THE PREDICTIVE RELATIONSHIP BETWEEN TEACHERS' KNOWLEDGE OF DYSLEXIA AND THEIR CONFIDENCE IN SUPPORTING STUDENTS WITH DYSLEXIA

by

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Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

The purpose of this quantitative, correlational study was to explore the relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia, as these factors impact teachers' ability to provide proper interventions and accommodations for students with dyslexia. A lack of knowledge or overconfidence in a teacher's abilities can negatively impact educational outcomes for these students. The population for this study consisted of 117 public-school teachers in rural Ohio within the Appalachian region. The Knowledge and Beliefs About Developmental Dyslexia Scale and the Teaching Students with Disabilities Efficacy Scale were utilized to collect data in a digital questionnaire format. A multiple linear regression analysis found a significant predictive relationship between three facets of dyslexia knowledge and confidence, and general knowledge of dyslexia was discovered to be the best predictor of teachers' confidence in teaching those with dyslexia. The findings of this study suggested that teacher training should focus on the complex aspects of dyslexia to further increase teachers' confidence and competencies. Future research should focus on replicating this study with other populations, investigating additional variables, and implementing different instrumentation to measure dyslexia knowledge as well as conducting qualitative research to gain a deeper understanding of teachers' confidence in their abilities.

Keywords: dyslexia, neurodiversity, public education, knowledge, confidence

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List of Abbreviations

Institutional Review Board (IRB)

Intelligence Quotient (IQ)

The Knowledge and Beliefs About Developmental Dyslexia Scale (KBDDS)

The Teaching Students with Disabilities Efficacy Scale (TSDES)

Variance Inflation Factor (VIF)

CHAPTER ONE: INTRODUCTION

Overview

The purpose of this quantitative, correlational study was to explore the relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. Chapter One provides an introduction to teachers' knowledge and perceptions of dyslexia, including how these trends have changed over time and how they impact students. The background section also prefaces the theoretical framework for this study. Next, the problem statement identifies a gap in the current literature. It is followed by the purpose statement, which describes how this study aids in the closure of that gap. The significance of the current study is also discussed. Lastly, a specific research question is introduced and important definitions related to this study are provided.

Background

Dyslexia is one of the most common disabilities in the United States of America with a prevalence rate of 20% of the population. However, teachers' knowledge of dyslexia is typically limited and filled with misconceptions (Gonzalez, 2021; Mullikin et al., 2021; Passadelli & Klonari, 2020; Shaywitz & Shaywitz, 2020). Knowledge is not the only barrier that teachers must overcome in order to help those with dyslexia. They must also be confident in their knowledge and abilities. While knowledge and confidence may be assumed to correlate directly, studies have found that the two do not always grow in tandem (Sanchez & Dunning, 2018; Worthy et al., 2018a). For example, some teachers possess the knowledge necessary to help students with dyslexia but do not feel confident in their abilities to implement appropriate teaching strategies (Gonzalez, 2021). Both confidence without knowledge and knowledge without confidence have the potential to detrimentally affect the educational growth and

experiences of students with dyslexia (Arrow et al., 2019; Claessen et al., 2020; Worthy et al., 2018a).

Historical Overview

Dyslexia was first identified in 1877 by Adolph Kussmaul; however, it was not until the 1960s that dyslexia rose to prominence in both the research and education domains (Kirby, 2020). The mid-1900s flourished with revised medical definitions and research focusing on reading's connection to neurology, vision, and hearing (Leong, 1991).During this time, dyslexia was found to be caused by neurological differences rather than vision or hearing deficits (Alfonso & Flanagan, 2018; International Dyslexia Association Board of Directors, 2002; Shaywitz & Shaywitz, 2020). The working definition of dyslexia from 1994 highlighted emphasized dyslexia was not the result of sensory impairments (e.g., vision and hearing), other general developmental disabilities, or impaired cognition (Lyon et al., 2003). The most recent definition of dyslexia utilizes the term "neurobiological" to explain its underlying cause. (International Dyslexia Association Board of Directors, 2002; Lyon et al., 2003). Further, the definition defines dyslexia as a specific learning disability that causes difficulty with decoding, reading, and spelling (International Dyslexia Association Board of Directors, 2002).

As research on dyslexia grew and parents became more aware of their children's struggles, teachers began asking for further instruction on how to educate students with dyslexia (Zedler, 1968). Several teachers expressed frustration regarding educating those with reading difficulties because of the depth and complexity of the students' needs (Sartain, 1976; Zedler, 1968). Their frustration and pleas for support continued into the 1980s. Teachers continued to express a lack of knowledge regarding appropriate teaching techniques and diagnostic methods as well as a desire to understand why students with dyslexia required drastically different

educational approaches (Cox, 1983). Therefore, in the 1990s, research began to shift toward investigating teachers' knowledge of dyslexia and the gaps in their knowledge as well as examining teacher education programs in hopes of finding a way to close the knowledge gap (Moats, 1994).

Research at the start of the 21st century began to show promising results regarding teachers' knowledge of dyslexia, which appeared to correlate with increased pre-service and in-service teacher trainings (Moats & Foorman, 2003). However, the knowledge many teachers possessed, and continue to possess, was superficial. While teachers understand that dyslexia impacts reading and spelling, they are unaware of other aspects of dyslexia, such as slow processing speed, difficulty with working memory, and directional confusion, which impact all academic skills (Knight, 2018; Passadelli et al., 2020). Most recently, studies have focused on teachers' perceptions of dyslexia and discovered that some have strong opinions about dyslexia despite having little practical knowledge of the learning disability while others question their competence and ability to teach those with dyslexia despite possessing adequate knowledge of dyslexia (Worthy et al., 2016, 2018a).

Society-at-Large

Approximately one out of every five individuals in the United States of America has dyslexia (Shaywitz & Shaywitz, 2020). Therefore, it is not a matter of *if* a teacher will have a student with dyslexia but a matter of *when* a teacher will have a student with dyslexia. Teachers must be equipped with the proper knowledge and skills in order to educate those with dyslexia (Cainelli & Bisiacchi, 2019). It is imperative that educators possess knowledge regarding dyslexia symptoms because it is estimated that only 25% of those with dyslexia have an official diagnosis (Shaywitz & Shaywitz, 2020). Thus, teachers need to be able to accurately identify

dyslexia to ensure that their students receive appropriate interventions and supports (Reid & Guise, 2017).

Dyslexia is a life-long condition; therefore, it is a part of our society (Hudson et al., 2007). Proper intervention during a student's education is not only important for their academic growth but also their social well-being. Poor reading skills negatively impact individuals' ability to obtain and maintain employment, which contributes to poverty and homelessness (Livingston et al., 2018). The consequent need for financial support for this population increases the overall burden placed on society. Those with learning disabilities, such as dyslexia, comprise an overwhelming amount of the homeless and prison populations (Cassidy et al., 2021; Livingston et al., 2018; Macdonald et al., 2016)

Additionally, those with dyslexia are more likely to experience depression, sadness, and anxiety (Livingston et al., 2018). Suicidality is higher for those with poor reading skills than for those with typical reading skills (Daniel et al., 2006). While a specific reason for the higher rate of suicide among those with learning disabilities has not been identified, it has been theorized that a combination of stigma, embarrassment, poor self-esteem, isolation, guilt, and anger contribute to ideations of suicide amongst this population (Livingston et al., 2018; McBride & Siegel, 1997).

Dyslexia's impact also extends to physical health (Huang et al., 2020). The importance of taking care of one's body is consistently highlighted through the promotion of healthy activities, such as exercising, eating a proper diet, and avoiding poor habits, including cigarette smoking and excessive alcohol consumption (Kelishadi, 2022). However, education's impact on health is not often emphasized. R. B. Johnston (2019), in connection with the National Academy of Medicine, summarized previous research regarding the relationship between education and

health. It was noted that reading proficiency is a more accurate indicator of overall health and a better predictor of longevity than obesity and cigarette smoking. Therefore, if left unnoticed and untreated, dyslexia has the potential to deteriorate every aspect of a person's life (R. B. Johnston, 2019).

Theoretical Background

Knowledge does not always equate to understanding and confidence (Bloom, 1974; Kruger & Dunning, 2000). Two teachers can possess the same amount of knowledge on a specific topic, yet one may appear to know much more than the other. Two theories can be used to analyze this phenomenon: Bloom's taxonomy of learning domains and the Dunning-Kruger effect.

Bloom developed a taxonomy of learning domains, which examines the cognitive domain, the affective domain, and the psychomotor domain (Engelhart et al., 1956). The cognitive domain classifies knowledge and is the domain that is examined in this study. Bloom hypothesized that knowledge had levels of understanding, ranging from simple recall to complex, higher-level thought processes (Moseley et al., 2009). The cognitive domain is comprised of six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation (Engelhart et al., 1956). Knowledge is the lowest level, and evaluation is the highest level. Bloom theorized that an individual must be able to demonstrate cognitive functioning at the lower levels before attaining functioning at the higher levels (Bloom, 1974). When examining the relationship between teachers' knowledge of dyslexia and their confidence in instructing those with dyslexia, it is possible that teachers with the same amount of knowledge may demonstrate vastly different levels of confidence due to their position within the cognitive domain.

Kruger and Dunning (2000) theorized that individuals are usually overly confident in newly acquired skills. One line of reasoning behind their theory is that those with limited knowledge tend to fill the gaps in their knowledge with assumptions, which ultimately leads to poor conclusions and rash decisions. The other line of reasoning behind their theory is that a lack of knowledge leaves individuals without the ability to self-reflect on their own strengths and weaknesses. They coined their theory the Dunning-Kruger effect (Kruger & Dunning, 2000). Further development of the theory has noted that an individual cannot be impacted by the Dunning-Kruger effect if they possess no knowledge on a topic (Sanchez & Dunning, 2018). The Dunning-Kruger effect may explain why some teachers have little knowledge of dyslexia yet feel highly confident in their abilities to educate students with dyslexia.

Unremediated dyslexia has a vast impact on society, and teachers have been expressing their lack of knowledge and understanding of dyslexia for over half a century (Livingston et al., 2018; Zedler, 1968). While teachers are beginning to increase their knowledge of dyslexia, their knowledge remains superficial and filled with fallacies (Knight, 2018). While the rise in knowledge is being accompanied by a rise in confidence, the confidence is beginning to surpass knowledge, potentially leading to poor outcomes for those with dyslexia (Worthy et al., 2018a).

Problem Statement

The need for increased knowledge of dyslexia and appropriate instructional methodologies to help those with dyslexia has been well established. Teachers have expressed their lack of knowledge about dyslexia and demonstrated a desire to learn how to identify the disability and teach those with dyslexia in order to best serve their students. (Morrison et al., 2020; Worthy et al., 2018a). Additionally, parents have created advocacy groups in hopes of educating others about dyslexia so that their children can receive an appropriate education and

learn how to read (Odegard et al., 2021). Recent legislation across the United States of America has also included provisions requiring teachers to receive additional training in identifying dyslexia and utilizing research-based reading interventions (Reading Sufficiency Act, 2019; Teacher Professional Development in Dyslexia, 2021). Research has shown that most teachers have some knowledge about dyslexia (Echegaray-Bengoa et al., 2017; Gonzalez, 2021; Schabmann et al., 2020). However, the majority of studies on teachers' knowledge of dyslexia have revealed that teachers possess a superficial knowledge of the disability (Knight, 2018; Passadelli et al., 2020). Teachers understand the basics of dyslexia, such as how it impacts reading and spelling, but they do not understand the other associated cognitive deficits deficits, such as poor working memory and slow processing speed (Knight, 2018).

Furthermore, knowledge level does not always correlate with teachers' perceptions of dyslexia or their confidence in teaching those with dyslexia (Claessen et al., 2020; Worthy et al., 2018a). Some research has discovered that high confidence is generally associated with increased knowledge of dyslexia (Echegaray-Bengoa et al., 2017; Gonzalez, 2021). However, other research has found that teachers are highly confident in their abilities despite possessing little knowledge of dyslexia and no formal training (Mullikin et al., 2021; Worthy et al., 2018a). The problem is that the literature has presented mixed results regarding the relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia.

Purpose Statement

The purpose of this quantitative, correlational study was to determine whether a predictive relationship exists between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. The predictor variables in this study examined three facets of dyslexia knowledge: general knowledge of dyslexia, knowledge of dyslexia diagnostic markers,

and knowledge of dyslexia treatments. The criterion variable in this study examined teachers' confidence in their abilities to educate those with dyslexia. General knowledge of dyslexia refers to the definition of dyslexia, common myths that surround dyslexia, and the overall impact that dyslexia has on an individual's education (Wadlington & Wadlington, 2005). Knowledge of dyslexia diagnostic markers refers to common dyslexia symptoms as well as the general areas that should be assessed when conducting a diagnostic evaluation (Soriano-Ferrer et al., 2016). Knowledge of dyslexia treatments refers to appropriate teaching techniques for those with dyslexia as well as accommodations. Confidence in teaching those with dyslexia refers to teachers' personal beliefs that they are prepared to educate students with dyslexia (Gonzalez, 2021).

The population for this study consisted of public-school teachers in a rural area in Ohio within the Appalachian region. The participants taught elementary, middle, or high school students in either general education or special education.

Significance of the Study

This study aims to increase our understanding of the relationship between teachers' knowledge of dyslexia and their confidence in teaching students with dyslexia, thereby providing insight into teachers' strengths and weaknesses and shaping future teacher training courses. Previous studies can be compared to the current study because the participants included in-service teachers in a public-school environment (Gonzalez, 2021; Mullikin et al., 2021). Comparison is important in this case as there have been conflicting results regarding the relationship between teachers' knowledge and confidence, and comparing studies can pave the way for future research to reconcile the various results (Gonzalez, 2021; Worthy et al., 2018a).

One of the main differences when comparing this study to previous studies is the location of the population, which was rural Appalachia. Typically, research on this topic has occurred in urban areas outside of the Appalachian region (Gonzalez, 2021; Mullikin et al., 2021; Worthy et al., 2018a). Studying participants in the Appalachian region is important because the region's culture and school environment vary greatly from other areas. Much of the Appalachian area has been suppressed by poverty and the opioid epidemic (Sherfinski et al., 2021). Therefore, teachers' knowledge and confidence in the Appalachian region may differ from those in other geographical areas due to competing concerns of students struggling with homelessness and drug addiction.

This study also aims to reveal if teachers demonstrate over-confidence in their knowledge of dyslexia. It is important that teachers be able to recognize the gaps in their knowledge so that they can best help their students with dyslexia. The suicide rates, homelessness, and criminality that run rampant in those with learning disabilities could be mitigated with proper supports and interventions during their formative years (Livingston et al., 2018). However, teachers can only provide the appropriate methodologies when they possess both accurate knowledge and confidence in their knowledge (Flynn et al., 2021; Worthy et al., 2018b).

Research Question

RQ1: How accurately can confidence in teaching those with dyslexia be predicted from a linear combination of dyslexia knowledge domains for rural Appalachian teachers?

Definitions

1. *Appalachia* – A region in the eastern United States that is often associated with poverty and known for its unique culture and social environments (Obermiller & Maloney, 2016).

2. *Confidence* - One's belief that they will be successful at a given task due to their perceived abilities and knowledge (Bénabou & Tirole, 2002).
3. *Dyslexia* - A specific learning disability that is caused by neurological differences and results in difficulty with decoding skills, reading, and spelling due to poor phonemic awareness abilities (International Dyslexia Association Board of Directors, 2002).
4. *Dyslexia Diagnostic Markers* - Skill areas (e.g., spelling, reading) that are assessed when completing a dyslexia evaluation (Soriano-Ferrer et al., 2016).
5. *Dyslexia Treatments* - Teaching methodologies and accommodations that are appropriate for those with dyslexia (Soriano-Ferrer et al., 2016).
6. *Knowledge* - Believing something that has been established to be true (Zagzebski, 2017).

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic review of the literature was conducted to present information about dyslexia, describe teachers' knowledge and beliefs about dyslexia, and review the relationship between teachers' knowledge of dyslexia and their confidence in teaching students with dyslexia. This chapter begins with the theoretical framework. Bloom's taxonomy of learning domains and the Dunning-Kruger effect are the theories that create the foundation of this study. The remainder of the chapter contains a thorough review of the literature pertinent to dyslexia, teachers' knowledge of dyslexia, their perceptions of dyslexia's impact on overall educational experience, and their confidence in educating those with dyslexia. The chapter concludes with a summary.

Theoretical Framework

Knowledge extends far beyond basic understanding and branches into abstract thought and complex application. While an individual may possess adequate knowledge on a topic, they may not have the ability or confidence needed to properly apply their knowledge. Bloom's taxonomy of learning domains provides a framework for examining the depth of one's knowledge. The Dunning-Kruger effect provides a framework for examining the relationship between knowledge and confidence.

Bloom's Taxonomy of Learning Domains

Benjamin Bloom was an American educational psychologist interested in classifying achievement in an objective manner (Engelhart et al., 1956). The concept of a classification system was first developed in 1948 by a group of college examiners at the annual American Psychological Association Convention. Following the initial meeting, Bloom held several

conferences to obtain the opinions of researchers and educators on ways to best measure and categorize achievement. Bloom's research goal was to create a scale that could aid educators in teaching children higher-level thinking skills (Engelhart et al., 1956).

With help from his colleagues, Bloom developed a taxonomy of learning domains, which can be used to classify various types of learned skills into a hierarchical model (Engelhart et al., 1956). While the taxonomy examines three domains (cognitive, affective, and psychomotor), the cognitive domain is the focus of the theoretical framework for this study. The cognitive domain classifies knowledge. Bloom and his committee hypothesized that knowledge has levels of understanding ranging from low-level recall of information to higher-level thought processes. When creating these levels, Bloom and his colleagues considered several factors, including the acquisition of knowledge, teaching strategies that are likely to improve knowledge, the relationship between knowledge and the learner's perceived value of the knowledge, and the generalization and application of knowledge. They also explored knowledge as a fluid concept that can change based on the individual, location, and time period (Engelhart et al., 1956).

The cognitive domain consists of six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation (Engelhart et al., 1956). The lowest level is knowledge, and the highest level is evaluation. It was highlighted that these levels can be perceived as occurring on a spectrum that ranges from tangible to abstract (Engelhart et al., 1956). The knowledge level is concrete and focuses on the recall of facts (Moseley et al., 2009). Knowledge can be assessed by prompting the learner to recite the material or determine whether a statement is accurate (Engelhart et al., 1956). These processes are typically seen in multiple-choice and true/false test questions. The comprehension level focuses on the interpretation of the information (Moseley et al., 2009). Individuals at this level understand the material and can convey this knowledge to

others in their own words (Engelhart et al., 1956). The application level centers around an individual's ability to utilize their knowledge in a concrete setting (Moseley et al., 2009). Bloom believed that the best way to assess the this level was to place the student in a real-life scenario, which would require them to utilize their knowledge in a meaningful way (Engelhart et al., 1956). The analysis level expects learners to investigate the information in a way that challenges them to determine the individual parts that compose the information and explore the relationship between those elements (Moseley et al., 2009). Those at this level in the taxonomy demonstrate an understanding of the information beyond that which is directly stated (Engelhart et al., 1956). The synthesis level focuses on restructuring the elements of the information and combining them into a new configuration. At this level, the individual should be able to integrate new information with old information. The final, and most complex, level is evaluation, which is a learner's ability to judge information (Moseley et al., 2009). Those at this level are expected to evaluate the information for its accuracy and effectiveness (Engelhart et al., 1956).

Researchers have continued to support the use of Bloom's taxonomy and have suggested ways to improve the various levels (Adams, 2015; L. W. Anderson & Krathwohl, 2001; Moseley et al., 2009). The largest proposed revision to the levels included changing the levels' labels to terms that are more easily measured (e.g., exchanging the term "remember" for the term "knowledge") and incorporating an additional axis to the taxonomy that views knowledge dimensions (factual, conceptual, procedural, and meta-cognitive) across the six levels (L. W. Anderson & Krathwohl, 2001). L. W. Anderson and Krathwohl (2001) argued that these changes would aid educators in creating objectives that were measurable and encouraged higher-level thinking processes. Bloom's taxonomy continues to be utilized in education because it challenges teachers to think of learning in behavioral terms (Adams, 2015). When educators

structure their lessons around these concepts, education departs from focusing on what the student knows and moves toward evaluating what the student can do with that knowledge (Adams, 2015; Moseley et al., 2009).

Further research by Bloom (1974) revealed that, despite being developed in the United States of America, the cognitive domain of the taxonomy can be applied internationally. The research also found that the taxonomy can be used to assess both students and teachers. Bloom (1974) noted that teachers cannot be expected to teach higher-order cognitive objectives if they have not been taught how to think about topics in such a manner. For example, many educators utilize Bloom's taxonomy due to its well-defined categories; however, most do not know how to differentiate between the higher-level categories due to their lack of experience in these areas (Moseley et al., 2009).

Similarly, teachers cannot fully utilize their knowledge of specific teaching strategies or learning disabilities if they do not know how to expand their knowledge beyond lower-level cognitive skills (Bloom, 1974; Engelhart et al., 1956). Studies have shown that some teachers do not possess a full understanding of the various cognitive skill levels, and they do not exhibit higher-level cognitive skills within the subjects that they teach (Amin & Munawar, 2020; Bibi et al., 2020; Monrad et al., 2021). Studies have also revealed that teachers believed they were examining higher-level cognitive skills when they were actually evaluating lower-to-middle-level cognitive skills, further demonstrating their lack of understanding of the cognitive domain (Bibi et al., 2020; Monrad et al., 2021).

With many teachers lacking an understanding of higher-level cognitive skills, it is no surprise that teachers who possess knowledge of dyslexia generally only understand dyslexia at a lower cognitive level (Echegaray-Bengoa et al., 2017; Knight, 2018; Passadelli et al., 2020;

Schabmann et al., 2020). Teachers have a basic knowledge of dyslexia, including classic symptoms of dyslexia and identifying basic classroom accommodations (Echegaray-Bengoa et al., 2017; Knight, 2018). They lack a more in-depth understanding of dyslexia, such as how it impacts all educational subjects. Without higher-level cognitive skills, teachers may be aware of appropriate instructional methodologies and classroom accommodations but unable to implement them effectively within the classroom (Passadelli et al., 2020; Schabmann et al., 2020).

This study relates to Bloom's taxonomy of learning domains because it investigates teachers' knowledge of dyslexia, which was measured with the Knowledge and Beliefs About Developmental Dyslexia Scale (KBDDS). The KBDDS measure's knowledge of dyslexia at various cognitive levels (Soriano-Ferrer & Echegaray-Bengoa, 2014). For example, some test items require teachers to recall commonly known knowledge about dyslexia, such as the fact that dyslexia causes difficulty with reading fluency. Other test items require teachers to evaluate the given information and determine an appropriate response, such as confirming or denying the benefit of colored overlays for those with dyslexia. By using this measure, this study was able to examine where teachers' knowledge of dyslexia lies in relation to their critical thinking skills and how their level of thinking impacts their confidence in teaching those with dyslexia.

The Dunning-Kruger Effect

Kruger and Dunning (2000) were interested in the phenomena of over-confidence. They wanted to study the impact that metacognitive skills have on one's ability to self-reflect on past performances and appropriately judge themselves as successful or unsuccessful. Metacognition has been defined as "thinking about and managing your thoughts, experiences, and what your senses are telling you" (Cohen et al., 2021).

Kruger and Dunning (2000) theorized that individuals are typically overly confident in newly acquired skills. Their theory was based on two postulations. First, those with limited knowledge tend to fill the gaps in their knowledge with assumptions, which ultimately leads to poor conclusions and rash decisions. Second, lack of knowledge leaves individuals without the ability to self-reflect on their strengths and weaknesses within the knowledge area. The best example of this concept is the above-average effect, which is the phenomenon that many individuals who demonstrate average skills tend to believe that their skills are above average (Alicke, 1985; Klar, 2002; Krizan & Suls, 2008). Kruger and Dunning (2000) believed that those with deficits in their metacognitive skills tended to automatically view their actions as positive rather than giving themselves an accurate appraisal through thorough reflection on the positive and negative outcomes of their actions.

The main theory developed by Kruger and Dunning (2000) is that those with the least amount of knowledge on a topic tend to be the most confident in their abilities within the topic area. They coined their theory the Dunning-Kruger effect. Further development of the theory has noted that an individual cannot be impacted by the Dunning-Kruger effect if they have no knowledge on a topic (Sanchez & Dunning, 2018).

The Dunning-Kruger effect may explain why some teachers have little knowledge of dyslexia yet feel highly confident in their abilities to educate students with dyslexia (Dymock & Nicholson, 2023; Okechukwu et al., 2023). The initial rise in teacher trainings focused on dyslexia correlated with an increase in teachers' confidence in their ability to educate students with dyslexia (Gonzalez, 2021; Knight, 2018). However, confidence has begun to surpass knowledge (Mullikin et al., 2021; Worthy et al., 2018a). Research has found that the most confident individuals tend to have the least knowledge of dyslexia and no formal training. A

majority of participants in Worthy et al.'s (2018a) study mentioned that they strongly disagreed with the diagnosis, definition, and medical model of dyslexia. Moreover, the participants were highly confident in their abilities to educate students with dyslexia. Nevertheless, a majority of the participants had not received any formal training on dyslexia. These results directly aligned with the Dunning-Kruger effect. The participants demonstrated high levels of confidence despite admitting to limited education on the topic and disagreeing with common practices accepted by the International Dyslexia Association (Worthy et al., 2018a).

According to Kruger and Dunning (2000), many individuals tend to believe their abilities are above average, and limited knowledge makes self-reflection of an individual's true abilities challenging. The present study further explores the relationship between knowledge and ability, specifically the relationship between teachers' knowledge of dyslexia and their confidence in their ability to teach those with dyslexia. The connection between this study and the Dunning-Kruger effect enables an observation of whether teachers' level of confidence in educating students with dyslexia is proportionate to their knowledge of dyslexia. If knowledge is not a predictor of confidence, then gaps in teachers' knowledge can be identified, and teacher education programs can be modified to help teachers fill the gaps with appropriate knowledge rather than incorrect assumptions.

Related Literature

Dyslexia is one of the most prevalent learning disabilities; however, it is also one of the most misunderstood learning disabilities (Schabmann et al., 2020; Shaywitz & Shaywitz, 2020). Despite the wealth of information available about dyslexia, as well as the introduction of dyslexia legislation, teachers continue to demonstrate little or superficial knowledge of the disability (Knight, 2018; Passadelli et al., 2020; Teacher Professional Development in Dyslexia,

2021). Teachers' knowledge of dyslexia impacts their beliefs about dyslexia and their teaching methodologies when educating students with dyslexia (Echegaray-Bengoa et al., 2017; Passadelli & Klonari, 2020; Peries et al., 2021). Further, there is a strong dissonance exists between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia (Worthy et al., 2016, 2018a). If teachers trust misinformation about dyslexia or exhibit an unwillingness to grow their knowledge and change their teaching methodologies, then students with dyslexia are going to receive an inadequate education (Blamire & Omidire, 2020; Indrarathne, 2019; Peltier et al., 2022; Peries et al., 2021; Ryder & Norwich, 2019; Worthy et al., 2018a).

Dyslexia

According to the definition adopted by the International Dyslexia Association, dyslexia is a specific learning disability that causes difficulty with decoding skills, reading, and spelling (International Dyslexia Association Board of Directors, 2002). Dyslexia is caused by neurological differences in the structure and connections of the brain that result in difficulties with various language processes. One such process is phonemic awareness, which is the main underlying deficit in dyslexia. The difficulties experienced by those with dyslexia are not due to cognitive deficits (Shaywitz & Shaywitz, 2020). Those with dyslexia typically possess average or above-average intelligence.

Dyslexia impacts many other areas outside of reading, spelling, and writing. Working memory, retrieval of information from long-term memory, processing speed, directionality, and rote memorization are all impacted by dyslexia (International Dyslexia Association, 2019). Consequently, these deficits impact all areas of academia and life (Smith-Spark et al., 2016). For example, difficulty with rote memorization impacts an individual's ability to remember the correct order of steps when completing mathematical equations as well as their ability to

remember the sequence of their telephone number. Because dyslexia is a spectrum learning disability that ranges from mild to profound, some individuals may have more difficulties in these areas than others (Shaywitz & Shaywitz, 2020).

While dyslexia is characterized by weaknesses and difficulties, it is important to note that many individuals with dyslexia are gifted in other areas. The neurological differences that cause dyslexia also cause the right hemisphere of the brain to be larger than that of a neurotypical brain (D'Mello & Gabrieli, 2018; International Dyslexia Association, 2020b). The right hemisphere of the brain is associated with creativity, emotion, and intuition (Shaywitz & Shaywitz, 2020). It is believed that this difference is the reason that many individuals with dyslexia are talented in areas such as acting, singing, entrepreneurship, interpersonal relationships, and art (Shaywitz & Shaywitz, 2020).

Examining dyslexia through the lens of strengths rather than weaknesses has recently gained momentum, as society's view of disability is shifting and differences are being embraced (Fung, 2021; Rappolt-Schlichtmann et al., 2018). These changes have led to the use of the term "neurodiversity," which refers to those whose neurological functions or brain structures differ from what is typical of the human population (Grant, 2022; Fung, 2021). Dyslexia falls within the category neurodiversity, as the underlying cause of the disability is neurological differences (D'Mello & Gabrieli, 2018; International Dyslexia Association, 2020b; Shaywitz & Shaywitz, 2020). The main focus of those who have adopted the term "neurodiversity" is to change our culture by modifying the environment to facilitate the innate strengths of those with neurodiverse conditions, such as dyslexia, consequently enabling them to thrive within society (Fung, 2021).

Dyslexia has one of the highest prevalence rates among all disabilities. Approximately 20% of the United States of America's population has dyslexia, which means that one out of

every five individuals is affected by this learning disability (Shaywitz & Shaywitz, 2020). Unlike many other disabilities, the prevalence of dyslexia among boys and girls is equal, meaning that just as many girls are affected by dyslexia as boys (Arnett et al., 2017). Despite such a high prevalence, only approximately 25% of those with dyslexia have received an official dyslexia diagnosis (Shaywitz & Shaywitz, 2020).

Dyslexia Diagnostic Markers

Dyslexia is a complex learning disability that impacts several major life activities, such as learning, reading, and spelling (International Dyslexia Association, 2019; Smith-Spark et al., 2016). To properly diagnose dyslexia, it is imperative that multiple aspects of learning and several cognitive processes be investigated (International Dyslexia Association, 2008; Shaywitz & Shaywitz, 2020). The depth, breadth, and type of assessments needed to identify dyslexia diagnostic markers depend on the purpose of the investigation. For example, those who are providing a medical diagnosis of dyslexia must utilize a wide range of standardized assessments, while those who are screening for dyslexia can use fewer assessments and do not need to rely on formal measures (Drigas & Politi-Georgousi, 2019; International Dyslexia Association, 2008). While a screening does not provide a medical diagnosis of dyslexia, it can be given by many professionals, including teachers (Shaywitz & Shaywitz, 2020). Dyslexia screenings are important within the school system as it is estimated that only 25% of those with dyslexia have received an official dyslexia diagnosis. Therefore, teachers must understand the diagnostic markers of dyslexia and how to evaluate these areas in order to help all of their students with dyslexia and not just those with a medical diagnosis (Reid & Guise, 2017; Shaywitz & Shaywitz, 2020).

The International Dyslexia Association (2008) states that the following areas should be assessed when completing a dyslexia evaluation: phonological awareness, phonological memory, rapid automatic naming, receptive vocabulary, phonics skills, decoding ability for both real and nonsense words, oral reading fluency, spelling, and writing. Reading and writing should be observed at the single-word, sentence, and paragraph levels. While an intelligence quotient (IQ) assessment may also be given during a dyslexia evaluation, IQ scores should be interpreted with caution. Those with dyslexia have a tendency to score lower on IQ tests due to their limited reading experience, which impedes vocabulary growth and knowledge base, and their difficulty with various aspects of language, such as language-based memory and directional verbiage (Snowling et al., 2020). An additional reason that IQ assessments are not required when conducting a dyslexia evaluation is that IQ and reading abilities are not related (Gray et al., 2022; International Dyslexia Association, 2008; Otaiba et al., 2018; Snowling & Hulme, 2020). Oral language skills, rather an IQ, have been found to have the strongest relationship to reading success (Chang et al., 2020; International Dyslexia Association, 2008; Lervåg et al., 2018). Therefore, an in-depth language assessment should also be conducted when engaging in a dyslexia evaluation.

An area of great misunderstanding with dyslexia identification is that students must be in the below-average range on standardized reading assessments to have dyslexia. Some students with dyslexia, especially those with high intellectual skills, score in the average range on reading assessments (Shaywitz & Shaywitz, 2020). According to Shaywitz and Shaywitz (2020), observing the "manner in which they read" is more important than to relying solely on test scores to evaluate reading ability (p. 106). Those with dyslexia may be able to read accurately; however, the speed of reading is generally much slower than that of a typical reader as those with

dyslexia lack automaticity (Reis et al., 2020; Shaywitz & Shaywitz, 2020). Moreover, when diagnosing dyslexia, it is important to remember that diagnoses are not determined solely by the results of a test but by the professional expertise and judgment of a clinician (Wilson & Felton, 2004). In essence, a diagnostic test provides a narrow view of a student. The examiner is only able to measure a specific skill within a singular setting. Further, a diagnosis should not be dependent on whether a student can perform well at given tasks, but rather should be based on *why* a student is able or unable to succeed at a given task. Test results are one of the many tools used by clinicians to make an informed diagnosis (Wilson & Felton, 2004). Therefore, those who screen for dyslexia or conducting a dyslexia diagnostic evaluation should evaluate the data properly, examine beyond the descriptive labels, and properly synthesize all data to make an informed and accurate judgment (International Dyslexia Association, 2019; Shaywitz & Shaywitz, 2020).

Dyslexia Treatment Methodologies

Due to the large scope of abilities impacted by dyslexia, identifying appropriate treatment methodologies can be challenging. When selecting treatment goals and methodologies, it is important to consider both general dyslexia deficits and individual deficits that the student may present with that do not fall perfectly within a specific diagnostic area (Cainelli & Bisiacchi, 2019). Therefore, the ability to adapt to each student is paramount for a successful outcome. Additionally, teachers need to recognize their own limitations. The National Education Association (2020) published a code of ethics that discusses how educators should conduct themselves within the profession of teaching. The code states that teachers shall not make false claims about their competencies or qualifications. If a teacher feels that a student's educational needs are beyond their current competencies, then they need to refer the student for services

outside of their classroom or gain the knowledge needed to serve the student (Hinchliffe & Campbell, 2016; Tomlinson & Imbeau, 2013).

Many teaching approaches have been studied to determine their effectiveness in improving reading and spelling skills in those with dyslexia, such as Orton-Gillingham methodology, play therapy, technology-assisted learning, rhythmic training, and rapid automatized naming training (Bolduc & Guay, 2021; Khalid & Anjum, 2019; Stappen et al., 2020). Research has shown that the most effective instruction to remediate dyslexia is Structured Literacy (Birsh & Carreker, 2019; Fallon & Katz, 2020; V. Johnston, 2019; Moats, 2019; Spear-Swerling, 2019). The International Dyslexia Association (2020c) endorses this approach, stating that it "is the most effective approach for students who experience unusual difficulty learning to read and spell printed words" (p. 1). Structured Literacy is an approach to reading and writing intervention that focuses on several main areas, including phoneme awareness, phoneme-grapheme correspondence, orthography, morphology, syntax, and semantics (Fallon & Katz, 2020; Moats, 2019).

The method of instruction in Structured Literacy is just as important as the targeted academic skills. When utilizing Structured Literacy, it is emphasized that concepts must be taught in a manner that is explicit, systematic, and multi-sensory (Fallon & Katz, 2020; Moats, 2019; Spear-Swerling, 2019). "Explicit" refers to the manner in which the teacher delivers the information to the student (Moats, 2019). During Structured Literacy instruction, teachers are to be clear, direct, and provide immediate, consistent feedback. "Systematic" refers to the sequence the teacher should follow when presenting the topics of instruction (V. Johnston, 2019; Moats, 2019). The simplest concepts should be taught first, and students should slowly progress to more difficult topics. As students progress, it is necessary that the teacher guides them in

understanding the connection between the previously learned concepts and the newly introduced topics (V. Johnston, 2019). “Multi-sensory” refers to the utilization of multiple senses, such as hearing, sight, and touch, when teaching new concepts (Birsh & Carreker, 2019). Many Structured Literacy programs integrate color-coded letter tiles and various hand gestures into lessons to incorporate visual and tactile learning experiences (V. Johnston, 2019; Moats, 2019).

Dyslexia Accommodations

When working with students who have dyslexia, appropriate teaching methodologies is not the only area of importance to ensure academic success. Those with dyslexia also require accommodations to access and participate in their education as adequately as students without a disability (Martin, 2020). Accommodations are paramount for academic independence, as they allow those with dyslexia to demonstrate their knowledge without the burden of print (conventional reading and writing methods) and time constraints (Atanga et al., 2020; Martin, 2020; Shaywitz & Shaywitz, 2020). While accommodations are commonly thought of as giving an unfair advantage or cheating, they are necessary for academic success and are a protected right under the Individuals with Disabilities Education Act (Demirok et al., 2019; Martin, 2020; Shaywitz & Shaywitz, 2020).

While accommodations vary based on individual needs, some standard accommodations should always be considered when educating a student with dyslexia. Audiobooks and text-to-speech technology are the most utilized accommodations, as they allow those with dyslexia to bypass their difficulty reading by receiving printed information auditorily (Martin, 2020; Shaywitz & Shaywitz, 2020). Speech-to-text further relieves the burden of weaknesses with print by turning written assignments into oral assignments (Al-Dababneh & Al-Zboon, 2022; Martin, 2020). Another standard accommodation is extended time because those with dyslexia have

difficulty processing information in a timely manner (Shaywitz & Shaywitz, 2020). Neuroimaging studies have revealed that those with dyslexia utilize different areas of the brain to process printed writing than those without dyslexia (International Dyslexia Association, 2020b). This process is highly inefficient and takes considerable time (Shaywitz & Shaywitz, 2020; Stenneken et al., 2011). Therefore, allowing an individual with dyslexia to utilize additional time gives them the opportunity to process the information completely and allows them to demonstrate their competence (Shaywitz & Shaywitz, 2020).

Accommodations are often thought of as technological, complex, and expensive; however, this is not always the case. Assistive technology can also be "low-tech," meaning that the devices need little-to-no training to implement, are not electronic, and are cost-effective (Al-Dababneh & Al-Zboon, 2022). Those with dyslexia benefit from the incorporation of these simple accommodations. For example, a highlighter can be utilized to help identify key words on a worksheet or act as a visual cue to remind the student to begin writing on the left side of their paper (International Dyslexia Association, 2020a).

The benefits of accommodations further extend to strengthening academic skills. The utilization of text-to-speech technology has been shown to improve vocabulary, decoding ability, reading comprehension, and writing mechanics skills for those with dyslexia (Demirok et al., 2019; Košak-Babuder et al., 2019; Martin, 2020; Sulaimon & Schaefer, 2023; Svensson et al., 2021). Additionally, the combination of access and improved academic skills that accommodations provide improves students' self-esteem. Students with learning disabilities, such as dyslexia, who are given access to accommodations show increased interest, motivation, and participation within their academic environments (Atanga et al., 2020; Martin, 2020; Nordström et al., 2019; Svensson et al., 2021).

Teachers' Knowledge of Dyslexia

Research has shown mixed results regarding teachers' knowledge of dyslexia (Echegaray-Bengoa et al., 2017; Schabmann et al., 2020). Some studies have found that teachers possess a foundational knowledge of basic dyslexia concepts (Echegaray-Bengoa et al., 2017; Gonzalez, 2021; Makgato et al., 2022). Other studies have discovered that teachers possess incorrect knowledge of dyslexia and, in some cases, no knowledge (Indrarathne, 2019; Okechukwu et al., 2023; Peries et al., 2021; Schabmann et al., 2020; Worthy et al., 2018a). While the differences between these findings are vast, they can be examined by reviewing the literature regarding teachers' training on the subject of dyslexia as well as reviewing the depth of teachers' understanding of dyslexia.

Training on Dyslexia

The need for teacher training on dyslexia has been established through various legislation, advocacy groups, studies, and teachers' expressions of a desire for increased knowledge (A. Anderson, 2021; Gabriel, 2018; Moats, 2020; Morrison et al., 2020; Okechukwu et al., 2023; Teacher Professional Development in Dyslexia, 2021; Worthy et al., 2018a, 2018b). The need for training is not limited to primary and secondary educators, as those teaching in higher education have also expressed the lack of availability of training (Ryder & Norwich, 2019). Currently, a wealth of research has investigated the characteristics of dyslexia and instructional strategies to help those with dyslexia; however, a gap exists between research and teachers (A. Anderson, 2021; Moats, 2020). Training can help bridge this divide and allow teachers to put research into practice. An additional benefit of training is that teachers tend to view those with dyslexia through a more positive lens, which improves student-teacher relationships (Indrarathne, 2019).

Dyslexia training can occur in many forms and across various stages in a teacher's education, including pre-service training, in-service training, and informal training. It is important to note that the effectiveness of dyslexia training can vary. Studies have found that professional development courses can be more or less effective based on the length of the course, instructor knowledge, the method of presentation, and the availability of support for teachers after completion of the course (Abdullah & Benjamin, 2019; Basma & Savage, 2018; McMahan et al., 2019). Because of the instructional differences between courses, some teachers possess little knowledge about dyslexia despite receiving several hours of dyslexia training (McMahan et al., 2019; Peltier et al., 2022). Other teachers may have a wealth of knowledge about dyslexia after receiving very minimal training. This same principle also applies to student outcomes. Increased teacher training does not always correlate with improved literacy rates among students (Basma & Savage, 2018; McMahan et al., 2019).

Pre-service Training. Despite the recent increase in dyslexia awareness, the number of teacher training programs that incorporate courses on dyslexia are almost non-existent (A. Anderson, 2021; Jones et al., 2019; Knight, 2018; Sayeski, 2019; Worthy et al., 2018b). Studies examining teachers' pre-service training on dyslexia demonstrated that more than half of the participants received minimal or no training on dyslexia (Jones et al., 2019; Knight, 2018). However, this trend is changing, as several states within the United States of America have passed legislation requiring teachers to receive training on dyslexia during their undergraduate education (Jones et al., 2019; Peltier et al., 2020).

The research on pre-service teacher training on dyslexia has revealed conflicting data. According to Jones et al. (2019), pre-service teachers who had completed courses on dyslexia demonstrated an increased knowledge of dyslexia. There was also a significant connection

between dyslexia courses and pre-service teachers' confidence in working with students with dyslexia. Opposingly, Knight (2018) found that pre-service training courses did not increase knowledge of dyslexia; however, they did increase pre-service teachers' confidence in working with students with dyslexia.

The varying student outcomes may be explained by the content students are being taught (Gabriel, 2018; Sayeski, 2019). Despite extensive research supporting Structured Literacy, some institutions continue to teach their students balanced literacy because this approach is believed to cover more topic areas (Sayeski, 2019). It is important that institutions shift their focus from teaching all of the possible topics to teaching the most important topics. Furthermore, even when teaching important topics, institutions should focus on the core of Structured Literacy rather than a particular curriculum. Gabriel (2018) investigated graduate programs for dyslexia therapy and discovered that many of the programs partnered with curriculum companies. These partnerships raised several questions regarding the ethics of the program, as they create a viable space for private, commercial interests to invade students' education. Further, most of the students were only taught how to implement the specific curriculum that was partnered with the university. Therefore, students learned a singular curriculum rather than learning about the complexities of dyslexia or the science behind appropriate teaching methodologies, which limited their autonomy and ability to apply their skills in a broad, flexible manner (Gabriel, 2018).

In addition to investigating what students are taught, it is also important to determine how students are being taught. Research has shown that the method of instruction needs to be carefully crafted to achieve positive learning outcomes (Peltier et al., 2020; Sayeski, 2019). When learning about dyslexia, outcomes are optimized when the teaching approach extends beyond traditional text-based learning (Peltier et al., 2020). Lessons should be taught in a

specific order, and all concepts should be integrated (Peltier et al., 2020; Sayeski, 2019). While the ability to demonstrate knowledge in an isolated, recall format, such as through a single examination, will generate small-to-moderate levels of learning, the level of learning increases greatly when knowledge must be demonstrated through a real-world situation (Sayeski, 2019). Therefore, participating in simulations and receiving immediate feedback are important to the learning process (Sayeski, 2019).

In-service Training. Professional development courses regarding dyslexia are becoming more common as legislation within the United States of America continues to be passed that requires teachers to obtain training specifically for dyslexia (A. Anderson, 2021; Gabriel, 2018; Gonzalez, 2021; Reading Sufficiency Act, 2019; Teacher Professional Development in Dyslexia, 2021). Some research has found that in-service dyslexia training leads to consistently positive outcomes for both students and teachers; however, other studies have discovered that in-service dyslexia training has little to no effect on students or teachers (Abdullah & Benjamin, 2019; Basma & Savage, 2018; Gonzalez, 2021; Morris, 2023; Morrison et al., 2020; Peries et al., 2021). These varied findings may be due to the differences in subject matter across various professional development courses. For example, some courses focus on instructional methodology while others focus on identifying dyslexia (Flynn et al., 2021; Gonzalez, 2021; Morrison et al., 2020).

Another possible reason for the differences in professional development course outcomes could be differences in the courses themselves. Valiandes and Neophytou (2018) interviewed participants to investigate aspects of professional development courses that teachers believed to be the most important when determining the effectiveness of a course. Several participants noted a moderate course length, courses with follow-up trainings and on-site support, and the ability to

openly collaborate with experts in the particular subject area as well as their colleagues as indicators of an effective professional development course. Other researchers have generated similar results when professional development courses were less than 30 hours, multisensory teaching methods were utilized, and the opportunity to collaborate with others was provided (Abdullah & Benjamin, 2019; Basma & Savage, 2018; Flynn et al., 2021; Gonzalez, 2021). One of the most common indicators of a successful professional development course is the participants' ability to work directly with a coach both during and after the course (Flynn et al., 2021; Morris, 2023). Coaches can correct misconceptions and provide feedback, which helps the participants properly implement the contents of the course in their classrooms.

Informal Training. Research has shown that teachers who have only received informal training on dyslexia were more knowledgeable about dyslexia and more prepared to teach students with dyslexia than their peers who have received formal training (Gonzalez, 2021; Mullikin et al., 2021). Gonzalez (2021) described informal training as any training that does not occur in a typical setting, such as in an undergraduate or graduate classroom or during a professional development course. Therefore, informal training can be accomplished through personal research or experience teaching students with dyslexia.

Length of educational career and experience teaching children with dyslexia have been shown to positively correlate with dyslexia knowledge (Gonzalez, 2021; Mullikin et al., 2021; Peries et al., 2021; Ryder & Norwich, 2019). Many teachers have expressed that they gained more knowledge working with students with learning disabilities than from any training (You et al., 2019). Additionally, teachers who identified as having dyslexia also demonstrated a strong knowledge of the disability (Ryder & Norwich, 2019). These positive correlations may be due to personal interest. When an individual has a personal interest or curiosity in a topic, the person

likely possesses intrinsic motivation to pursue the topic (Ibrahim et al., 2021). It can be theorized that teachers who have spent a considerable amount of time working closely with students with dyslexia may have an increased motivation to learn more about dyslexia because they created close, personal bonds with their students (Ibrahim et al., 2021).

Superficial Knowledge

Studies have shown that many teachers possess superficial knowledge of dyslexia (Arrow et al., 2019; Knight, 2018; Makgato et al., 2022; Passadelli et al., 2020). Knight (2018) noted that most teachers have a "stereotypical view of dyslexia" (p. 216). Teachers tend to demonstrate an understanding that dyslexia causes difficulties with reading, writing, and spelling (Knight, 2018; Makgato et al., 2022; Passadelli et al., 2020; Peries et al., 2021). Consequently, most teachers explain dyslexia in behavioral terms, such as making mistakes when spelling and demonstrating poor reading fluency when reading aloud (Knight, 2018; Makgato et al., 2022). Possessing a narrow view of dyslexia leads many teachers to believe that those with dyslexia are highly homogeneous in their pattern of strengths and weaknesses; therefore, teachers' beliefs on the type of instruction students with dyslexia require are impacted (Peries et al., 2021). Many teachers focus solely on literacy skills, as they do not realize that other academic areas can also be impaired (Blamire & Omidire, 2020). Generally, those with a superficial knowledge of dyslexia feel that they do not possess the knowledge or skills necessary to provide accurate identification of dyslexia or proper instructional methodologies and supports (Makgato et al., 2022). Their awareness of their lack of knowledge is important because they understand that their students with dyslexia need support from someone outside of their classroom (Blamire & Omidire, 2020).

Some teachers do not even possess a superficial knowledge of dyslexia (Okechukwu et al., 2023; Peltier et al., 2022; Peries et al., 2021). Further worsening the issue of lacking knowledge, many of the teachers within this category believe in harmful myths about dyslexia. The most common misconception is that the root cause of dyslexia is a visual deficit (Peltier et al., 2022; Peries et al., 2021). Other misconceptions include the following: those with dyslexia having low intelligence, dyslexia can be cured, and labeling those with dyslexia as having a disease (Peries et al., 2021). Teachers who do not understand that their students' struggles are due to intrinsic issues tend to implement punishments for lack of academic achievement (Indrarathne, 2019). Furthermore, those with little knowledge of dyslexia have difficulty understanding the referral and assessment processes for special education services for those with dyslexia because they are unaware that dyslexia falls within the category of specific learning disability (Peltier et al., 2022).

Comprehensive Knowledge

While teachers generally possess superficial knowledge of dyslexia, they rarely demonstrate comprehensive knowledge of dyslexia (Gonzalez, 2021; Mullikin et al., 2021; Passadelli & Klonari, 2020; Peries et al., 2021). Peries et al. (2021) found that only 1.1% of the participants in their study demonstrated a highly sufficient level of knowledge about dyslexia. Many teachers can correctly answer general questions about dyslexia, but most incorrectly answer more specific questions and tend to believe in popular dyslexia myths (Gonzalez, 2021; Mullikin et al., 2021; Peries et al., 2021). For example, while most teachers correctly note that dyslexia is not a visual disability, they also state that the main symptom of dyslexia is seeing letters backward (Gonzalez, 2021; Mullikin et al., 2021). Even with some knowledge of dyslexia, a small number of teachers continue to believe that dyslexia is a visual acuity issue and that other

disabilities cannot co-occur with dyslexia (Knight, 2018; Passadelli et al., 2020). Teachers also demonstrate little knowledge of dyslexia's impact on orientational skills and short-term memory (Passadelli & Klonari, 2020).

Teachers' lack of comprehensive knowledge regarding dyslexia impairs their ability to identify dyslexia symptoms (Makgato et al., 2022; Mullikin et al., 2021; Passadelli & Klonari, 2020). If a teacher is unable to identify dyslexia, they cannot adequately help the students who are struggling with this learning disability. Only 7% of the participants in Makgato et al.'s (2022) research demonstrated adequate knowledge of dyslexia symptoms. Additionally, more than half of the participants in Mullikin et al.'s (2021) study incorrectly identified that dyslexia occurs more often in males than females and that a specific test is needed to appropriately diagnose dyslexia. Many teachers continue to focus solely on the literacy aspects of dyslexia and do not attempt to identify markers of dyslexia outside of reading and writing tasks (Passadelli & Klonari, 2020; Ryder & Norwich, 2019). Therefore, teachers do not typically investigate dyslexia symptoms in other subjects, such as math, science, and history, as they do not possess the understanding that dyslexia impacts all academic areas (Passadelli et al., 2020; Ryder & Norwich, 2019). They also do not focus on the cognitive deficits of dyslexia, such as poor working memory and slow processing speeds (Knight, 2018). Lack of comprehensive knowledge not only impacts a teacher's ability to identify warning signs of dyslexia but also their ability to identify appropriate assessment tools and the depth at which they can analyze the results from the assessments (Peries et al., 2021).

Teachers' misrepresentations of dyslexia and their lack of comprehensive knowledge about dyslexia also lead them to utilize inappropriate teaching methodologies and accommodations (Passadelli et al., 2020). Dyslexia is a language-based learning disability that

requires highly structured instruction in several language-based skills; therefore, studies have investigated teachers' understanding of language and shown that teachers' knowledge of language is superficial rather than comprehensive (Arrow et al., 2019; Peltier et al., 2022). Teachers demonstrate knowledge of phonemic awareness skills but do not about the importance of phonics and morphology (Arrow et al., 2019). Also, teachers tend to answer questions correctly about language but are unable to explain why their answers are correct (Arrow et al., 2019; Peltier et al., 2022). Although teachers correctly identified that phonemic awareness skills were important to utilize, when given the definition of phonemic awareness, they noted that these skills were not important (Peltier et al., 2022). This phenomenon demonstrates a lack of comprehensive understanding of common dyslexia teaching methodologies.

Teachers' Beliefs About Dyslexia

Teachers' perceptions of dyslexia, their attitudes toward students with dyslexia, their confidence in educating those with dyslexia, and how they modify their teaching methods for students with dyslexia vary drastically (Claessen et al., 2020; Indrarathne, 2019; Peries et al., 2021; Worthy et al., 2018a). Studies have shown that training on dyslexia and the amount of knowledge a teacher possesses about dyslexia do not always correlate with improved confidence, positive attitudes, or enhanced student outcomes (Mullikin et al., 2021; Worthy et al., 2018a). Such varied outcomes may be the result of the many debates surrounding dyslexia (Gabriel, 2018). Despite a wealth of research, the definition, assessment, and treatment of dyslexia continues to be debated by various professionals, such as researchers, teachers, legislators, and parents (Gabriel, 2018; Kirby, 2020; Worthy et al., 2018a). Understanding teachers' beliefs about dyslexia is necessary to investigate the outcome of teacher trainings and the depth of teachers' factual knowledge of dyslexia.

Teachers' Perceptions of Dyslexia

Teachers' perceptions of dyslexia vary greatly, and their differences of opinions begin with the definition of dyslexia. While most agree with the standard research-based definition of dyslexia, others believe that the definition is too broad and encompasses other learning differences (Dymock & Nicholson, 2023; Woodcock & Moore, 2021; Worthy et al., 2018a). Those who do not agree with the definition of dyslexia are more likely to hold other negative perceptions of dyslexia. For example, some educators believe that dyslexia is overidentified and over-diagnosed. Others view the word "dyslexia" as nothing more than a catch-all term (Ryder & Norwich, 2019). There is also a strong belief that students are receiving diagnoses of dyslexia at too young an age (Worthy et al., 2018a). Some of the educators were so passionate about the overidentification of dyslexia that they refused to utilize the term "dyslexia." These teachers believed that eliminating the label would provide students with more opportunities to receive appropriate services because it would force teachers to examine the strengths, weaknesses, and needs of the student rather than focusing only on areas that are typically impaired in those with dyslexia (Hellawell, 2022; Worthy et al., 2018a). Some educators disagree with the definition of dyslexia to such a great extent that they do not view dyslexia as a disability (Ryder & Norwich, 2019; Worthy et al., 2018b). While this perspective can hold positive connotations, such as viewing students' strengths rather than their weaknesses, it can also have negative connotations, such as students' lack of academic success being caused by low effort rather than a disability (Ryder & Norwich, 2019; Woodcock & Moore, 2021). Those who hold these negative connotations also have a high expectation of future failure for those with dyslexia (Woodcock & Moore, 2021).

However, not all teachers hold these negative beliefs. Some teachers are highly supportive of the research-based definition of dyslexia (Worthy et al., 2018b). Other teachers believe that dyslexia is highly under-identified and the only proper identification and diagnosis can place students with dyslexia on the path to success. Other teachers support the utilization of the label "dyslexia," arguing that it enables students to feel empowered when they understand the reason behind their academic struggles (Claessen et al., 2020). One teacher from Claessen et al.'s (2020) study noted that students are generally relieved to discover they have dyslexia because it provides them with an understanding of their struggles and differences. While teachers' perceptions of dyslexia vary, some overlapping elements that may influence their beliefs have emerged in the research, such as prior education and experience (Claessen et al., 2020; Worthy et al., 2018a, 2018b).

Teachers' Attitudes Toward Students With Dyslexia in the General Education Classroom

Most schools in the United States of America utilize inclusion in their classrooms, which means that students with disabilities learn alongside their peers without disabilities (Boer et al., 2010). While some teachers and students enjoy and benefit from this blended learning environment, others become frustrated and suffer (Boer et al., 2010; Dymock & Nicholson, 2023; Zee et al., 2020). After reviewing 26 research articles, Boer et al. (2010) found that most teachers regard inclusion with either negative or neutral attitudes. Some teachers tend to foster more negative attitudes toward students with learning disabilities than students without learning disabilities (Boer et al., 2010; Indrarathne, 2019). These teachers label students with learning differences as weak and view them as less motivated than their peers (Indrarathne, 2019). Those with negative views of learning disabilities were also more likely to perceive students with learning disabilities as responsible for their lack of advancement in academic skills (Flynn et al.,

2021). Participants in Flynn et al.'s (2021) study did not believe that their teaching effectiveness could be the cause of the students' lack of academic growth. While teachers are beginning to show more acceptance of those with dyslexia in the general education classroom, students feel that their relationships with their teachers are strained (Zee et al., 2020). Researchers have hypothesized that students with dyslexia may not connect with their teachers due to a lack of understanding and empathy (Zee et al., 2020).

Nevertheless, studies have found that most teachers view inclusion and those with learning disabilities through a highly positive lens (Berchiatti et al., 2022; Dymock & Nicholson, 2023; Peries et al., 2021; Ryder & Norwich, 2019; Woodcock, 2021; Woodcock & Moore, 2021; Woodcock & Nicoll, 2022). These positive attitudes extend beyond primary and secondary educators to lecturers in higher education (Ryder & Norwich, 2019). Studies have uncovered strong relationships between various factors and teachers' positive attitudes toward students with learning disabilities in the general education classroom. Strong comprehensive knowledge of dyslexia, proper training, years of experience, confidence, and awareness of students' diagnoses all indicate that teachers are more likely to have a positive view of inclusion (Peries et al., 2021; Woodcock & Moore, 2021; You et al., 2019). Age and gender were also found to influence positive views of inclusion, as younger teachers and female teachers are more likely to embrace inclusion than older teachers and male teachers (Woodcock, 2021; Woodcock & Nicoll, 2022).

How students with learning disabilities are taught and treated in the general education classroom depends heavily on teachers' confidence, previous experience, knowledge of learning disabilities, and their attitudes toward inclusion (Woodcock, 2021; Woodcock & Faith, 2021; You et al., 2019). Some teachers believe that inclusion only benefits students with disabilities by increasing their social development, while other teachers argue that inclusion benefis students

with disabilities by increasing both social and cognitive development (You et al., 2019). Those who do not believe in inclusion feel strongly that students with learning disabilities will fail academically (Woodcock & Nicoll, 2022). However, those who do believe in inclusion expect positive future academic outcomes for students with learning disabilities (Woodcock, 2021; Woodcock & Faith, 2021). Belief in inclusion is also positively correlated with increased sympathy for those with learning disabilities, reduced frustrations among teachers educating in inclusive classrooms, reduced conflict with students, and improved feedback to students (Berchiatti et al., 2022; Woodcock, 2021; Woodcock & Faith, 2021; Woodcock & Moore, 2021; Woodcock & Nicoll, 2022).

Teachers' Confidence in Educating Students With Dyslexia

Some teachers have reported high confidence in their ability to identify and teach those with dyslexia; however, they were unable to demonstrate an adequate understanding of dyslexia (Dymock & Nicholson, 2023; Okechukwu et al., 2023). Other teachers reported high confidence and could demonstrate a comprehensive knowledge of dyslexia (Peltier et al., 2022). The discrepancy between knowledge and confidence may be due to teachers' inability to properly assess their knowledge. Arrow et al. (2019) found that teachers' perceived knowledge of learning disabilities did not match their actual knowledge of learning disabilities.

Confidence can be increased with training on dyslexia, as confidence has been found to be highly correlated with teacher training (Morris, 2023; Worthy et al., 2018b). However, research has generated mixed results on this concept, as training does not always correspond to improved confidence in teaching those with dyslexia. As mentioned previously, some teachers may feel unconfident despite hours of formal training, while others feel highly confident in their teaching skills and methodologies despite receiving little or no training on dyslexia (Makgato et

al., 2022; Mullikin et al., 2021; Worthy et al., 2018a). Furthermore, experience is positively correlated with perceived confidence in teaching students with dyslexia (Gonzalez, 2021; Mullikin et al., 2021; Yakut, 2021). Mullikin et al. (2021) found that teachers with informal training reported higher levels of preparedness to teach students with dyslexia than teachers who received training on dyslexia during their formal education or professional development courses. This may be due to teachers gaining confidence through real-world practice and the integration of knowledge (Gonzalez, 2021; Mullikin et al., 2021).

Teachers' confidence can vary based on the types of skills they are teaching. Higher confidence has been found to relate to more simplistic language skills, such as sequencing, answering content questions, and basic vocabulary (Abdullah & Benjamin, 2019; Arrow et al., 2019). Conversly, lower confidence has been associated with higher-order language skills, such as figurative language and inferential vocabulary, and teaching complex concepts, such as phonology and orthography. How teachers are expected to teach concepts also impacts their confidence. Teachers who are given explicit programs to follow demonstrated higher confidence in their abilities than those who have to develop lesson plans on their own (Arrow et al., 2019; Worthy et al., 2018b.).

Implementing Dyslexia Treatment Methodologies

The largest issue with teachers implementing dyslexia treatment methodologies is their lack of support and ignorance surrounding evidence-based teaching approaches (Makgato et al., 2022; Peries et al., 2021). Teachers have stated that they are reluctant to consult online sources about dyslexia due to a plethora of misinformation (Makgato et al., 2022). Many have expressed a desire to contact an expert in the field of dyslexia for help, but they are unsure who to contact and feel they are left without support (Dymock & Nicholson, 2023; Makgato et al., 2022; Peries

et al., 2021). Despite decades' worth of detailed research on how to effectively teach those with dyslexia, many teachers are not introduced to that research (A. Anderson, 2021; Moats, 2020). There is often a divide between science and education, which creates a barrier between teachers and research-based literacy approaches (A. Anderson, 2021). Without access to science, teachers are isolated from the resources they need to begin the process of helping students with dyslexia. Several teachers have expressed that they are unaware of appropriate assessment tools to determine which students need help and uncover these students' specific areas of weakness (Dymock & Nicholson, 2023; Peries et al., 2021). This issue is further exasperated by a lack of school policies regarding dyslexia screenings, assessments, and teaching methodologies (Dymock & Nicholson, 2023).

Teachers who believe in common dyslexia misrepresentations tend to utilize inappropriate teaching methodologies (Passadelli et al., 2020). For example, those who think that dyslexia is the result of visual deficits cite eye-tracking exercises as an effective method of remediation (Gonzalez, 2021). Further, those with minimal knowledge of dyslexia have demonstrated great difficulty selecting and utilizing appropriate teaching methods (Gonzalez, 2021; Passadelli & Klonari, 2020). Some teachers believe that increased homework and additional reading practice are enough to overcome dyslexia (Moats, 2020; Peries et al., 2021). Others assume it is beneficial to teach students with dyslexia coping strategies, such as memorizing words based on their shape and utilizing context clues and pictures to decode words, to mitigate their weaknesses (Moats, 2020; Peltier et al., 2022). A few teachers have noted that intelligence plays such a vital role in students' ability to learn that they do not believe implementing standard dyslexia tutoring would be beneficial for those they perceive as possessing low intelligence (Worthy et al., 2018b). Those who believed dyslexia only affects

reading, spelling, and writing do not provide additional supports beyond the English-language arts curriculum (Blamire & Omidire, 2020; Passadelli & Klonari, 2020).

Many teachers possess a general knowledge of teaching methods that are beneficial for those with dyslexia; however, their methods typically focus on changing the presentation of the material (Abdullah & Benjamin, 2019; Boardman, 2020; Dymock & Nicholson, 2023; Makgato et al., 2022). The most commonly implemented method is teaching concepts in a manner that encompasses various learning modalities, such as auditory, visual, and kinesthetic. While this method is helpful, is does not change the instruction or provide students with evidence-based literacy instruction (Makgato et al., 2022). A small number of teachers are aware that students with dyslexia require help beyond what they are able to provide and will refer their students to other professionals, such as reading specialists and speech-language pathologists, as needed (Blamire & Omidire, 2020; Morris, 2023). However, many teachers do not refer their students for help outside of the general education classroom as they feel their knowledge and abilities are adequate to lead their students with learning disabilities to academic success (Peries et al., 2021).

Implementing Structured Literacy

Generally, teachers demonstrate knowledge of the importance of implementing Structured Literacy practices and differential instruction; however, most feel that they are unable to properly implement these methods (Blamire & Omidire, 2020; Boardman, 2020; Dymock & Nicholson, 2023; Peltier et al., 2022). The most commonly cited barriers to properly implementing Structured Literacy techniques are high costs of curriculum and staffing shortages (Boardman, 2020; Morris, 2023; Ryder & Norwich, 2019). Worthy et al. (2018b) interviewed dyslexia intervention teachers in Texas, a state well-known for its innovative dyslexia legislation. Teachers in Texas are prescribed a research-based Structured Literacy curriculum that is multi-

sensory, explicit, systematic, and sequential. The teachers in Worthy et al.'s study stated that the curriculum is effective if provided with fidelity. In other words, the curriculum must be implemented with exactness, which means that teachers must apply each step of the curriculum in the proper order without adding or removing steps while also providing instruction in the proper setting (e.g., small group, one-on-one) for an appropriate duration (e.g., 60 minutes per session, 90 minutes per session) and frequency (e.g., once per week, twice per week; Varghese et al., 2021). Worthy et al. (2018b) found that most teachers were unable to utilize the curriculum with fidelity within the confines of the school environment. Teachers were restricted in their ability to cater to each student due to class sizes and limited instructional time. This phenomenon is common, as curricula are beginning to shift from quality to quantity, and teachers are not being properly educated on the curriculum they are required to utilize in their classrooms (Gabriel, 2018; Indrarathne, 2019). Following professional development courses, teachers are typically only given the tools to follow the curriculum on a surface level and are rarely given the opportunity for further education on the topic; therefore, they are unable to implement the curriculum with fidelity due to a lack of knowledge (Abdullah & Benjamin, 2019; Arrow et al., 2019; Flynn et al., 2021; Morris, 2023). The most commonly cited issue when implementing pre-made curricula was teachers' difficulty presenting the material in a concrete, explicit, and systematic manner (Abdullah & Benjamin, 2019; Arrow et al., 2019).

Knowledge of dyslexia and Structured Literacy methodologies play a large role in how teachers educate students with dyslexia; however, these are not the only areas impacting teaching methodologies. Teachers' perceptions of dyslexia and curriculum can drastically impact how they teach students with dyslexia (Flynn et al., 2021). While found at all levels of education, teachers in higher education tend to have stronger opinions on changing their teaching styles to

meet their students' needs (Ryder & Norwich, 2019). Some professors feel that modifying their teaching style is inappropriate, as their goal is to prepare students for a career. They believe that real-world application does not come with modifications. Other professors argue that changing their lessons would be the equivalent of lowering educational standards. When reviewing beliefs regarding curriculum, many teachers felt that using a published curriculum would make them appear incompetent and eliminate their autonomy as a professional (Moats, 2020). Therefore, teachers avoid these curricula as much as possible despite research on their effectiveness.

Implementing Dyslexia Accommodations

Teachers utilize various accommodations to help those with dyslexia depending upon their knowledge of dyslexia, their perceptions of dyslexia, their knowledge of assistive technology devices, and their access to assistive technology devices (Al-Dababneh & Al-Zboon, 2022; Atanga et al., 2020; Martin, 2020; Passadelli & Klonari, 2020; Schabmann et al., 2020). Lack of adequate accommodations is common across both primary and secondary education settings (Al-Dababneh & Al-Zboon, 2022; Atanga et al., 2020; Demirok et al., 2019; Passadelli & Klonari, 2020). Those who possess a basic understanding of dyslexia tend to utilize common, appropriate accommodations, such as audio-books, speech-to-text software, and extra time (Al-Dababneh & Al-Zboon, 2022; Blamire & Omidire, 2020; Demirok et al., 2019). However, a lack of comprehensive knowledge about dyslexia results in an underutilization of accommodations (Al-Dababneh & Al-Zboon, 2022; Passadelli & Klonari's, 2020). For example, teachers in Passadelli and Klonari's (2020) study taught geography and a majority believed that dyslexia only impacts reading and spelling. Therefore, most teachers did not implement any supports during instruction despite having access to tools that would help students with dyslexia better understand class material, such as 3D maps, diagrams, and computer imaging.

Underutilization of accommodations is also present in higher education. Schabmann et al. (2020) discovered that university professors tend to only provide exam-related accommodations to students with dyslexia despite possessing adequate, basic knowledge of dyslexia. Exam-related accommodations typically include extended time, tests read aloud, and eliminating bubble test forms. Most professors do not adjust their courses to better educate students with dyslexia. Little focus is placed on teaching content in multiple formats or providing materials that can be utilized appropriately with various assistive technologies (Schabmann et al., 2020).

A common issue noted by many teachers is a lack of education about assistive technology (Al-Dababneh & Al-Zboon, 2022; Atanga et al., 2020; Chukwuemeka & Samaila, 2020; Demirok et al., 2019; Indrarathne, 2019; Kundu et al., 2020). Many teachers stated that they tend to only utilize technologies with which they are familiar, such as basic computer software and tablets (Al-Dababneh & Al-Zboon, 2022; Demirok et al., 2019). Teachers have expressed a desire to implement various forms of assistive technology, but they fear they will not be able to implement them properly (Atanga et al., 2020). Further, a lack of training on assistive technology devices has increased common myths about accommodations. Al-Dababneh and Al-Zboon (2022) found that teachers would not utilize word processing software, as they felt it decreased students' motivation to improve their academic skills and would lead to an unnecessary reliance on technology.

Teachers' largest hurdle when navigating accommodations is their lack of access to resources (Al-Dababneh & Al-Zboon, 2022; Atanga et al., 2020; Blamire & Omidire, 2020; Chukwuemeka & Samaila, 2020; Demirok et al., 2019; Indrarathne, 2019; Kundu et al., 2020). Teachers recognize that accommodations can increase student motivation and learning, and some have even noted that accommodations helped them better understand the extent of their students'

difficulties (Blamire & Omidire, 2020; Demirok et al., 2019; Kundu et al., 2020; Nordström et al., 2019). However, teachers cannot be expected to implement accommodations when they are not given the needed supports and technology. The most noted barriers to accommodating students are limited budgets and poor internet connections (Al-Dababneh & Al-Zboon, 2022; Atanga et al., 2020; Blamire & Omidire, 2020; Indrarathne, 2019). Limited budgets not only impact teachers' ability to obtain assistive technology for their students but also increase their class sizes and limit the number of available support teachers (Morris, 2023; Peries et al., 2021; Turner & Spain, 2020). Therefore, some teachers avoid implementing devices as they do not have the time to attend to a singular student or to implement additional classroom management strategies when devices cause distractions (Blamire & Omidire, 2020).

Summary

Bloom's taxonomy of learning domains emphasizes the idea that knowledge is vast and ranges from simple to complex. Those with early levels of knowledge, such as remembering and understanding, have more difficulty implementing their knowledge within a practical scenario (Engelhart et al., 1956). In contrast, higher levels of knowledge, such as analyzing and evaluating, demonstrate that the individual can apply their knowledge accurately and appropriately. As one advances within Bloom's taxonomy, it becomes easier to engage in metacognitive skills that aid in self-assessment. Those with little knowledge tend to have difficulty with self-reflection; therefore, they are often overly confident in their abilities and falsely believe that they are adept within the skilled area (Kruger & Dunning, 2000). Despite increased training on dyslexia, teachers generally continue to present with no knowledge of dyslexia or a surface knowledge of dyslexia (Arrow et al., 2019; Basma & Savage, 2018; Gonzalez, 2021; Jones et al., 2019; Knight, 2018; Makgato et al., 2022). The deficit in teachers'

knowledge of dyslexia has led to beliefs in common dyslexia myths, poor attitudes toward working with students with dyslexia, and the implementation of inappropriate teaching strategies and accommodations (Al-Dababneh & Al-Zboon, 2022; Boer et al., 2010; Moats, 2020; Passadelli & Klonari, 2020; Peries et al., 2021). Additionally, many teachers report possessing high levels of confidence in their ability to effectively educate students with dyslexia despite having little knowledge of dyslexia, inappropriate knowledge of dyslexia, or no training on dyslexia (Claessen et al., 2020; Mullikin et al., 2021; Worthy et al., 2018a). Without proper knowledge of dyslexia, teachers cannot adequately support students with dyslexia, which has a direct negative impact on students with dyslexia and society as a whole.

CHAPTER THREE: METHODS

Overview

The purpose of this quantitative, correlational study was to determine if there was a predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. This chapter begins by discussing the research design choice for this study, including complete definitions of all variables. The research question and null hypothesis follow. Finally, the participants, setting, instrumentation, procedures, and data analysis plans are identified and detailed.

Design

A quantitative correlational design was utilized for this study. According to Gall et al. (2007), correlational research is "a type of investigation that seeks to discover the direction and magnitude of the relationship among variables" (p. 636). Prediction studies, which focus on determining if a variable or group of variables have a predictive relationship with a specific variable, fall under the umbrella of correlation design (Abbott & McKinney, 2012). Correlation design is considered nonexperimental (Warner, 2021). Therefore, the researcher does not interfere with the participants in any manner (Gall et al., 2007). Instead, the researcher collects information about aspects of the participants, such as their beliefs and cognitive skills, without influencing them (Warner, 2021). The main strengths of the correlation design are that it allows researchers to explore many variables at once and it determines the degree of the relationship between the variables (Gall et al., 2007).

Data for three predictor variables and one criterion variable were collected for the present study. The predictor variables are teachers' general knowledge of dyslexia, teachers' knowledge of dyslexia diagnostic markers, and teachers' knowledge of dyslexia treatments. The criterion

variable is teachers' confidence in teaching those with dyslexia. General knowledge refers to the definition of dyslexia, common myths that surround dyslexia, and the overall impact that dyslexia has on one's education (Wadlington & Wadlington, 2005). Knowledge of dyslexia diagnostic markers refers to common dyslexia symptoms as well as the general areas that should be assessed when conducting a dyslexia diagnosis (Soriano-Ferrer et al., 2016). Knowledge of dyslexia treatments refers to appropriate teaching techniques for those with dyslexia as well as accommodations. Confidence in teaching those with dyslexia refers to teachers' personal beliefs that they are prepared to educate students with dyslexia (Gonzalez, 2021). The correlational design enabled the investigation of multiple variables as well as quantifiable data obtained through surveys, which aligned with the needs of the current study (Gall et al., 2007). Additionally, the correlation design was appropriate for the homogeneity of the participants in this study, which consisted of teachers from rural schools in the Appalachian region. Further, the correlation design has been utilized by other studies that have investigated the relationship between teachers' knowledge of dyslexia and a variety of variables, including years of experience and continuing education (Abed & Shackelford, 2022; Knight, 2018; Mullikin et al., 2021).

Research Question

RQ1: How accurately can confidence in teaching those with dyslexia be predicted from a linear combination of dyslexia knowledge domains for rural Appalachian teachers?

Hypothesis

The null hypothesis for this study is:

$H_0$1: There is no significant predictive relationship between the criterion variable (confidence in teaching those with dyslexia), as measured by the Instruction subscale of the

Teaching Students with Disabilities Efficacy Scale, and the linear combination of predictor variables (general knowledge of dyslexia, knowledge of dyslexia diagnostic markers, and knowledge of dyslexia treatments), as measured by the Knowledge and Beliefs About Developmental Dyslexia Scale, for rural Appalachian teachers.

Participants and Setting

This section provides information about the population from which the sample was drawn. Demographic information about the participants, as well as the overall sample size, is discussed. Finally, a description of the setting in which the research was conducted is provided.

Population

The participants for this study were drawn from a convenience sample of public-school teachers in eastern Ohio. The schools were located within the Appalachian region, and 98.5% of the area is considered rural (United States Census Bureau, 2021). A majority of the area's population is comprised of Caucasians. The average household income is within the lower-to-middle class, and fewer than 20% of the population holds a bachelor's degree or higher.

Participants

The number of participants sampled for this study was 117, which exceeded the required minimum sample size. Warner (2013) suggested a minimum sample size of the larger of the two following equations when conducting multiple linear regression: $N > 50 + 8k$ or $N > 104 + k$, where k represents the number of predictor variables. The current study included three predictor variables; therefore, the second calculation produced the largest number ($N > 104 + 3 = 107$). The required minimum sample size was 108. According to Warner (2020), utilizing the above-listed equations to determine sample size "should provide adequate statistical power to detect medium effect sizes" (p. 149).

Convenience sampling procedures were utilized to gather the participants, who were sampled from seven school districts within eastern Ohio. All of the schools were public and allowed open enrollment. Of the participants, 87 taught general education and 30 taught special education. The sample consisted of 20 males and 97 females. There were seven participants in the 18–24-year-old range, 15 participants in the 25–34-year-old range, 36 participants in the 35–44-year-old range, 40 participants in the 45–54-year-old range, 14 participants in the 55–64-year-old range, and five participants in the 65 year or older range.

The participants were gathered from all grade levels, and several taught more than one grade level (34 taught kindergarten, 31 taught first grade, 28 taught second grade, 33 taught third grade, 31 taught fourth grade, 29 taught fifth grade, 31 taught sixth grade, 22 taught seventh grade, 21 taught eighth grade, 26 taught ninth grade, 26 taught 10th grade, 26 taught 11th grade, and 25 taught 12th grade). Years of teaching experience varied, with six participants having less than 1 year of experience, 15 participants having 1-5 years of experience, 11 participants having 6-10 years of experience, 16 participants having 11-15 years of experience, 26 participants having 16-20 years of experience, 20 participants having 21-25 years of experience, and 23 participants having more than 25 years of experience. Most participants held either a bachelor's degree (31) or a master's degree (85). One participant held a doctoral degree.

Twenty-seven participants reported receiving training on dyslexia during their education. Forty-two participants reported receiving training on dyslexia outside of their degree programs. Finally, 63 participants stated that they had taught a child diagnosed with dyslexia at some point in their career.

Setting

The invitation to participate in the study was sent to the participants through email. A link was provided in the email that allowed the participants to access the survey online. Participants had to complete the survey online. The survey link was accessible for three weeks. During that time, participants could complete the survey at their convenience.

Instrumentation

The instruments utilized in this study were the Knowledge and Beliefs About Developmental Dyslexia Scale and the Teaching Students with Disabilities Efficacy Scale. The Knowledge and Beliefs About Developmental Dyslexia Scale was used to measure the three predictor variables: knowledge of general information about dyslexia, dyslexia symptoms, and dyslexia treatments. The Teaching Students with Disabilities Efficacy Scale was used to measure the criterion variable: teachers' confidence in instructing those with dyslexia. Information about the creation of these scales and appropriate uses of the scales are discussed in the following sections.

Knowledge and Beliefs About Developmental Dyslexia Scale (KBDDS)

The purpose of the KBDDS is to measure teachers' knowledge of dyslexia within three domains: general information, symptoms/diagnosis, and treatment, which were the three predictor variables in this study (Soriano-Ferrer & Echegaray-Bengoa, 2014). The KBDDS was created by Soriano-Ferrer and Echegaray-Bengoa (2014) as a way to measure an individual's knowledge of dyslexia. The consequences related to the over-identification and under-identification of dyslexia were the primary driving forces behind the importance of being able to assess professionals' knowledge of dyslexia. The KBDDS was developed to determine the depth and accuracy of a professional's knowledge of dyslexia. Soriano-Ferrer and Echegaray-Bengoa

believed that the KBDDS would be able to determine gaps in teachers' knowledge of dyslexia and aid course instructors in developing appropriate curricula to close any identified gaps. The KBDDS has been utilized in numerous studies to assess teachers' knowledge of dyslexia (Abed & Shackelford, 2022; Dodur & Kumaş, 2021; Echegaray-Bengoa et al., 2017; Schraeder et al., 2021). See Appendix A for the instrument.

Soriano-Ferrer and Echegaray-Bengoa (2014) conducted an intensive literature review before developing the KBDDS. The initial draft of the KBDDS included 65 items, which were reviewed by 12 university professors who specialized in learning disabilities to ensure construct validity. These professors categorized the items into three subscales: general information about dyslexia, symptoms/diagnosis of dyslexia, and treatment of dyslexia. The items were included in the subscales if at least 80% of the professors were in agreement. Following deliberations, the KBDDS was reduced to 50 items. Pilot testing was conducted with a group of 89 elementary teachers. An item-total correlation test was conducted to determine if the 50 items measured the same constructs. Fourteen items were removed based on the item-total correlation, which resulted in the final KBDDS containing 36 items (Soriano-Ferrer & Echegaray-Bengoa, 2014).

Cronbach's alpha was utilized to measure the reliability of the finalized KBDDS. According to Warner (2021), adequate reliability is a Cronbach's alpha of .70 or greater (p. 314). The entire KBDDS has a Cronbach's alpha of .76 (Soriano-Ferrer & Echegaray-Bengoa, 2014). The subscales yielded slightly lower scores on Cronbach's alpha: general information - .69, symptoms/diagnosis - .64, and treatment - .67. Soriano-Ferrer and Echegaray-Bengoa (2014) theorized that these smaller values in comparison with the total scale occurred because the subscales contained significantly fewer items than the scale as a whole. Subsequent research utilizing the KBDDS conducted by Echegaray-Bengoa et al. (2017) found higher scores for

Cronbach's alpha (total scale - .81, general information - .75, symptoms/diagnosis - .73, and treatment - .67). While the KBDDS's subscales had reliability scores below .70 when initially created by Soriano-Ferrer and Echegaray-Bengoa (2014), this instrument was the most appropriate instrument for the present study because it is the only instrument that investigates knowledge of dyslexia in various categories, such as general knowledge, diagnostics, and treatment. Understanding the differences in types of dyslexia knowledge can identify specific gaps in teachers' knowledge and demonstrated the impact these gaps have on teachers' confidence in teaching those with dyslexia. Cronbach's alpha was recalculated for the KBDDS utilizing the data collected during this study to determine if the reliability for the collected data was stronger.

The KBDDS consists of 36 items (Soriano-Ferrer & Echegaray-Bengoa, 2014). There are 17 items under the subscale of general information, 10 items under the subscale of symptoms/diagnosis, and nine items under the subscale of treatment. The items are presented in a random fashion, so the subscale items are not grouped together. Participants respond to the items on a three-choice nominal scale. The choices are true, false, and do not know. Scores range from 0-36. Zero is the lowest score and denotes no knowledge of dyslexia. Thirty-six is the highest score and denotes highly accurate knowledge of dyslexia. An evaluator's copy contains the correct answers to each item. The KBDDS was scored by the researcher utilizing the evaluator's copy. Participants could begin the survey at their convenience and take as long as needed to complete the items. It takes approximately 15 minutes to complete the 36 items on the KBDDS (Soriano-Ferrer & Echegaray-Bengoa, 2014). Permission to utilize the KBDDS was obtained from the authors. See Appendix B for documentation of their permission.

Teaching Students with Disabilities Efficacy Scale (TSDES)

The purpose of the TSDES is to measure teachers' self-efficacy when teaching those with disabilities (Dawson & Scott, 2013). The TSDES examines specific areas of self-efficacy, including confidence in instruction, which was the criterion variable in this study. The TSDES was created by Dawson and Scott (2013) as a way to measure teachers' self-efficacy in teaching students with disabilities. The TSDES was created because previous instruments measuring self-efficacy focused mainly on the general student population rather than students with disabilities. While some instruments have included questions about self-efficacy when working with those with disabilities, these instruments' main focuses were on beliefs and attitudes toward those with disabilities, not self-efficacy. Dawson and Scott's primary motivation for creating the TSDES was their understanding of the importance of teacher self-efficacy. They referenced prior research that had demonstrated a positive relationship between self-efficacy and several important teaching areas, such as classroom behavior, student motivation, and differential instructional practices. The TSDES has been utilized in numerous studies to assess teachers' self-efficacy when teaching students with disabilities (Carey et al., 2019; Katsora et al., 2022; Mathews et al., 2022). See Appendix C for the instrument.

Dawson and Scott (2013) based the TSDES on the Teachers' Sense of Self Efficacy Scale (TSES). The TSES was developed by Tschannen-Moran and Hoy (2001) to assess in-service and pre-service teachers' self-efficacy in teaching the general education population. The initial draft of the TSDES consisted of 11 items, which were reviewed by 15 educational psychology doctoral students (Dawson & Scott, 2013). Following the initial review, three additional items were added to the scale. The TSDES was field tested with the TSES to compare outcomes to determine construct validity. The scales were positively correlated with an $r = .686$, which

indicated that the TSDES and the TSES measured similar, yet different, constructs. The TSDES was further refined through the addition of questions that focused specifically on teachers' self-efficacy in instruction, classroom management, and assessment. These additional items were revised by the same group of doctoral students as well as several in-service teachers. The TSDES was field-tested again with the TSES. The scales were shown to be correlated (r = .742), which further demonstrated appropriate construct validity (Dawson & Scott, 2013).

Cronbach's alpha was utilized to measure the reliability of the finalized TSDES (Dawson & Scott, 2013). Warner (2021) states that adequate reliability is a Cronbach's alpha of .70 or greater (p. 314). The entire TSDES yielded a Cronbach's alpha of .913 (Dawson & Scott, 2013). The subscales also had appropriate Cronbach's alphas: Instruction - .880, Professionalism - .843, Teacher Support - .846, Classroom Management - .882, and Related Duties - .779.

The entire TSDES consists of 19 items; however, only the Instruction subscale, which consists of five items, was utilized for this study (Dawson & Scott, 2013). Participants respond to the items on a nine-point Likert scale, with 1 indicating that they do not believe they could perform the mentioned task and 9 indicating that they have a strong belief they could adequately complete the mentioned task. Therefore, the lowest possible score on the subscale is five, which indicates no confidence in their abilities to instruct students with disabilities, and the highest possible score on the subscale is 45, which indicates extremely high confidence in their abilities to instruct students with disabilities. Participants could begin the survey at their convenience and take as long as necessary to complete the items. It takes approximately three minutes to complete the five items on the Instruction subtest of the TSDES (Dawson & Scott, 2013). Permission to utilize the TSDES was obtained from the authors. See Appendix D for documentation of their permission.

Procedures

IRB approval was secured before data collection began. See Appendix E for IRB approval. Once IRB approval was obtained, an Educational Service Center distributed an email to the seven school districts' special education coordinators or curriculum directors, who proceeded to distribute the email to the teachers within their schools. See Appendix F for the permission form that was sent to the Educational Service Center and Appendix G for their confirmation. The email contained an explanation of the study, contact information in the event that participants had questions about the study, and a link to the online survey. See Appendix H for the recruitment email. Two reminder emails were sent to encourage participation. Once participants clicked on the survey link, they were presented with an information sheet. See Appendix I for the participant study information form. A consent form was not required because the IRB determined that this study qualified for an exemption.

The participants were given three weeks to complete the survey. The survey consisted of the KBDDS; the Instruction subscale of the TSDES; and questions regarding demographic information, current teaching position, years of teaching experience, prior education on dyslexia, and experience working with students with dyslexia. The participants could start and finish the survey at any time during the three-week period. They were encouraged to answer all questions; however, the survey could be completed without answering each question. The survey responses were recorded on the online platform, which the researcher could access.

Due to the electronic nature of this study, data security practices were conducted throughout all data collection and management tasks. The only identifying information collected was email addresses, which were separated from the survey responses by the platform's software. To protect the records and identifying information, the researcher was the only person

to have access to the survey responses and email addresses, which were stored on a password-protected computer. Private, secure internet connections were utilized every time the data were actively viewed on the internet. The data will be retained for a period of five years after the completion of this research study.

Data Analysis

The statistic utilized for this study was multiple linear regression. This analysis was chosen because it allows two or more variables to be utilized as predictors of a criterion variable (Warner, 2021). This study attempted to determine if there was a predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. Teachers' knowledge of dyslexia was examined in three domains: general information, diagnostic markers, and treatment. Multiple linear regression enabled the researcher to determine if there was a predictive correlation between the criterion variable (teachers' confidence) and all three predictor variables at once (Gall et al., 2007).

Data screening was conducted to visually inspect the data for missing data points and inaccuracies. The following assumption tests were completed: independence of observations, a linear relationship between variables, homoscedasticity, absence of multicollinearity, no significant outliers, and normal distribution of residuals. The assumption of independence of observations test can be completed by utilizing the Durbin-Watson statistic, which determines if there is an autocorrelation between the residuals (Laerd Statistics, n.d.). Values for the Durbin-Watson statistic range from 0 to 4, and a value of 2 indicates that there is no autocorrelation. The assumption of a linear relationship between variables and homoscedasticity tests can be completed utilizing a scatter plot. A linear relationship between variables can be determined by plotting a scatterplot of the residuals against the predicted values and utilizing partial regression

plots between each predictor variable and the criterion variable. The scatterplots were checked to determine linearity. Homoscedasticity can be determined by visually inspecting a scatterplot of the criterion variable against the predictor variables. To meet this assumption, the points of the scatterplot will not exhibit a pattern and will be approximately equally spread across the fitted values. Multicollinearity was examined through inspection of the correlation coefficients and the Tolerance and variance inflation factor (VIF) values. To meet the assumption of the absence of multicollinearity, the independent variables should not be highly correlated with each other; therefore, the predictor variables should not possess correlations greater than 0.7 and the VIF values should not be 10 or greater. Significant outliers were determined by utilizing Casewise Diagnostics to identify any case's standardized residuals that are greater than 3 standard deviations from the mean. The assumption of normal distribution of residuals test was completed through the utilization of a P-P Plot. Normal distribution is met if the points are aligned to the line of fit. Statistical significance occurred at $p < .05$ and/or when the *F* statistic was greater than the *F* critical. The effect size was reported based on the coefficient of determination (R^2) following Cohen's definitions of effect, which is that $r^2 < .01$ has a small effect, $r^2 = .09$ has a medium effect, and $r^2 > .25$ has a large effect (Warner, 2021). The alpha level utilized was $\alpha = .05$.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this quantitative, correlational study was to determine if there was a predictive relationship between three facets of teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. A multiple linear regression was used to test the hypothesis. The Findings chapter includes the research question, null hypothesis, data screening, descriptive statistics, assumptions testing, and results.

Research Question

RQ1: How accurately can confidence in teaching those with dyslexia be predicted from a linear combination of dyslexia knowledge domains for rural Appalachian teachers?

Null Hypothesis

$H_0$1: There is no significant predictive relationship between the criterion variable (confidence in teaching those with dyslexia), as measured by the Instruction subscale of the Teaching Students with Disabilities Efficacy Scale, and the linear combination of predictor variables (general knowledge of dyslexia, knowledge of dyslexia diagnostic markers, and knowledge of dyslexia treatments), as measured by the Knowledge and Beliefs about Developmental Dyslexia Scale, for rural Appalachian teachers.

Data Screening

The researcher utilized Microsoft Excel to sort the data into categories based on demographic information, general knowledge of dyslexia, knowledge of dyslexia diagnostic markers, knowledge of dyslexia treatments, and confidence. Various Microsoft Excel functions, such as sorting and formatting, as well as a visual scan, were utilized to check for inconsistencies

in each variable and ensure that all of the data were transferred correctly from the online survey to the Microsoft Excel spreadsheet. No data errors or inconsistencies were identified. The data were entered into SPSS by importing the Microsoft Excel spreadsheet. When complete, all entries were checked manually through visual inspection to ensure that the data were transferred completely and accurately.

Descriptive Statistics

Descriptive statistics were obtained for each variable. The sample consisted of 117 participants. Teachers' general knowledge of dyslexia, their knowledge of dyslexia diagnostic markers, and their knowledge of dyslexia treatments were measured using the KBDDS. The general knowledge subscale has a high score of 17, indicating superior knowledge of basic dyslexia constructs, and a low score of zero, indicating no knowledge of basic dyslexia constructs. The dyslexia diagnostic markers subscale has a high score of 10, which denotes a strong understanding of dyslexia symptoms and diagnostic processes, and a low score of zero, which denotes no knowledge of dyslexia symptoms or the diagnostic process. The dyslexia treatments subscale has a high score of nine, indicating exceptional knowledge of dyslexia treatments, and a low score of zero, indicating no knowledge of dyslexia treatments. Teachers' confidence in teaching those with dyslexia was measured using the instruction subscale of the TSDES. A high score of 45 shows that the teacher had high confidence in their abilities to instruct students with dyslexia, whereas a low score of five means the teacher had no confidence in their abilities to instruct students with dyslexia. Table 1 provides the descriptive statistics for each variable.

Table 1

Descriptive Statistics

	n	Min.	Max.	*M*	*SD*
General Knowledge	117	4	16	10.30	2.780
Diagnostic Markers	117	0	10	6.25	1.952
Dyslexia Treatments	117	0	9	6.04	1.812
Confidence	117	5	45	35.50	7.433
Valid n (listwise)	117				

Cronbach's alpha was calculated for the KBDDS utilizing the data collected. The entire KBDDS had a Cronbach's alpha of .82. The subscales yielded the following for Cronbach's alpha: general knowledge - .67, diagnostic markers - .60, and treatments - .58.

Assumption Testing

The first assumption for running a multiple linear regression is that the criterion variable is continuous, which was true for this study. The second assumption for running a multiple linear regression is that there are two or more predictor variables that are either continuous or nominal. All predictor variables for this study were measured on a continuous scale; therefore, this assumption was also met.

Independence of Observations

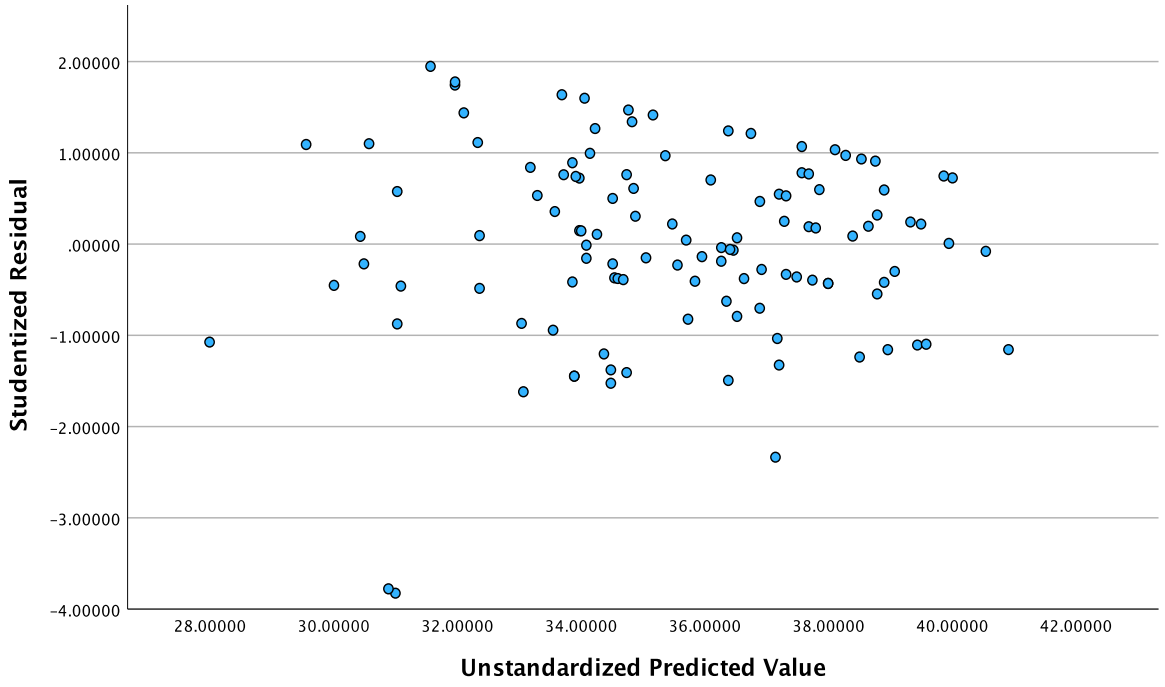
The assumption of independence of observations was tested using the Durbin-Watson statistic. A value of 1.70 was reported, which is close to 2; therefore, the assumption of independence of observations was tenable.

Assumption of Linearity

Multiple linear regression requires that the assumption of linearity be met. This was done in two parts. First, linearity was assessed between the criterion variable and the continuous predictor variables collectively by plotting the studentized residuals against the unstandardized predicted values. Visual inspection of the scatter plot indicated a nearly normal distribution for all. See Figure 1 for the scatterplot.

Figure 1

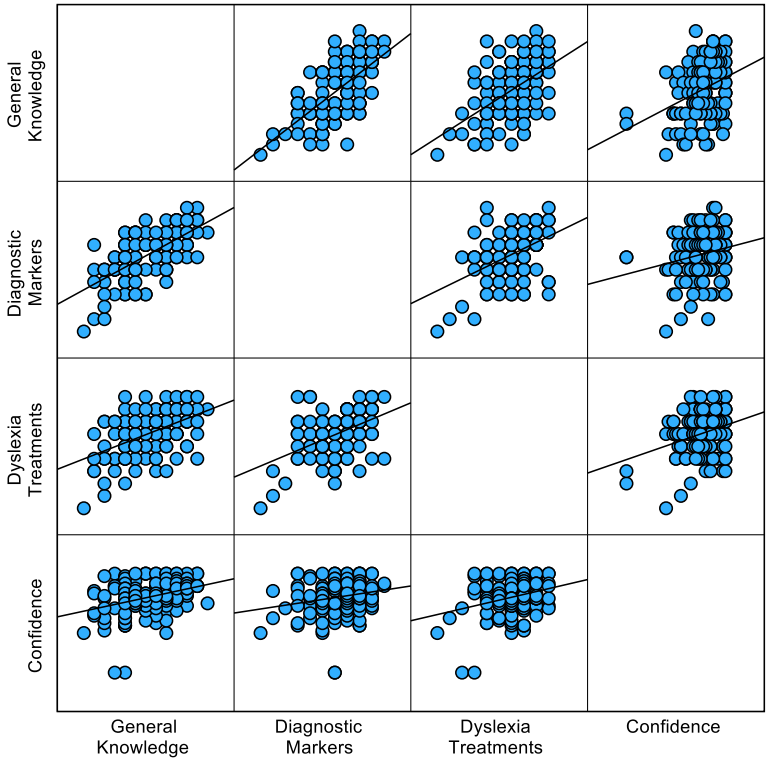
Scatterplot of Studentized Residual by Unstandardized Predicted Value



Next, the linear relationship between the criterion variable and each of the predictor variables was assessed using partial regression plots. See Figure 2 for the matrix scatterplot. Visual inspection revealed a nearly linear relationship. Therefore, the assumption of linearity was tenable.

Figure 2

Matrix Scatterplot for General Knowledge, Diagnostic Markers, Dyslexia Treatments, and Confidence



Assumption of Homoscedasticity

The assumption of homoscedasticity was checked using the scatterplot created when assessing the assumption of linearity by plotting the studentized residuals against the unstandardized predicted values (see Figure 1). The scatterplot showed that the residuals were evenly spread; thus, the assumption of homoscedasticity was tenable.

Assumption of the Absence of Multicollinearity

To test this assumption, Pearson's correlation coefficients and VIF tests were conducted. Examination of Pearson's correlation coefficients for all predictor variables revealed all correlations to be below the threshold of $r = 0\ .7$, as shown in Table 2.

Table 2

Pearson correlation (r)

Variable		1	2	3
1	General Knowledge	--	.65	.50
2	Diagnostic Markers	.65	--	.45
3	Dyslexia Treatments	.50	.45	--

Note. $N = 117$

Table 3 shows the collinearity statistics. The assumption of the absence of multicollinearity between the predictor variables was met.

Table 3

Collinearity Statistics

		Collinearity Statistics	
Model		Tolerance	VIF
1	General Knowledge	.524	1.910
	Diagnostic Markers	.555	1.801
	Dyslexia Treatments	.721	1.386

a. Dependent Variable: Confidence

Assumption of no Significant Outliers

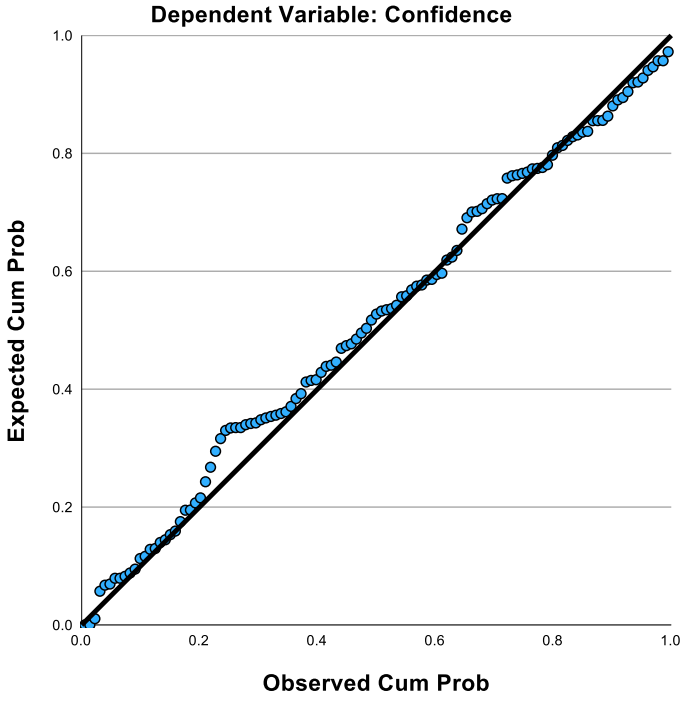
Casewise diagnostics were used to determine if any case's standardized residual was greater than ±3 standard deviations. Two cases were identified as being greater than ±3 standard deviations (-3.7 and -3.6). Leverage points were examined, and all cases were below .2. Cook's Distance values were examined, and all cases were below 1. Since there were no high-leverage or highly influential cases, despite the two cases with significant outliers, all data were retained.

Assumption of Normal Distribution of Residuals

P-P plots were created to determine if the data were normally distributed. The results indicated the assumption was met for all data, as seen in Figure 3.

Figure 3

Normal P-P Plot of Regression Standardized Residual



Results

Multiple linear regression was conducted to determine if there was a predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. The predictor variables were teachers' general knowledge of dyslexia, teachers' knowledge of dyslexia diagnostic markers, and teachers' knowledge of dyslexia treatments. The criterion variable was teachers' confidence in teaching those with dyslexia. The researcher rejected the null hypothesis at the 95% confidence level, where $F(3, 113) = 5.79$, $p = .001$. There was a significant relationship between the predictor variables (general knowledge of dyslexia,

knowledge of dyslexia diagnostic markers, and knowledge of dyslexia treatments) and the criterion variable (confidence in teaching those with dyslexia). Table 4 provides the regression model results.

Table 4

Regression Model Results

Model		*SS*	*df*	*MS*	*F*	Sig.
1	Regression	853.764	3	284.588	5.789	.001[b]
	Residual	5555.484	113	49.164		
	Total	6409.248	116			

a. Dependent Variable: Confidence
b. Predictors: (Constant), Dyslexia Treatments, Diagnostic Markers, General Knowledge

The model's effect size was medium where $R = .365$. Furthermore, approximately 13% of the variance of the criterion variable could be explained by the linear combination of predictor variables. Table 5 provides a summary of the model.

Table 5

Model Summary

Model	*R*	R^2	Adjusted R^2	*SEM*
1	.365[a]	.133	.110	7.012

a. Predictors: (Constant), Dyslexia Treatments, Diagnostic Markers, General Knowledge

Because the researcher rejected the null hypothesis, analysis of the coefficients was required. Based on the coefficients, it was found that general knowledge was the best predictor of confidence, where $p = .016$. Table 6 provides the coefficients.

Table 6

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	*SE*	*β*	*t*	Sig.
1	(Constant)	24.822	2.775		8.945	<.001
	General Knowledge	.793	.324	.296	2.449	.016
	Diagnostic Markers	-.254	.448	-.067	-.568	.571
	Dyslexia Treatments	.680	.423	.166	1.607	.111

a. Dependent Variable: Confidence

CHAPTER FIVE: CONCLUSIONS

Overview

Chapter Five investigates the results of this quantitative, correlational study that sought to determine if there was a predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. The chapter opens with a discussion of the findings and compares the results to previous studies, existing literature, and theoretical constructs. The implications and limitations of the study are also discussed. Finally, recommendations for future research are provided.

Discussion

The purpose of this quantitative, correlational study was to determine if there was a predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. Knowledge of dyslexia was examined in three facets: general knowledge of dyslexia, knowledge of dyslexia diagnostic markers, and knowledge of dyslexia treatments. The study was conducted through an online survey that was sent to teachers within seven public-school districts located in Appalachia (eastern Ohio). One hundred seventeen teachers responded to the survey.

The survey contained two instruments, the KBDDS and the Instruction subscale of the TSDES, as well as questions regarding demographic information, current teaching position, years of teaching experience, prior education on dyslexia, and experience working with students with dyslexia. Both the KBDDS and the TSDES contain appropriate validity, which demonstrates that the scales truly measure what they claim to measure: dyslexia knowledge and confidence in instructing those with learning differences, respectively (Dawson & Scott, 2013; Soriano-Ferrer & Echegaray-Bengoa, 2014; Warner, 2020). Furthermore, the TSDES,

specifically the Instruction subscale, demonstrates appropriate reliability with a Cronbach's alpha of .880 (Dawson & Scott, 2013). Warner (2021) stated that adequate reliability is a Cronbach's alpha of .70 or greater (p. 314). Reliability refers to an instrument's capability to obtain consistent results when administered at various times or across different settings (Gall et al., 2007; Warner, 2020). While the entirety of the KBDDS contained appropriate reliability with a Cronbach's alpha of .76, the subscales yielded slightly lower scores on Cronbach's alpha: general information - .69, symptoms/diagnosis - .64, and treatment - .67 (Soriano-Ferrer & Echegaray-Bengoa, 2014). Cronbach's alpha was calculated for the KBDDS utilizing data collected during this study to determine if the reliability of the collected data was stronger. The results were similar, with a Cronbach's alpha of .82 for the entire instrument and lower scores on the subscales: general knowledge - .67, diagnostic markers - .60, and treatments - .58. The researcher maintains that this instrument was the most appropriate measure for the study as it is the only instrument that investigates knowledge of dyslexia in various categories, such as general knowledge, diagnostics, and treatment, and it has been utilized in numerous other studies to assess teachers' knowledge of dyslexia (Abed & Shackelford, 2022; Dodur & Kumaş, 2021; Echegaray-Bengoa et al., 2017; Schraeder et al., 2021).

This study aimed to answer the following research question: How accurately can confidence in teaching those with dyslexia be predicted from a linear combination of dyslexia knowledge domains for rural Appalachian teachers? The null hypothesis stated that there was no significant predictive relationship between the criterion variable (confidence in teaching those with dyslexia), as measured by the Instruction subscale of the Teaching Students with Disabilities Efficacy Scale, and the linear combination of predictor variables (general knowledge of dyslexia, knowledge of dyslexia diagnostic markers, and knowledge of dyslexia treatments),

as measured by the Knowledge and Beliefs about Developmental Dyslexia Scale, for rural Appalachian teachers. A multiple linear regression was conducted to test the null hypothesis. The researcher rejected the null hypothesis at the 95% confidence level, where $F(3, 113) = 5.79$, $p = .001$. The results revealed a statistically significant predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. The model's effect size was medium, where $R = .365$. Furthermore, approximately 13% of the variance of the criterion variable could be explained by the linear combination of predictor variables. An analysis of the coefficients revealed that general knowledge of dyslexia was the best predictor of teachers' confidence, where $p = .016$

The literature has mixed results when investigating the relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia. The findings of this study support other studies that have also found a relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia (Echegaray-Bengoa et al., 2017; Gonzalez, 2021; Peltier et al., 2022). These studies concluded that confidence in teaching those with dyslexia increases as teachers' knowledge of dyslexia increases. The current study did not align with studies that found teachers to have either high confidence in teaching those with dyslexia and little to no knowledge of dyslexia or low confidence in teaching those with dyslexia and adequate knowledge of dyslexia (Claessen et al., 2020; Dymock & Nicholson, 2023; Mullikin et al., 2021; Okechukwu et al., 2023; Worthy et al., 2018a).

The relationship between knowledge and confidence was viewed through the lens of the Dunning-Kruger effect, which postulates that those with the least amount of knowledge on a topic tend to be the most confident in their abilities within the topic area (Kruger & Dunning, 2000). Previous research has supported this theory, as teachers with little to no knowledge of

dyslexia demonstrated high levels of confidence in their ability to educate those with dyslexia (Mullikin et al., 2021; Worthy et al., 2018a). However, the current study does not support this theory, as knowledge and confidence grew in tandem. Other studies have also observed this tandem growth (Gonzalez, 2021; Knight, 2018).

This study found general knowledge of dyslexia to be the best predictor of teachers' confidence in teaching those with dyslexia, which aligns with several studies that have also demonstrated that teachers possess superficial, or general knowledge, of dyslexia (Arrow et al., 2019; Knight, 2018; Makgato et al., 2022; Passadelli et al., 2020). In contrast to previous studies, most of the participants in this study did not believe in several of the common myths about dyslexia, such as those with dyslexia possessing low intelligence and dyslexia not being a real disability (Peries et al., 2021; Worthy et al., 2018a). The most commonly perpetuated myth about dyslexia is that its root cause is a visual deficit (Gonzalez, 2021; Peltier et al., 2022; Peries et al., 2021). Approximately 69% of the participants in this study correctly noted that dyslexia was not caused by visual perception deficits. Despite possessing underlying knowledge that dyslexia is not a visual issue, only 38 participants noted that reversals of letters and words are not the main characteristics of dyslexia. Previous studies have also uncovered this exact paradox, where teachers state that vision does not play a role in dyslexia, yet they note that viewing letters backward is the main symptom of dyslexia (Gonzalez, 2021; Mullikin et al., 2021).

While a strong general knowledge of dyslexia was observed in this study, many of the more complex questions regarding dyslexia were answered incorrectly. Previous studies have demonstrated that educators typically have a foundation of basic dyslexia knowledge but do not possess comprehensive knowledge of dyslexia (Gonzalez, 2021; Mullikin et al., 2021; Passadelli & Klonari, 2020; Peries et al., 2021). Similar to the results of Mullikin et al.'s (2021) study,

slightly more than half of the participants in the present study incorrectly stated that dyslexia occurs more often in males than females. Additionally, 50 of the participants believed there was no difference in brain structure between those with dyslexia and those without dyslexia. Since dyslexia is caused by a neurological difference, it impacts all academic areas as well as some basic neurological processes, such as working memory (D'Mello & Gabrieli, 2018; International Dyslexia Association, 2019, 2020b; Shaywitz & Shaywitz, 2020; Smith-Spark et al., 2016). Other studies have similarly found that teachers do not possess an understanding of dyslexia outside of basic reading and writing skills (Knight, 2018; Passadelli et al., 2020; Ryder & Norwich, 2019).

The current study also revealed that participants possessed some understanding of Structured Literacy concepts. Approximately 75% of the participants identified the importance of direct, structured, and sequential instruction in combination with emphasizing phonological patterns among letters. Other studies have shown that most teachers understand these concepts and the benefits of Structured Literacy instruction when educating those with dyslexia (Blamire & Omidire, 2020; Boardman, 2020; Dymock & Nicholson, 2023; Peltier et al., 2022). In previous studies, many teachers have stated that they implement various learning modalities, such as auditory, visual, and kinesthetic, when teaching those with dyslexia; however, 71 of the participants in the present study noted that multisensory instruction was an ineffective teaching method for those with dyslexia (Boardman, 2020; Makgato et al., 2022).

Mixed results were also noted when reviewing teachers' understanding of accommodations that are appropriate for those with dyslexia. Of the participants in this study, 94% felt that accommodations, such as extra time and shortened spelling tests, were equitable adaptations that benefited those with dyslexia. This finding contradicts that of Al-Dababneh and

Al-Zboon's (2022) study, which showed that teachers believed accommodations decrease student motivation and are unfair to other students. However, various studies have demonstrated that teachers generally utilize common, appropriate accommodations (Blamire & Omidire, 2020; Demirok et al., 2019). The most commonly utilized inappropriate accommodation is the implementation of colored lenses or colored overlays (Gonzalez, 2021). Only 28 participants in this study noted that colored lenses or colored overlays are not beneficial for those with dyslexia.

Bloom's taxonomy of learning domains was utilized as a framework for examining the depth of teachers' knowledge of dyslexia. Bloom's taxonomy of the cognitive domain consists of six levels that increase in knowledge depth, understanding, and plasticity: knowledge, comprehension, application, analysis, synthesis, and evaluation (Engelhart et al., 1956). It is believed that teachers cannot fully utilize their knowledge if they do not know how to expand their knowledge beyond lower-level cognitive skills (Bloom, 1974; Engelhart et al., 1956). This study highlighted these boundaries. The participants demonstrated an understanding of general dyslexia knowledge, but they did not possess an in-depth knowledge of dyslexia and did not always implement appropriate accommodations or all aspects of appropriate teaching strategies. This pattern has also been shown in previous research (Passadelli et al., 2020; Schabmann et al., 2020).

Implications

Dyslexia awareness is currently trending across the United States of America, with parent groups and legislation attempting to address the barriers between research, teacher training, and proper implementation of evidence-based treatments and accommodations (A. Anderson, 2021; Gabriel, 2018; Indrarathne, 2019; Odegard et al., 2021; Reading Sufficiency Act, 2019; Teacher Professional Development in Dyslexia, 2021; Worthy et al., 2018b). This study helped to

reconcile the contradictory findings from previous studies (Gonzalez, 2021; Worthy et al., 2018a). It also explored the knowledge and views of those in a rural area located within the Appalachian region, which has yet to be thoroughly investigated, as most studies have focused on urban areas (Gonzalez, 2021; Mullikin et al., 2021; Worthy et al., 2018a). This extension of research is important, as the Appalachian region varies greatly in culture from other areas and has been suppressed by poverty and the opioid epidemic (Sherfinski et al., 2021).

This study found a statistically significant predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia, suggesting that teachers' confidence in teaching those with dyslexia grows in tandem with their knowledge of dyslexia. Research has found that those who are overconfident in their abilities to educate those with dyslexia tend to disagree with common, research-based knowledge, such as the medical model of dyslexia, and implement inappropriate teaching methodologies (Mullikin et al., 2021; Worthy et al., 2018a). Thus, a continual balance between knowledge and confidence is necessary, as knowledge enables individuals to utilize metacognitive skills to self-evaluate their strengths and weaknesses (Kruger & Dunning, 2000). The current findings suggest that teachers possess adequate knowledge to reflect on their abilities, which means they are more likely to utilize appropriate teaching strategies and accommodations as well as adjust their approaches as needed based on their current knowledge and skillset. This is highly impactful, as those with dyslexia who are given appropriate instruction and accommodations thrive academically and demonstrate increased participation and motivation within educational environments (Atanga et al., 2020; Birsh & Carreker, 2019; Fallon & Katz, 2020; V. Johnston, 2019; Martin, 2020; Moats, 2019; Nordström et al., 2019; Spear-Swerling, 2019; Svensson et al., 2021).

An important finding from this study was that the participants demonstrated an understanding of general dyslexia knowledge; however, they did not possess an in-depth knowledge of dyslexia and did not always implement appropriate accommodations or all aspects of appropriate teaching strategies. Understanding teachers' current knowledge base and identifying their weaknesses is essential to crafting effective and appropriate teacher trainings (Peltier et al., 2020; Sayeski, 2019). According to this study, teacher training should focus on utilizing multisensory instruction, implementing appropriate accommodations, and identifying dyslexia, specifically aspects of dyslexia that are not related to reading and spelling.

Limitations

Several limitations relating to both internal and external validity were noted in this study. Internal validity refers to the extent to which a study's results were not impacted by other variables (Warner, 2021). External validity refers to the extent to which a study's results can be generalized to other settings or applied in a practical, real-world scenario (Gall et al., 2007; Warner, 2021).

The first limitation was the sample population utilized for this study, as it impacted both internal and external validity. Teachers in the state of Ohio are required by law to receive training on dyslexia (Teacher Professional Development in Dyslexia, 2021). The survey for this study was sent to Ohio teachers within the first quarter of the school year, which is important to note as several in-service teacher trainings occur shortly before the beginning of the school year. Therefore, the participants may have recently undergone professional development training on dyslexia and been able to recall information on dyslexia due to recent exposure rather than a true, deep understanding. Because the sample was drawn from Ohio teachers within the Appalachian

region, results cannot be generalized to areas outside of the Appalachian region or populations that are not required to undergo training on dyslexia.

Another limitation concerning external validity was the study's effect size. Although a statistically significant relationship was discovered, the effect size was medium. According to Warner (2021), effect size is important as it helps to denote the difference between statistical significance and practice significance. A study can be statically significant but the difference may be too small to notice in the real world (Warner, 2021). A medium effect size suggests that the difference may be noticeable within the classroom in a real-world setting but not overtly easy to recognize.

A third limitation was possible non-response bias, which occurs when participants do not complete or answer all of the items on a survey (Sedgwick, 2014). The survey was sent to approximately 700 teachers, and 117 teachers responded to the survey. Therefore, the response rate was approximately 17%. The large number of individuals who did not respond may have possessed different levels of dyslexia knowledge or confidence. Additionally, those who responded to the survey may have had a higher interest in dyslexia and, consequently, possessed greater knowledge of dyslexia than those who did not respond to the survey.

A fourth limitation was the utilization of the KBDDS despite having a lower Cronbach's alpha than recommended. The KBDDS's reliability was not strong enough to assume that similar results would be obtained if this instrument were utilized again with the same population. Nevertheless, the KBDDS was able to provide valuable information about teachers' knowledge of dyslexia in various domains (general, diagnostics, and treatment).

Recommendations for Future Research

Researching teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia helps to bridge the gaps in existing research and improve student outcomes by ensuring teachers are equipped to educate and support students with dyslexia. The current study examined the predictive relationship between teachers' knowledge of dyslexia and their confidence in teaching those with dyslexia within a rural Appalachian region. While this study helped to close some of the gaps in the current literature, many areas have yet to be explored. The following are recommendations for future research:

1. Replication of this study with participants from other areas within the Appalachian region and outside of the Appalachian region to increase generalizability.
2. Replication of this study with participants from states with and without dyslexia legislation to compare the effectiveness of legally mandated teacher trainings.
3. Replication of this study with a different instrument to measure dyslexia knowledge to compare and contrast findings from this study and further investigate the reliability of the KBDDS.
4. Conduct qualitative research to further investigate teachers' confidence in their ability to educate those with dyslexia and their perspectives on various dyslexia teaching techniques and accommodations.
5. Investigate additional variables that may impact teachers' confidence in teaching those with dyslexia, such as administrative support, financial restraints, and accessibility to resources.
6. Investigate the relationships between teachers' knowledge of dyslexia, their confidence in teaching those with dyslexia, and students with dyslexia's academic performance.

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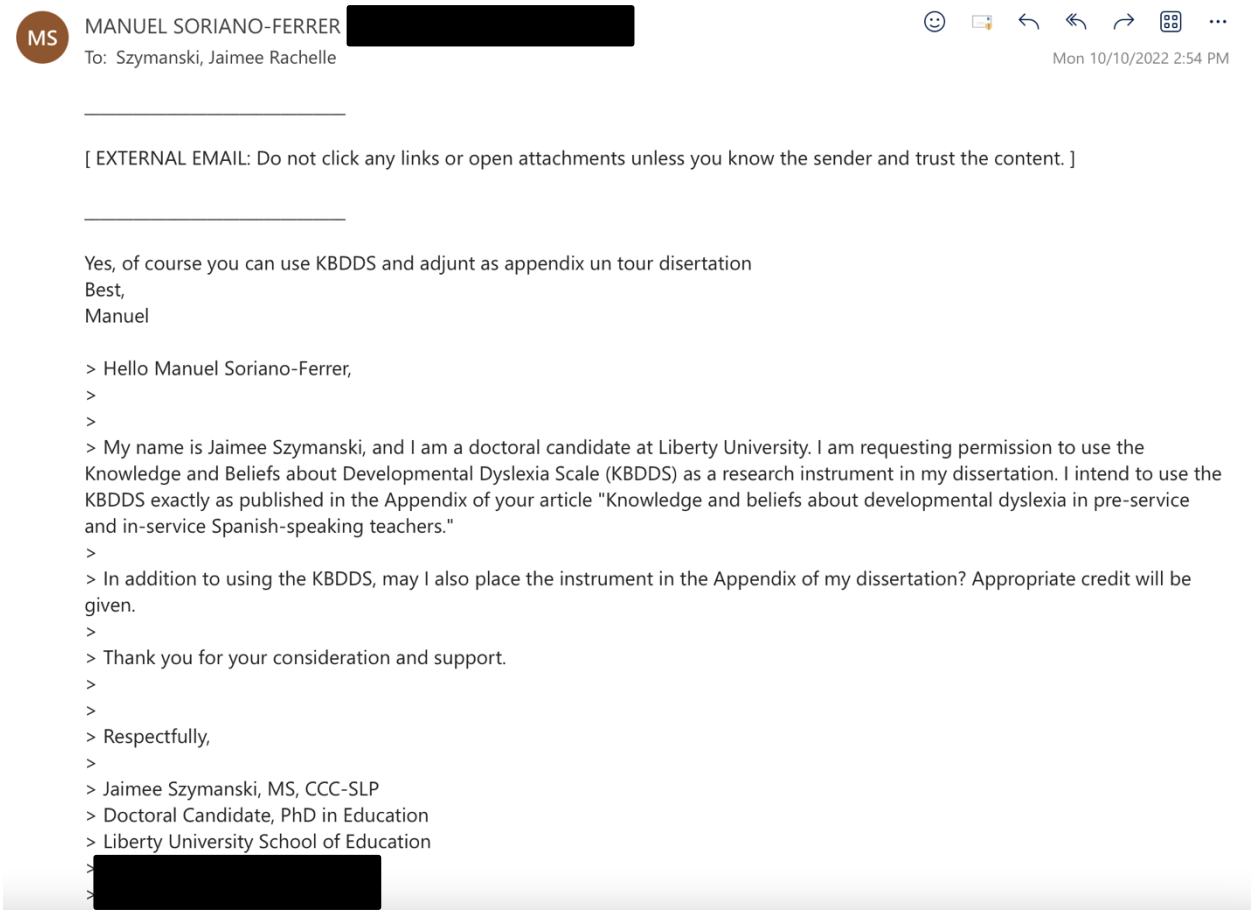
APPENDIX A

Item	Question	True	False	Do Not Know
1	Dyslexia is a neurologically based disorder.			
2	Dyslexia is caused by visual perception deficits resulting in reversals of letters and words.			
3	A child can be dyslexic and gifted.			
4	Most children with dyslexia usually have emotional and/or social problems.			
5	The brains of people with dyslexia are different from those of people without dyslexia.			
6	Dyslexia is hereditary.			
7	Most studies indicate that about 5% of school-age students have dyslexia.			
8	Dyslexia is more frequent in males than in females.			
9	Generally, children with dyslexia have problems with phonological awareness (e.g., the ability to hear and manipulate sounds in language).			
10	Modeling fluent reading is often used as a teaching technique.			
11	People with dyslexia have below-average intelligence.			
12	Students with dyslexia often read with inaccuracy and lack of fluency.			
13	Reversing letters and words is the main characteristic of dyslexia.			
14	Difficulty with phonological processing of information is one of the major deficits True found in dyslexia.			
15	Intelligence tests are useful in identifying dyslexia.			
16	All poor readers have dyslexia.			
17	Children with dyslexia can be helped by using colored lenses/colored overlays.			
18	Physicians can prescribe medications to help students with dyslexia.			
19	Multisensory instruction has been shown to be an ineffective teaching method for treating dyslexia.			
20	Students who have reading disabilities without an apparent cause (e.g., intellectual disabilities, absenteeism, inadequate instruction,...) are referred to as dyslexic.			
21	Children with dyslexia are not stupid or lazy. Knowing about the term helps children.			
22	Giving students with dyslexia accommodations, such as extra time on tasks, shorter spelling lists, special seating close to the teacher, etc., is unfair to other students.			
23	Intervention programs that emphasize phonological aspects of language with letters as visual support are effective for students with dyslexia.			

24	Most teachers receive specific training to work with dyslexic children.			
25	I think dyslexia is a myth, a problem that does not really exist.			
26	Techniques involving repeated reading of material (e.g., words, sentences or texts) help to improve reading fluency.			
27	Problems in establishing laterality (body schema) are the cause of dyslexia.			
28	Students with dyslexia need structured, sequential, direct instruction in basic skills and learning strategies.			
29	Dyslexia refers to a relatively chronic condition that is often not completely overcome.			
30	Many students with dyslexia continue to have reading problems as adults.			
31	Many students with dyslexia have low self-esteem.			
32	Children with dyslexia have problems with decoding and spelling, but not with listening comprehension.			
33	Applying an individual reading test is essential in diagnosing dyslexia.			
34	Children with dyslexia generally tend to be poor spellers.			
35	Dyslexia usually lasts a long time.			
36	Dyslexia is characterized by difficulties in learning to read fluently.			

APPENDIX B



MS

MANUEL SORIANO-FERRER [redacted]

To: Szymanski, Jaimee Rachelle

Mon 10/10/2022 2:54 PM

[EXTERNAL EMAIL: Do not click any links or open attachments unless you know the sender and trust the content.]

Yes, of course you can use KBDDS and adjunt as appendix un tour disertation
Best,
Manuel

> Hello Manuel Soriano-Ferrer,
>
>
> My name is Jaimee Szymanski, and I am a doctoral candidate at Liberty University. I am requesting permission to use the Knowledge and Beliefs about Developmental Dyslexia Scale (KBDDS) as a research instrument in my dissertation. I intend to use the KBDDS exactly as published in the Appendix of your article "Knowledge and beliefs about developmental dyslexia in pre-service and in-service Spanish-speaking teachers."
>
> In addition to using the KBDDS, may I also place the instrument in the Appendix of my dissertation? Appropriate credit will be given.
>
> Thank you for your consideration and support.
>
>
> Respectfully,
>
> Jaimee Szymanski, MS, CCC-SLP
> Doctoral Candidate, PhD in Education
> Liberty University School of Education
> [redacted]

APPENDIX C

1. I can adapt the curriculum to help meet the needs of a student with disabilities in my classroom.

1	2	3	4	5	6	7	8	9
Certain I Cannot								Certain I Can

2. I can adjust the curriculum to meet the needs of high-achieving students and low-achieving students simultaneously.

1	2	3	4	5	6	7	8	9
Certain I Cannot								Certain I Can

3. I can use a wide variety of strategies for teaching the curriculum to enhance understanding for all of my students, especially those with disabilities.

1	2	3	4	5	6	7	8	9
Certain I Cannot								Certain I Can

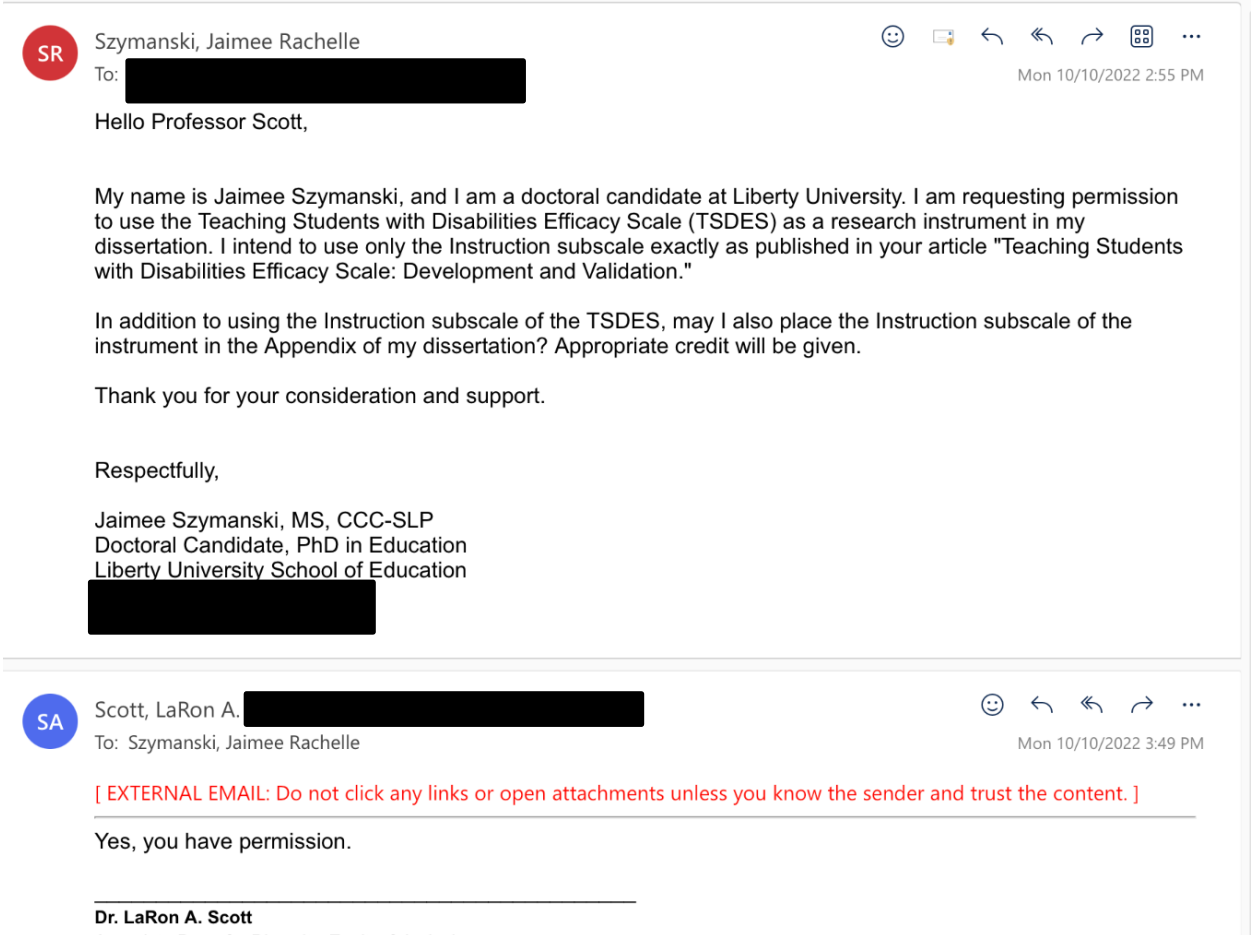
4. I can adjust my lesson plans to meet the needs of all of my students, regardless of their ability level.

1	2	3	4	5	6	7	8	9
Certain I Cannot								Certain I Can

5. I can break down a skill into its component parts to facilitate learning for students with disabilities.

1	2	3	4	5	6	7	8	9
Certain I Cannot								Certain I Can

APPENDIX D



SR

Szymanski, Jaimee Rachelle

To: [redacted]

Mon 10/10/2022 2:55 PM

Hello Professor Scott,

My name is Jaimee Szymanski, and I am a doctoral candidate at Liberty University. I am requesting permission to use the Teaching Students with Disabilities Efficacy Scale (TSDES) as a research instrument in my dissertation. I intend to use only the Instruction subscale exactly as published in your article "Teaching Students with Disabilities Efficacy Scale: Development and Validation."

In addition to using the Instruction subscale of the TSDES, may I also place the Instruction subscale of the instrument in the Appendix of my dissertation? Appropriate credit will be given.

Thank you for your consideration and support.

Respectfully,

Jaimee Szymanski, MS, CCC-SLP
Doctoral Candidate, PhD in Education
Liberty University School of Education
[redacted]

SA

Scott, LaRon A. [redacted]

To: Szymanski, Jaimee Rachelle

Mon 10/10/2022 3:49 PM

[EXTERNAL EMAIL: Do not click any links or open attachments unless you know the sender and trust the content.]

Yes, you have permission.

Dr. LaRon A. Scott

APPENDIX E

Date: 8-31-2023

IRB #: IRB-FY23-24-177
Title: The Predictive Relationship Between Teachers' Knowledge of Dyslexia and Their Confidence in Supporting Students With Dyslexia
Creation Date: 8-2-2023
End Date:
Status: Approved
Principal Investigator: Jaimee Fisher
Review Board: Research Ethics Office
Sponsor:

Study History

Submission Type	Review Type	Decision
Initial	Exempt	Exempt

Key Study Contacts

Member	Rich Jensen	Role	Co-Principal Investigator	Contact	[redacted]
Member	Jaimee Fisher	Role	Principal Investigator	Contact	[redacted]
Member	Jaimee Fisher	Role	Primary Contact	Contact	[redacted]

APPENDIX F

08, 31, 2023

[redacted]
Superintendent
[redacted]
[redacted] Ohio [redacted]

Dear [redacted]

As a doctoral candidate in the School of Education at Liberty University, I am conducting research for my dissertation as part of the requirements for a doctor of philosophy degree. The title of my dissertation is "The Predictive Relationship Between Teachers' Knowledge of Dyslexia and Their Confidence in Supporting Students with Dyslexia." The purpose of this study is to determine if there is a predictive relationship between teachers' understanding of dyslexia and their confidence in their abilities to educate students with dyslexia.

I am writing to request that you communicate with the special education coordinators within [redacted] to invite their school districts to participate in my research study. I have created an email communication that can be sent to the special education coordinators, which can then be forwarded to the teachers in their districts. If needed, I can send individual permission forms to each special education coordinator for their district.

Participants will be asked to complete the attached survey. Participants will be presented with information about the study prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. If you choose to grant permission, please email a signed statement on official letterhead indicating your approval to jfisher102@liberty.edu.

Sincerely,

Jaimee Szymanski, MS, CCC-SLP
Doctoral Candidate, PhD in Education
Liberty University School of Education
[redacted]

APPENDIX G

[redacted] Sep 6, 2023, 8:37 AM

to me

Hi Jaimee!
Congratulations! I can distribute everything out through our SPED directors/curriculum directors. Let me know when you want me to send it to them.
Thanks and I hope you are doing well!
[redacted]

From: Jaimee Szymanski [redacted]
Sent: Thursday, August 31, 2023 7:48 PM
To: [redacted]
Cc: [redacted]
Subject: Re: Dissertation Survey

APPENDIX H

Dear Potential Participant,

As a doctoral candidate in the School of Education at Liberty University, I am conducting research for my dissertation as part of the requirements for a doctor of philosophy degree. The title of my dissertation is "The Predictive Relationship Between Teachers' Knowledge of Dyslexia and Their Confidence in Supporting Students with Dyslexia." The purpose of this study is to determine if there is a relationship between teachers' understanding of dyslexia and their confidence in their abilities to educate students with dyslexia. I am writing to invite you to join my study.

Participants must be 18 years of age or older and teach students in grades K-12. Participants will be asked to take an anonymous, online survey. It should take approximately 20 minutes to complete the survey. Participation will be completely anonymous, and no personal identifying information will be collected.

To participate, please click here (https://www.surveymonkey.com/r/8BC7KQT) to complete the survey.

Participants can partake in a raffle for a chance to receive one of ten $25 Amazon gift cards.

Sincerely,

Jaimee Szymanski, MS, CCC-SLP
Doctoral Candidate, PhD in Education
Liberty University School of Education
[redacted]

APPENDIX I

Study Information

Title of the Project: The Predictive Relationship Between Teachers' Knowledge of Dyslexia and Their Confidence in Supporting Students with Dyslexia
Principal Investigator: Jaimee Szymanski, Doctoral Candidate, School of Education, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be 18 years of age or older and teach students in grades K-12. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

The purpose of the study is to determine if there is a relationship between teachers' understanding of dyslexia and their confidence in their abilities to educate students with dyslexia.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

1. Participate in an anonymous, online survey. It should take approximately 20 minutes to complete the survey.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study.

Benefits to society include expanding the literature on how teachers' knowledge of dyslexia impacts their confidence in teaching students with dyslexia. This information can help determine gaps in teachers' knowledge, which can guide teacher education on dyslexia.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be anonymous.
- Data will be stored on a password-locked computer. After five years, all electronic records will be deleted.

How will you be compensated for being part of the study?

Participants can be entered into a raffle for participating in this study. At the conclusion of the survey, participants will have the opportunity to enter a raffle for a chance to receive one of ten $25 Amazon gift cards. Email addresses will be requested for raffle purposes; however, they will be collected through a separate survey from the study survey to maintain your anonymity.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Jaimee Szymanski. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at [redacted] and/or [redacted]. You may also contact the researcher's faculty sponsor, Richard Jenson, Ed.D., at [redacted].

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the IRB. Our physical address is Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA, 24515; our phone number is 434-592-5530, and our email address is irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.