notably, Otis was also the only participant who demonstrated growth in intervention on more than one dependent variable (i.e., real word reading accuracy, oral reading accuracy). Otis' increased engagement and performance is consistent with research that illustrates the powerful role of affective variables in predicting positive student outcomes (Leighton et al., 2018).

Denton et al. (2020) found similar results among participants in a recent self-regulation intervention study. Researchers in the study noted that, because of differences in character among participants and their various strengths and needs in reading, students may have diverse responses to various reading intervention approaches (Denton et al., 2020). Because growth mindset has been linked to academic self-monitoring (Burnette et al., 2013), participants' views about their own potential for success may be a character difference that could possibly explain the varied results observed in this study.

Individual Differences in Student/Teacher Connections

One unexpected discovery that was made with informal observation was the impact of student/teacher connection on student engagement, and, consequently, student performance. When students feel they are in a safe learning environment, in which they feel connected to and supported by their teacher, they can more effectively explore and communicate their needs and challenge, and they can feel comfortable to attempt new learning activities and make mistakes (Libbey, 2004). This positive connection had been

well established with Otis and Nick. The researcher had been working with both students in person for over a year prior to beginning the intervention. Both participants felt comfortable exploring their needs and difficulties, and both students had learned and practiced new learning activities during reading sessions with the researcher.

Out of all three participants, Connor was the newest to the learning center, having received services for just a few weeks before starting the self-awareness intervention. Furthermore, Connor attended only seven reading sessions in person before services were moved to distance learning due to the COVID-19 pandemic. Although Connor and the researcher had begun to establish a positive connection when meeting face-to-face, this connection was not as well established when compared to the relationships between the researcher and the other participants. Therefore, one possible explanation for Connor's results in this study might be the limited connection he felt with the researcher. Connor often appeared uncomfortable exploring his learning needs and difficulties and practicing new learning strategies and activities, including but not limited to the self-awareness intervention. Overall, Connor demonstrated behaviors that suggested that he might have required more time to develop a positive, trusting connection with the researcher in order to fully benefit from the self-awareness intervention, as affective relationships have been frequently linked to students' engagement and academic achievement (Roorda et al., 2017).

In contrast, this did not appear to be a barrier to success among the other two participants. The difference was most noticeable between Otis and Connor. Otis was observed to maintain a positive attitude throughout the course of the study, even when his performance did not meet his own expectations. He rarely appeared to become

discouraged, and he expressed enthusiasm in listening to himself read. Otis also showed the most engagement out of all three participants. He asked to have the recording played back if he suspected he missed something; he took efforts to ensure he could hear the recording properly; and he was more talkative and reflective during the feedback discussions. Otis' optimistic attitude, increased engagement, and response to the self-awareness intervention may have been attributed to his positive connection with the researcher. This student had been working with the researcher the longest out of all three participants, a time in which a positive, trusting learning environment had been well established. Notably, Otis was also the only participant who showed statistically significant growth in intervention on one or more dependent variables. His increased engagement and performance, coupled with the positive relationship with the researcher that was built over an extended period of time, is consistent with research that illustrates the powerful role of affective variables in predicting positive student outcomes (Leighton et al., 2018).

Limitations of the Study

One limitation of this study was the shift to an online intervention format five weeks into data collection. Although distance learning sessions followed the routine and structure of typical in-person intervention sessions, some disruptions could not be avoided. The most significant disruption was, by recording students as they read over the computer, the sound quality of each video was compromised. While many efforts were taken to ensure participants could hear themselves as clearly as possible, the sound quality may not have been as clear as it would have been in person. Because participants may have had more difficulty hearing themselves read, it is possible that this could have

affected their ability to accurately identify their reading errors and self-corrections when listening back to the video.

Another limitation was the number of words that students were asked to read as part of the self-awareness intervention procedures. The intervention procedures were designed such that participants were required to remember a considerable number of unfamiliar words, which made the intervention procedures take more time than necessary, and may have affected participants' ability to accurately identify their errors and self-corrections. After recording the participant reading a word list containing 20 real words and 20 pseudowords, the researcher read the word list aloud so the participant could hear the correct word pronunciations (see Table 4 for the intervention procedures). The recording was then played back and the participant was asked to compare the correct pronunciation with what they heard themselves read in the recording, marking errors and self-corrections. This step required participants to remember numerous unfamiliar words for several minutes, while performing a task. Research indicates students with weaker working memory are less likely to identify their reading errors (Nguyen et al., 2020). Although the working memory of participants in this particular study was not taken into consideration, it is still reasonable to assume that remembering the pronunciation of numerous unfamiliar words might have been overly challenging. This could have affected participants' ability to identify their errors and self-corrections, given that they may have had difficulty remembering the correct pronunciation of each word. Consequently, the self-awareness results in this study could have been impacted by the number of words participants had to remember. Future research should consider including fewer words on word lists.

A further limitation of this study was the participant selection process. Although participants met specified participation criteria and were carefully identified based on reading and self-regulation needs, they were self-selected from a pool of students already receiving academic intervention at the learning center. Random selection was not feasible given the scope of this research. Yet, the participant pool of the learning center may not be representative of all students with learning and self-regulation difficulties. The smaller participant pool also resulted in the wide age gap between participants, which was another limitation of the study. Participants ranged in age from 9 years, 9 months old to 16 years, 11 months. Ideally, students would be closer in age to ensure that differences in participant age and development did not affect the results.

Also, interrater reliability for the self-awareness intervention procedures was not established until after formal data collection started, which could also be considered a limitation of the study. Although raters did obtain interrater agreement greater than 80%, this should have been established prior to formal data collection using data from the previously conducted pilot study.

Another possible limitation was the predetermined timeline for data collection. In this study, data collection lasted approximately 15 weeks for each participant. Because data analysis is used to guide phase changes in multiple baseline designs, and because participants proceed to the next phase once a stable pattern is observed in the previous condition, it is rare that participants would proceed along the same timeline. For this reason, it is ideal that data collection would not be constrained to a time limit. However, two factors influenced the researcher's decision to end data collection after the 15-week time period. First, reviews of research on reading intervention for students with RD in

Grades 4 through 12 reports no statistical differences in outcomes based on the duration of intervention (between 10-20 weeks; Scammacca et al., 2015; Wanzek et al., 2013). Therefore, it can be assumed that extending the intervention would not have significantly affected the reading or self-awareness outcomes in the current study. Second, participants in this study planned to discontinue services with the learning clinic at the end of the semester, so data collection had to wrap up by that point. Although 5 or more data points were documented in each phase across each participant, which meets evidence standards (Kratochwill et al., 2010), the plan to stop data collection at a predetermined time could be considered a limitation.

Additionally, the way in which self-awareness was measured in this study could be considered a limitation. Self-awareness of reading performance was defined as the participants' ability to identify their own errors and self-corrections on a word-reading task, and was calculated by comparing the number of self-corrections and errors counted by the student to those of the teacher. This measure indicated the participants' self-awareness of their own reading performance. However, it is difficult to measure self-awareness in an academic context (Perry et al., 2017), and so there may be different and better ways to operationalize and measure this construct.

Finally, participants showed relatively high reading accuracy on several variables during baseline, which left little room for growth during intervention. This was most evident on the oral reading accuracy variable, on which Participants Two and Three consistently scored above 90% accuracy during baseline. Although these levels of accuracy fall short of the recommended independent reading accuracy of 95% or above (Gickling & Armstrong, 1978; Treptow et al., 2007), the instruments used in the current

study were not sensitive enough to detect changes in reading accuracy at such a high level. Screening criteria for the current study involved measures of word-reading accuracy, including accuracy when reading real and pseudowords. However, research historically shows that students read with higher accuracy on connected text than on isolated word-reading tasks (McGee et al., 2015; Smith-Spark et al., 2017). Consistent with this line of existing research, all three participants in the present study read with higher accuracy on passage-level reading than real and pseudoword reading measures. Therefore, future research should explore different screening criteria for participation, in order to identify students reading with lower accuracy than those participants included in the present study. Screening measures should include passage-level reading tasks, as well as isolated word reading, which would provide further insight into reading accuracy when reading connected text.

Areas for Future Research

Future research could add to the findings of this study by exploring integrated intervention methods that take both affective and metacognitive variables into consideration. It is recommended that intervention approaches be designed to support individual students and the respective differences in reading and metacognitive skills they bring to the table. Indeed, Denton et al. (2020) recommended that future studies explore approaches to reading intervention that account for and target the various characteristics among students with RD. It would be useful for future research to test whether adjusting for individual responses to intervention may result in more powerful intervention outcomes.

Future research should also strive to ensure that participants have had adequate time to develop a connection with the instructor before incorporating the video self-awareness intervention. Because the intervention requires students to attempt new learning activities and to make errors and reflect on those errors, the learning environment should be one in which the student feels safe and supported through a positive connection with their instructor.

Additional research on this topic should also consider including qualitative data collection methods, such as student interviews or student think-alouds. These qualitative data were beyond the scope of the current study, but future studies should consider gathering these data as it could possibly provide deeper insight into the participant's use of reading strategies during the self-awareness intervention procedures. Additionally, the collection of qualitative data might provide insight into students' self-talk during their reading process, providing formal evidence on students' differing levels of self-efficacy and the impact it might have on their response to the self-awareness intervention. Interviews or think-alouds might also provide insight into the student's thoughts and feelings about the self-awareness intervention itself, which would further inform social validity in future studies. In the current study, an electronic participant satisfaction survey which included two open-ended questions was used to measure social validity outcomes. Future studies might consider conducting student interviews and possibly including more questions and/or asking follow-up questions to gather richer student feedback about the self-awareness intervention.

Finally, future research should test this self-awareness intervention in a school setting to explore the effects on student learning in environments that are less

individualized and intensive. The setting in which the current study took place was a clinic that provides highly unique, individualized, one-to-one instruction to students with academic, attention, and behavioral difficulties. Future research could add to the findings of the current study by testing the self-awareness intervention in a traditional school setting. If attempting to test the intervention in a classroom, researchers should consider shortening the self-awareness intervention procedures. This could be accomplished by reducing the number of words on the word lists (as discussed previously), or by playing the video back once instead of twice. Making these changes could (a) ensure the procedures are feasible in a school setting, (b) prevent fatigue and inattention among participants, and (b) reduce strain on working memory.

Conclusion

A substantial literature base on best practices for reading intervention has revealed several primary features that have demonstrated effectiveness in supporting students with RD. This research suggests the most effective reading interventions are those that introduce content in a systematic progression and employ intensive, explicit instruction in (1) phonological awareness, (2) the alphabetic principle and phonics, (3) word analysis, (3) reading fluency, and (4) reading comprehension (Habib & Giraud, 2013; Lyon et al., 2003; Peterson & Pennington, 2012; Suggate, 2016). Reading interventions are relatively consistent in practice, as the accumulation of decades of research has led us to effective techniques and approaches that are now considered standard practice in supporting student reading development (National Reading Panel, 2000). Reading intervention incorporating direct, explicit instruction in phonics, combined with instruction in word recognition, reading fluency, spelling, and

comprehension, tend to be effective for the majority of students with reading disabilities (Fletcher et al., 2018).

Yet, even with an assortment of evidence-based reading interventions available, mounting evidence suggests that a significant population of students with learning disabilities do not respond to these standardized intervention practices (Compton et al., 2014; Torgesen, 2000). This may be, in part, because students with RD tend to have impaired self-regulation (Cutting et al., 2009). Because integrated interventions can be more robust than either self-regulation or reading instruction in isolation, combined intervention approaches should be explored to support students who do not respond appropriately to effective reading intervention alone (Guzman et al., 2018).

The mastery of foundational reading skills increases a student's ability to learn and master subsequent reading strategies. For example, students with greater decoding and automatic word recognition may be more equipped with the self-awareness skills that enable them to identify and self-correct their errors (Nguyen et al., 2020). Conversely, students with RD tend to use significant attention resources while reading, so they may find the higher-level skill of self-monitoring even more demanding, given that they tend to struggle with lower-level reading skills such as phonological awareness and automatic word-level reading (e.g., decoding, word-recognition; Kim et al., 2017).

One approach for addressing both reading and self-regulation that should be further researched is supporting students in developing stronger self-awareness skills. By increasing self-awareness, students become more aware of and engaged in their learning process (Ennis et al., 2018). Research suggests that supporting students with learning difficulties to self-monitor can lead to higher accuracy (Kolić-Vehovec, 2002). However,

more research is needed on standardized, evidence-based intervention options to support students' development of self-awareness in their reading process.

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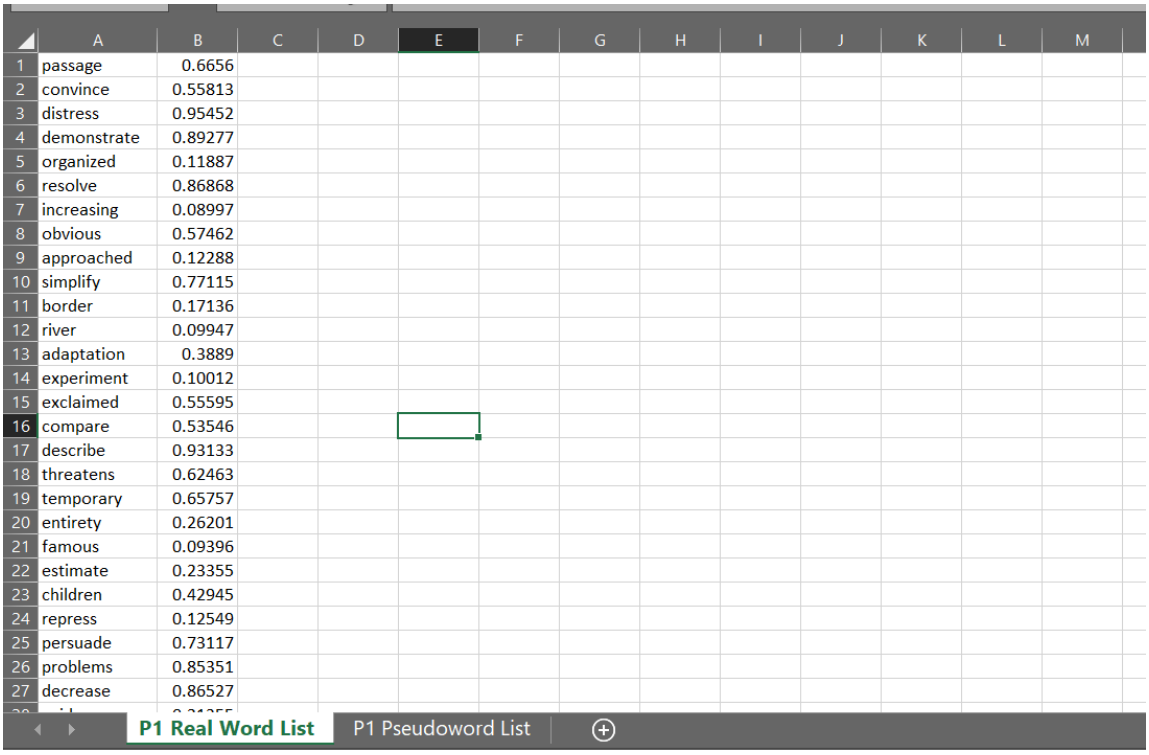
APPENDIX A

Sample Word List Spreadsheet



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	passage	0.6656											
2	convince	0.55813											
3	distress	0.95452											
4	demonstrate	0.89277											
5	organized	0.11887											
6	resolve	0.86868											
7	increasing	0.08997											
8	obvious	0.57462											
9	approached	0.12288											
10	simplify	0.77115											
11	border	0.17136											
12	river	0.09947											
13	adaptation	0.3889											
14	experiment	0.10012											
15	exclaimed	0.55595											
16	compare	0.53546											
17	describe	0.93133											
18	threatens	0.62463											
19	temporary	0.65757											
20	entirety	0.26201											
21	famous	0.09396											
22	estimate	0.23355											
23	children	0.42945											
24	repress	0.12549											
25	persuade	0.73117											
26	problems	0.85351											
27	decrease	0.86527											

P1 Real Word List | P1 Pseudoword List

APPENDIX B

Sample Word List

unprotected	consistent	memorable	impress
disinfectant	extension	exception	recommend
distantly	favorable	passenger	motivation
detective	derive	rubric	dominate
drove	classical	regulation	external
clorb	froon	phoad	plelt
ta	prote	depite	furd
skaint	chake	bemwip	chead
chree	plerp	drepnort	proy
nepting	bloid	brinbert	brex

APPENDIX C

Sample Reading Passage

Everyday Life as a Learning Experience

"From my earliest boyhood, ancient wearing apparel, old household and kitchen utensils, and antique furniture, have appealed to me with peculiar force, telling facts and relating incidents to me in such a plain, homely1 but graphic manner of the every-day life of our ancestors, that I look upon them more as text-books than as curiosities; for it is only by the light of truth reflected from these objects that we are enabled to…pierce the…fiction with which the perspective of years surrounds the commonest objects of those remote times." — Beard, Dan C. "Six Feet of Romance." *The Cosmopolitan*. July, 1889. p. 226.

Learning doesn't have to stop at the schoolhouse door — and, in fact, it shouldn't. The best way to learn about something is to live it: to drink it in through daily experience until familiarity and constant repetition make it second nature. It's one thing to read a book about a foreign country; it's quite another to go there and befriend its people, eat its foods and learn its language. This immersion technique can be applied to a wide variety of subjects: my husband Gabriel and I use it to engage with our love of history — specifically the late Victorian era of the 1880s and '90s. We can't travel to the past in exactly the same way we would go to a foreign country (by boarding a ship or an airplane), but we can bring history to us by incorporating2 as many of its details as possible into our daily lives.

APPENDIX D

Observation Rubric

Word List: Date:

Real Words

	Teacher observations	Student observations	Exact agreement
1. Error			
2. Error with a self-correction			
Total self-corrections			
Total errors			
Accuracy			

Nonsense Words

	Teacher observations	Student observations	Exact agreement
1. Error			
2. Error with a self-correction			
Total self-corrections			
Total errors			
Accuracy			

APPENDIX E

Student Survey

Student Survey

1. Did you like listening to yourself read? Why or why not?

2. Was it helpful to listen to yourself read? Why or why not?

APPENDIX F

Reading Intervention Procedures Checklist

REWARDS Lesson Plan Outline **Preskill Lessons (Lessons 1-15)**

BLOCK	PART	LESSON ACTIVITY	TIME
Decoding – Prerequisite Skills	A	**Oral Activity – Blending Word Parts into Words** Students blend orally presented word parts.	1-2
	B	**Vowel Combinations** Students say the major sounds for high-frequency vowel combinations.	1-2
	C	**Vowel Conversions** Students say the sound (short sound) and then the name (long sound) for the vowel letters **a**, **i**, **o**, **u**, and **e**.	1-2
	D	**Reading Parts of Real Words** Students read parts of real words that contain previously taught vowel sounds.	5
	E	**Underlining Vowels in Words** Students locate and underline vowel graphemes within multisyllabic words.	5
	F	**Oral Activity – Correcting Close Approximations** The teacher intentionally mispronounces a word in a manner similar to common decoding errors, repeats the mispronunciation within a sentence, and asks students to produce the accurate pronunciation of the word.	1-2
	G	**Prefixes and Suffixes** Students listen to the pronunciation of prefixes and suffixes, practice saying these affixes, and review previously introduced affixes.	2-3
	H	**Circling Prefixes and Suffixes** Students identify, circle, and pronounce prefixes and suffixes embedded within multisyllabic words.	5
Vocabulary	I	**Meanings of Prefixes and Suffixes** Students are explicitly taught the meanings of high-frequency prefixes and suffixes and asked to locate words when given a definition that stresses the meaning of the affix.	2-3
Encoding	J	**Spelling Dictation** The teacher dictates a lesson word; the students say the parts in the word and then write the word. The students then compare their spellings with the correct spelling of the word and cross out and rewrite any misspellings.	10
Vocabulary	K	**Academic Vocabulary** The meanings of two academic words are taught using the following instructional steps: 1) introduce the word, 2) provide a student-friendly explanation, 3) illustrate with examples, and 4) check for understanding.	5-10

APPENDIX G

Implementation Script

Step One: Film as student reads

Say: *You're going to read a list of words while I film you reading. The first set is real words. The second set is nonsense words. You will not be timed. Do your best reading. If you come to a word you don't know, you should try your best. You can say, "I don't know", if you can't figure it out. Ready?*

- The student is filmed as he/she reads a list of 40 words, 20 real and 20 nonsense
- If the student pauses after reading list of real words, say, *"You can move on to the nonsense words"*

Step Two: Listen to video (no marking)

Say*: Next, we will read along as we listen to the video. This time, you won't be marking anything. You'll just listen to yourself read. Your job is to notice any errors you made, and any times that you corrected an error. Ready?*

Say: *First, follow along as I read the real words.*

- With the word list placed in front of the student, the PI points to each word on the real word list while reading the word correctly.

After playing the real words, pause the video and say: *Now, follow along as I read the nonsense words.*

- The student listens to the first part of the video while reading along, noticing any errors or self-corrections, but not marking errors or self-corrections on the list.
- After the student and the PI listen to the video including the real words, the PI pauses the video and reads the nonsense words. Then the PI resumes the video.

Step Three: Review video (marking)

Say: *Now, we will read along as we listen to the video again. This time, I'll ask you to mark your errors and any times that you corrected an error. You will draw a line through any words that you notice an error, and you will underline any words that you notice that you corrected an error. You can ask me to pause or rewind the video at any time. Ready?*

- The student and PI listen to the video while reading along with the word list, this time using the "draw" tool to mark any errors and self-corrections that they noticed.
- The student and the PI will draw a line through any errors, or underline any self-corrections

Step Four: Debrief/feedback

Say*: Now let's talk about what we both noticed as we listened to the video.*

- The PI proceeds through the debrief/feedback script to guide self-reflection
- The PI and the student compare findings and discuss the self-corrections and errors they both noticed

Debrief/Feedback Script

1. Prompt one: Student identifies self-corrections in real words
    a. Say: *"Let's start with real words at the top. How many self-corrections did you notice?"*
    b. Allow the student to identify 1-3 self-corrections, if any
2. Prompt two: Student identifies errors in real words
    a. Say: *"How many errors did you notice in the real words?"*
    b. Allow the student to identify errors, if any
3. Prompt three: *"I'll tell you what I noticed as I listened to you read. In the real-word list, I noticed* ___ [#] *self-corrections and* ___ [#] *errors.*
4. Prompt four: Guide the use of decoding strategies
    a. Say: "*Now, let's choose a couple of the real word errors that you can use strategies to decode."*
    b. Allow the student to choose 1-3 words to decode using strategies.
    c. For each of the chosen words, hover the cursor over the word and say: *"How could you use your decoding strategies to read this word?"*
    d. Guide the student in effective strategy use to decode the chosen words.