

DISCERNING FACT FROM FICTION: WHAT KNOWLEDGE AND SENSE OF
RESPONSIBILITY DO PRE-SERVICE SCHOOL PRACTITIONERS HAVE ABOUT
DYSLEXIA?

by

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“You can’t fall if you don’t climb. But there’s no joy in living your whole life on the ground.”

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Abstract

More individuals are affected by dyslexia than any other learning disability. The success of students with dyslexia receiving early identification and evidence-based interventions is dependent upon the knowledge and skills of the school practitioners responsible for their academic programs. This study investigated knowledge of dyslexia and perceptions of responsibility by administering The *Knowledge and Insights of Dyslexia Survey (KIDS)* to 243 university students. Survey responses of students ($n = 154$) majoring in degrees in education (EM, $n = 154$) were compared to the survey responses of students majoring in degrees in architecture (NEM, $n = 89$). In addition, the results of EM responses were further examined between students majoring in General Education, Special Education, and School Psychology. The results indicated no significant differences in knowledge existed between EM and NEM or between General Education, Special Education, or School Psychology Majors. Analysis of individual survey items revealed significant differences between some majors on certain items. Generally speaking, the Special Education Majors had more correct responses than any other major. Overall, all participants knew the least about the treatment of dyslexia and demonstrated confusion about the components of appropriate instruction. Analysis of participant definitions revealed pervasive confusion about the characteristics of dyslexia with most believing myths that those with dyslexia “see and read backwards.” Additionally, EM majors rated themselves as being moderately responsible for educating students with dyslexia and believed Special Educators hold the greatest level of responsibility. Moreover, most EM felt unprepared to work with students with dyslexia. The results indicated a need for further preparation and instruction of school practitioners in knowledge about dyslexia, as well as how to provide explicit, systematic, evidence-based reading components for students with dyslexia.

CHAPTER 1: INTRODUCTION

Since the term “dyslexia” first appeared in the literature over 140 years ago, scientific understanding of this reading problem has grown substantially from its original conception (Anderson & Meier-Hedde, 2001). In the late 1800s, this disability was first described by an ophthalmologist as a visual processing problem (Christo, Davis, & Brock, 2009), but abundant research, including the use of functional magnetic resonance imaging (fMRI), has revealed that the language components of the brain are where the primary deficit occurs (Shaywitz, 2003). Copious, empirical research now exists pinpointing the origins, prevalence, characteristics, and treatment of this language-based learning disability to be quite different than how it was originally conceived.

Despite scientific advancement, however, understanding of dyslexia remains laden with inaccuracies and confusion (Bell, McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silvia, 2010; Furnham, 2013; Gwerman-Jones & Burden, 2010; Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-Cantrell, 2011). Educational product companies and service providers continue to market unsubstantiated visual therapies for those with reading difficulties and the disability is best portrayed in pop culture by letter reversals, backward vision, and blurry reading (Worthy et al., 2016). Such characterizations contribute to inaccurate understanding and improper identification and treatment of the disability. As pediatric ophthalmologists Drs. Handler, Fierson, and Rainey stated in their presentation at the annual Reading, Literacy, and Learning conference, “Dyslexia: The Eyes Don’t have it” (2013). Deficits in visual processing are not the cause of dyslexia and vision therapies such as the use of colored lenses have been found to be ineffective (Henderson, Tsogka, & Snowling, 2013; Hyatt, Stephenson, & Carter, 2009; Ritchie, Della Sala, & McIntosh, 2011). Explicit instruction in basic reading and spelling

skills has found to be effective (Joshi, Dahlgren, & Boulware-Gooden, 2002; Moats, 2009; Oakland et al., 1998). Aside from misunderstanding the language basis of the disability, confusion has also been noted among educators about the capabilities of individuals with dyslexia, the origins of the disability, the symptoms, and how to appropriately support students with dyslexia (Bell, McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silvia, 2010; Furnham, 2013; Gwerman-Jones & Burden, 2009; Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-Cantrell, 2011; Worthy et al., 2016).

Characterized by a primary deficit in the phonological component of language, those with dyslexia have weaknesses in identifying and sequencing speech sounds and representing those speech sounds with letter or letter combinations (Moats, 2009; Shaywitz, 2003; Torgesen, Foorman, & Wagner, 2008). This leads to poor word reading ability and spelling skills (British Dyslexia Association (BDA), 2007; Shaywitz, 2003; Wadlington & Wadlington, 2005). Neurobiological in origin, dyslexia is highly heritable and not the result of a person's experiences, environment, or efforts (Anderson & Meier-Hedde, 2001; BDA, 2009; Bell McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silvia, 2010; Hawke, Wadsworth & DeFries, 2006; Sawyer, 2006; Shaywitz, 2003; Torgesen et al., 2008). Some researchers report that from 5 to 8% of the population has dyslexia (Pennington, 2009), whereas others estimate that approximately 20% of the population, or one out of five individuals, are affected by dyslexia (Yale Center for Dyslexia and Creativity, 2015). While males tend to be identified more often, dyslexia affects both males and females equally (Arnett et al., 2017; Hawke, et al., 2005; Osisanya, Lazarus, & Adewunmi, 2013; Shaywitz, Shaywitz, Fletcher, & Escobar, 1990). Although those with dyslexia often have substantial difficulties when left unsupported, research studies have demonstrated that the provision of explicit, systematic, evidence based reading

instruction increases brain activation in the parts of the brain needed for successful reading (Shaywitz, 2003; Shaywitz 2004) and without this type of intervention, those with dyslexia are at a greater risk for reading failure (Moats, 1994; Snow, Burns, & Griffin, 1998; Snowling, 2013).

Reading is paramount to success in school and life and the consequences of illiteracy are substantial. Those who cannot read are at a greater risk for school dropout, substance abuse, and obtaining a criminal record (Lyon, 2002). Policies at the federal, state, and district level have been implemented to improve student reading success, yet recent statistics are still bleak. Only 34% of fourth-grade students enrolled in public schools demonstrated proficient reading skills on a national reading assessment, and 21% of American adults read below a fifth-grade level (National Center for Educational Statistics [NCEP], 2015). Within the group of students who receive special education services, those with reading disabilities make up the largest percentage (Clark, 1997). Such statistics speak to the complicated nature of both a child's acquisition of reading skills and a teacher's provision of explicit instruction.

The field of reading research is extensive, and in an effort to clarify the effectiveness of different reading approaches, congress formed the National Reading Panel [NRP, 2000]. The NRP reviewed over 100,000 high quality research studies and found that effective reading practices included instruction in phonemic awareness, phonics, fluency, vocabulary, and comprehension. Successful reading therefore requires some level of proficiency in all of the aforementioned skills. Because reading does not develop naturally or easily, students with dyslexia require explicit, direct, and systematic intervention in phonological awareness, phonics, and fluency to become proficient readers (Joshi, Dahlgren, & Boulware-Gooden, 2002; Shaywitz 2003; Shaywitz & Shaywitz, 2004; Snowling, 2013).

Research has also documented the critical need for early identification and intervention for those with dyslexia (Berninger & May, 2011; Griffiths & Stuart, 2013; NRP, 2003; Rose, 2006; Shaywitz, 2003; Snowling, 2013; Wadlington & Wadlington, 2000). A child's reading development can be screened as early as five years old to determine high-risk for reading difficulties, and consequently instruction can begin at an early age (Griffiths & Stuart, 2013; NRP, 2003; Rose, 2006; Shaywitz, 2003). In separate research summaries, Snowling (2013) and Wadlington and Wadlington (2000) both highlight several studies demonstrating that students with disabilities who receive interventions early have greater reading success than students who are diagnosed when they are older. Moreover, educational agencies worldwide seem to be adopting frameworks that are more conducive to both early identification and intervention for children with reading disabilities (Rose, 2006).

Statement of the Problem

The success of students receiving early identification and interventions is dependent upon the knowledge and skills of the school practitioners responsible for their academic programs. That is, in order for a student with dyslexia to be identified early and receive evidence-based interventions, school practitioners must have an understanding of the origins, prevalence, and characteristics of dyslexia, as well as evidence-based instructional methods. Unfortunately, research regarding teacher knowledge of reading and dyslexia has historically shown a lack of understanding of the central components needed to teach reading to struggling students (Bos et al., 2001; Cunningham et al., 2004; Moats, 1994; Ness & Southall, 2010; Spear-Swerling & Brucker, 2003) and confusion regarding the visual versus language-based disability persists (Bell, McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silvia, 2010; Furnham, 2013; Gwerman-Jones & Burden, 2009; Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-

Cantrell, 2011).

Previous Research on Teacher Knowledge of Reading and Dyslexia

A number of studies have measured teachers' knowledge specific to the concept of reading. First, studies that focused upon the effects of teacher training on student achievement outcomes demonstrated an increase in reading growth by students whose teachers received instruction in evidence-based reading practices (Carreker et al., 2005; O'Connor 1999; Odom et al., 2005; Podhajski, Mather, Nathan, & Sammons, 2009; Spear-Swerling & Brucker, 2004). Students whose teachers were more knowledgeable about reading constructs such as phonological awareness and common spelling patterns had higher reading scores. This demonstrates the importance of providing school practitioners with the information and preparation needed to support those with dyslexia. Dr. Louisa Moats, an expert on reading, has described the knowledge needed for teaching reading as "Rocket Science" and asserts that an understanding of speech sounds, letter-sound correspondences, spelling rules, and orthography are just a few of the language constructs needed to accurately instruct reading and monitor progress (1994, 2009, 2014). Yet, evidence still exists to support the fact that many teachers do not possess this domain-specific knowledge (Bos et al., 2001; Cunningham et al., 2004; Moats, 1994; Spear-Swerling & Brucker, 2003).

Similar results have been found with the smaller sample of studies focusing upon teacher knowledge of dyslexia. Both international and national studies have demonstrated that great confusion exists among educators regarding dyslexia, most often in the areas of origins and characteristics (Bell, McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silvia, 2010; Gwerman-Jones & Burden, 2009; Soriano-Ferrer, Echegaray-Benoga & Joshi, 2016; Thorwarth, 2014; Wadlington & Wadlington, 2005; Washburn, Binks-Cantrell, & Joshi, 2013; Worthy et al.,

2016). Teachers in multiple countries repeatedly felt that their education and training had been insufficient in preparing them to work with students with dyslexia, and many of these teachers requested more support and training (Carvalhais & Fernandes da Silvia, 2010; Thorwarth 2014; Worthy et al., 2017).

The majority of studies measuring knowledge of dyslexia have been international, following either a quantitative or qualitative design. There is not, however, a recent quantitative study in the United States, dedicated specifically to dyslexia, that measures knowledge of all the critical aspects of the disability (origins, prevalence, characteristics, and treatment). Also unknown is the depth of knowledge understood by those entering different fields of education (i.e. general education teachers, special education teachers, and school psychologists). Each of these professionals has slightly different roles in serving students with dyslexia, but it is unknown if they conceptualize the disability or their responsibilities differently. Finally, previous research has not compared those with educational preparation to those who are not studying for careers in the field of education. By comparing Education Majors to Non-Education Majors, a greater understanding could be gained as to what general societal misconceptions are held that possibly impact teacher beliefs.

Having a broad understanding of what professionals know about the scope and substance of dyslexia knowledge will enable professors of educational programs to focus on what information needs to be clarified and included in training. It is also important for parents of those with dyslexia to be aware of how school personnel define and understand dyslexia, so that they may assist in advocating for their child's needs. School teachers, school psychologists and principals will also benefit from understanding what knowledge is held regarding dyslexia, and how practitioners view their responsibility toward educating those with this disability.

Purpose

The purpose of the survey study was to obtain a broad measure of pre-service school practitioners' knowledge of dyslexia and conceptualizations of responsibility toward students with dyslexia. In an effort to gain a greater understanding of what school practitioners know about dyslexia, the *Knowledge and Insights of Dyslexia Survey (KIDS)* was developed by the researchers in 2015 (Appendix B). Several pilot studies and revisions were previously completed in preparation for this study. This survey contains statements considering the research evidence of the prevalence, origins, characteristics, and instruction of those with dyslexia, as well as open ended questions addressing definitional views, responsibility, and background. The Likert items contained in *KIDS* are intended to measure the amount and type of knowledge pre-service school practitioners currently possess.

In this study, pre-service school practitioners are defined as university graduate and undergraduate students majoring in General Education, Special Education, and School Psychology and are termed, Education Majors. Pre-service school practitioners' knowledge will also be compared to the knowledge of a group of university students who are not Education Majors (Non-Education Majors). The students not majoring in education will be from a school of architecture. Both groups of university students (Education and Non-Education Majors) were selected for participation based upon agreement of professors who volunteered to distribute the survey to their classes.

Knowledge of dyslexia is defined as research-based findings pertaining to the prevalence, origins, characteristics, and treatment/instruction of those with dyslexia. Twenty-two of the survey items pertain directly to knowledge of dyslexia and each of the items can be categorized by either the prevalence (frequency of the disability), origins (how the disability is developed),

characteristics (symptoms and manifestations of the disability), and treatment (evidence-based practices for working with those with dyslexia). The survey contains several open-ended and scaled items to measure conceptualizations of responsibility as they relate to dyslexia.

To obtain an understanding of pre-service school practitioners' knowledge of dyslexia and conceptualizations of responsibility toward students with dyslexia, four main questions will guide this research project:

1. What do pre-service school practitioners (Education Majors) and students not majoring in education (Non-Education Majors) understand about dyslexia?
2. Is there a difference in knowledge of dyslexia between different Education Majors (General Education Majors, Special Education Majors, and School Psychologist)?
3. Is there a difference in knowledge of dyslexia between Education Majors and Non-Education Majors?
4. How do pre-service School practitioners (Education Majors) and Non-Education Majors view responsibility toward educating those with dyslexia?

Each of these questions will be discussed within the theories that formed the basis of these questions in the following chapter.

Definition of Terms

In an effort to clarify understanding of the proposed research, the following terms are defined:

Basic Language Concepts:

A term that encompasses English language components such as phonology, phonics, phonemic awareness, and morphology

Dyslexia:

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

growth of vocabulary and background knowledge” (International Dyslexia Association, 2003)

Opaque (deep) orthography:

A more complicated language system in which multiple symbols can represent the same sound

Orthography:

The written representations of the sounds in a language

Phoneme:

The smallest unit of sound

Phonemic Awareness:

The understanding that language is made up of speech sounds and the ability to isolate and manipulate those sounds.

Phonics:

The explicit and systematic connection of written letter or letter combinations to sounds

Phonological Processes:

The thinking processes used to break down speech in language into smaller, concrete sounds and the ability to manipulate those sounds. The processes underlying the abilities to identify words, rhyme words, segment words into syllables and individual sounds, and blend sounds into syllables and words

Phonological Processing Deficit:

An impairment in processing the speech sounds in language

Pre-service School Practitioner:

A university student who is enrolled in a preparation program to work in the field of education as either a teacher, special education teacher, or school psychologist

Responsibility: The term responsibility is defined as “a sense of internal obligation and commitment to produce or prevent designated outcomes or that these outcomes should have been produced or prevented” (Lauermaun & Karabenick, 2011, p. 127)

Specific Learning Disability:

“A disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations” (Individuals with Disabilities Education Act, 2004). For school classification, dyslexia fits into the category of specific learning disability in reading

Transparent (Shallow) Orthography:

A language system with highly regular sound to symbol correspondence

Visual Processing Deficit:

An impairment in processing information through the eyes

Chapter 2: REVIEW OF LITERATURE

The purpose of the following chapter is threefold. First, a discussion of the theoretical framework that supports the research questions of this study is provided. Second, a review of all other studies investigating knowledge of dyslexia is included. Finally, a presentation of two pilot studies that lead to the development of the current study will be discussed.

Theoretical Perspectives and Research Questions

Several theories helped to establish the lenses through which this proposed survey study was developed. First, the theory of the Peter Effect (Applegate & Applegate, 2004; Binks-Cantrell & Washburn, 2012) will be discussed in terms of school practitioners' knowledge pertaining to dyslexia. Second, a theory of responsibility, the Network of Teacher Responsibility, (Lauermann, 2014) will be applied to school practitioners' conceptualizations of responsibility. Both theories shaped the development of the research questions and provided the rationale for the development of the Knowledge and Insights of Dyslexia Survey (KIDS) and each will be discussed in turn.

The Peter Effect and Knowledge of Dyslexia. The concept that one cannot give what one does not possess, came from the biblical story of Peter, who was asked by a beggar for money and replied that he could not give what he did not have (Applegate & Applegate, 2004). The Peter Effect was first applied in an educational context to reading teachers who did not possess motivation for reading, but were responsible for motivating children to read (Applegate & Applegate, 2004). These teachers were found to not be able to pass on that which they did not possess: motivation. Researchers Binks-Cantrell and Washburn (2012) also applied the concept of the Peter Effect to education and have researched several aspects of reading content knowledge that specifically affects instruction of those with dyslexia. They determined that

professors at the university level were lacking in understanding of the critical reading components. They also found that the textbooks being used by teacher preparation programs contained little detail regarding the instruction of both phonological awareness and decoding, two skills that are characteristically weak in students with dyslexia. Binks-Cantrell and Washburn (2012) attributed these findings to the Peter Effect. Because neither the professors nor the textbooks described evidence-based practices for students with disabilities, teachers would be ill prepared.

If this is indeed the case, then the Peter Effect could also be applied to school practitioners' knowledge of dyslexia. Namely, if pre-service school practitioners do not acquire key knowledge regarding dyslexia, then they will be unable to use this knowledge to identify dyslexia and/or provide these students with the evidence-based instruction needed. Students with dyslexia require knowledgeable school practitioners to identify their needs and give them appropriate supports in the form of instruction, accommodations, and modifications.

The Peter Effect provides a theoretical lens to investigate the first three research questions:

1. What do pre-service school practitioners (Education Majors) and students not majoring in education (Non-Education Majors) understand about dyslexia?
2. Is there a difference in knowledge of dyslexia between different Education Majors (general Education Majors, Special Education Majors, and school psychologist)?
3. Is there a difference in knowledge of dyslexia between Education Majors and non-Education Majors?

Addressing the previously mentioned research questions will provide insight into what school practitioners understand about the constructs of dyslexia, how the disability is defined, and if differences exist amongst different types of majors. By measuring knowledge of Non-Education Majors a greater understanding of societal views of dyslexia could also be gained and

could provide greater insight into the misunderstanding of dyslexia held by educators, that previous research has found.

The Network of Teacher Responsibility and Dyslexia. While school practitioner knowledge is critical, it is only one factor that impacts student success. Those who feel responsible toward a particular task are more willing to invest the time and energy needed for positive results (Ryan & Deci, 2006). Lauermann (2014) examined how teacher knowledge relates to responsibility and developed the Network of Teacher Responsibility. He theorized how teacher skills (training, expertise in subject area, and experience) are some of the factors that influence responsibility. The Network of Teacher Responsibility demonstrates how teacher skills are an antecedent to responsibility and a consequence of having responsibility is student success (Lauermann, 2014) (see Fig. 1). Worthy and colleagues (2016) completed a qualitative study analyzing public school teachers' knowledge and beliefs of dyslexia. They concluded that the majority of teachers felt a sense of responsibility toward those with dyslexia but identified lack of knowledge and preparation as some of the barriers to supporting those with dyslexia (Worthy et al., 2016). This research has set the foundation for a quantitative measurement of responsibility to strengthen or refute this finding. Considering the Network of Teacher Responsibility and the dearth of responsibility research, it seems prudent to also measure school practitioners' sense of responsibility toward those with dyslexia. A component of *KIDS* is dedicated to measuring the conceptualizations of responsibility toward dyslexia. The fourth research question is based upon the theory of the Network of Teacher Responsibility:

4. How do pre-service school practitioners (Education Majors) and students not majoring in education (Non-Education Majors) view responsibility toward educating those with dyslexia?

Theoretically speaking, while the Peter Effect explains how school practitioners must possess knowledge to provide knowledge for student success, The Network of Teacher Responsibility demonstrates how possessed knowledge leads to a sense of responsibility, and a consequence of this responsibility is student success.

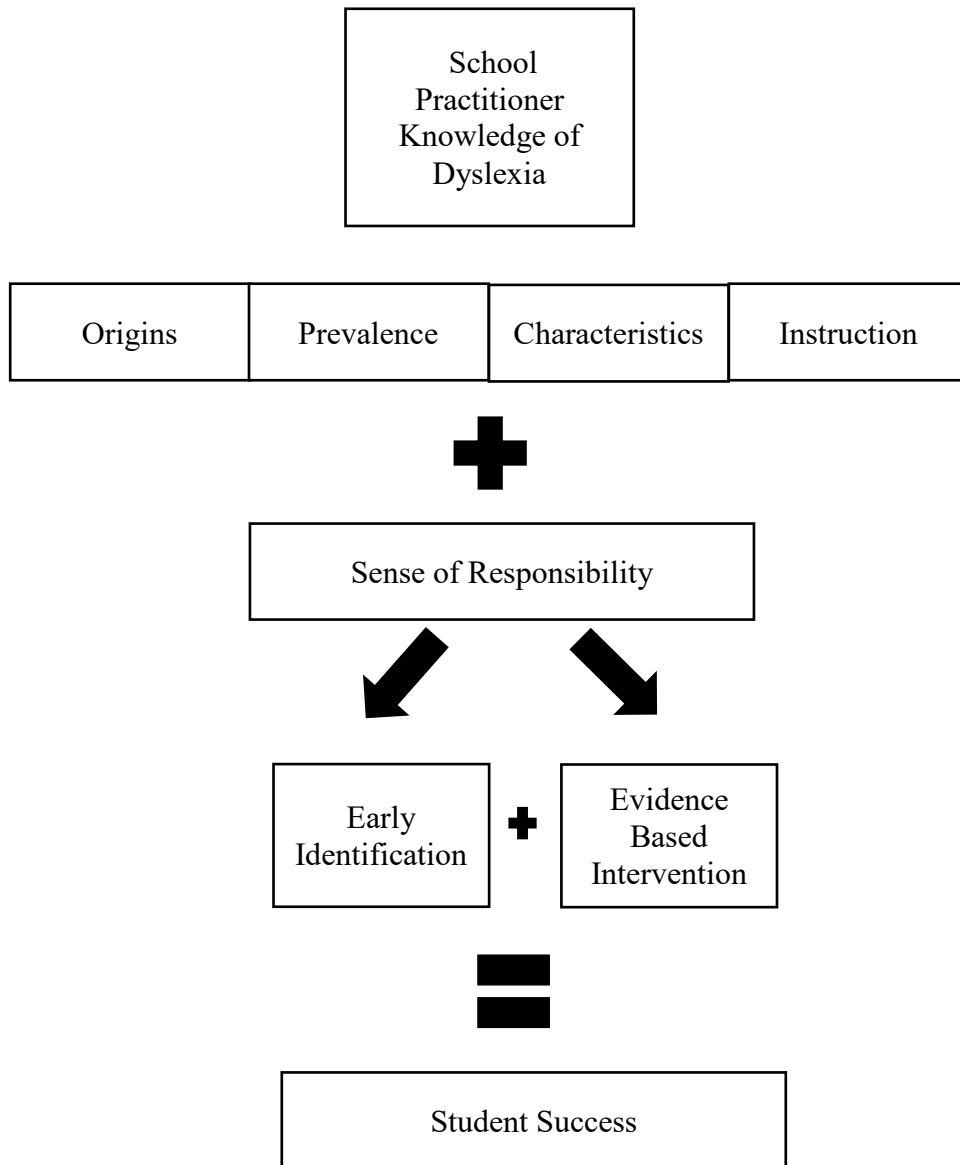


Figure 1. *Network of Teacher Responsibility and Dyslexia*

By addressing concerns and raising these important, previously mentioned research questions, much can be learned about pre-service school practitioners' current level of understanding about dyslexia and their sense of responsibility towards supporting these students. As these future teachers and school psychologists enter the field of education, as many as 20% of their students will have dyslexia and will be struggling to learn how to read. It is crucial to these students' success that they have informed, knowledgeable, and invested school practitioners, who are able to identify their difficulties and provide evidence-based intervention. The proposed research provides fundamental information regarding the preparedness of school practitioners and could inform the areas of dyslexia that need clarifying in education preparation programs, leading to better practices, earlier identification, more effective intervention, and ultimately decreasing the number of illiterate people who are considered non-readers as adults.

A Review of Educational Practitioner Knowledge and Attitudes Regarding Dyslexia

Over one hundred years of research have contributed substantial evidence to enhance our understanding of the most common learning disability, dyslexia (Anderson, & Meier-Hedde, 2001). Aspects of the origins, prevalence, characteristics, and treatment are now evidence based. However, as a descriptive label, dyslexia still has numerous myths, misconceptions, and opinions attached to its meaning. Understanding the cause of the disability, the symptoms, the methods of identification, and the need for instructional support has resulted in confusion for society in general, as well as school practitioners (general education teachers, special education teachers, and school psychologists) (Bell, McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silva, 2010; Gwernan-Jones & Burden, 2009; Ness & Southall, 2010; Wadlington & Wadlington, 2005). This is particularly alarming given the responsibility teachers and school psychologists have toward identifying and educating students with dyslexia. It is imperative that

school practitioners, who are in a unique position to recognize and support students with this disability, understand dyslexia. By examining previous studies regarding knowledge of dyslexia, it is possible to determine exactly what aspects have been found to be confusing and what beliefs and perceptions teachers actually have. The purpose of this chapter is to provide a review of the research that examines school practitioner understanding and beliefs regarding dyslexia.

A number of studies have been completed throughout the world that focus upon measuring school practitioners' knowledge, perceptions, and opinions of dyslexia, but myriad factors affect whether or not these studies meet the rigorous standards to substantiate what school practitioners do and do not know. It is critical that research in special education today be scientifically based through the use of quality indicators. Quality indicators are guidelines intended to drive the design of research, demonstrate the extent of the believability of the results for reviewers, and substantiate the usability of the findings for consumers (Odom et al., 2005). Thus, the purpose of this review is to not only summarize the studies designed to address the issue of school practitioner knowledge, beliefs, and perceptions of dyslexia, but also to evaluate the degree to which these studies are considered to be high quality. Two questions formed the focus of this review: a) What perceptions, beliefs and knowledge do teachers have about dyslexia? b) What was the quality of research pertaining to teacher understanding of dyslexia?

A search for relevant articles was completed through EBSCOhost online within the databases of Academic Search Complete, ERIC, and Psych Info. Search terms for this synthesis included, *knowledge of dyslexia*, *teacher knowledge of dyslexia*, *teacher knowledge of reading disability*, *teacher beliefs of dyslexia*, and *teacher perceptions of dyslexia*. The terms *school psychologist* and *school practitioner* were also used interchangeably with *teachers* as search terms, but yielded no results that fit the criteria of this project. An ancestral search of identified

articles was also completed. Research studies included in this synthesis were based on several criteria:

1. The study was published in a peer-reviewed journal.
2. The study was published in the year 2000 or after.
3. The study focused on the measurement of knowledge of dyslexia and included at least two facets of dyslexia (origins, characteristics, prevalence, and/or treatment.)

Following the aforementioned methods, 15 studies fit the criteria that will be discussed in detail.

A significant amount of research has been completed in the area of teacher knowledge of reading. While this is linked to the instructional component of dyslexia, studies that focused only on reading knowledge and included no other aspect of dyslexia were excluded from this review.

However, results of literature pertaining to teacher knowledge of reading are critical to understanding the instruction of those with dyslexia, as was briefly discussed in Chapter One.

The Studies. Each of the 15 studies included attends to slightly different aspects of dyslexia and each contributes to the field in a unique way. A summary of the purpose, participants, measurement, results, and quality of research for each study is presented in Table 1. Studies were divided into two broad categories based on the location of the research: international and national studies. This distinction was made because of differences in legal definitions and educational systems between countries which may affect the differences in results among the studies. While international studies provide key information about world-wide understanding, national studies provide more relevant findings of what has taken place in the United States, which is the author's country of origin. Within the international studies, the research was further divided according to the participants' language: (non-English speaking participants and English-speaking participants). Dyslexia is a language-based learning disability, so the complexity of the language spoken will also affect the ease with which reading is

acquired, impacting the presentation of symptomology and the prevalence of the disability (Wydell, 2012).

This relationship between sounds and written symbols pertains to a language's orthography, or the written representations of the sounds in a language, as well as the spelling rules and spelling patterns of a language. For instance, Hebrew is a straightforward language in which one symbol represents one sound and thus is described as having a transparent or shallow orthography. English however, is more complicated, and has an opaque or deep orthography. Words are derived from multiple languages (i.e. Greek, Latin, Anglo Saxon), and letters can represent more than one sound. For instance, the letters "gh" can make the sound of /g/ as in *ghost*, /f/ as in *laugh*, or be silent as in *light*. While individuals are affected by dyslexia in all countries, the ease with which the orthography can be taught and learned, varies. The regularity of the orthography needs to be taken into account when reviewing results about teacher knowledge of dyslexia in languages other than English. Countries will also vary in teacher preparation requirements, educational environments, special education laws and regulations, and national recognition and advocacy. These factors will inevitably affect the generalizability of study results to those in other countries. Nonetheless, inclusion of both international studies and studies in the United States provide a comprehensive world view of the understanding and conceptualization of dyslexia, insight into varied research methodologies, and implications for future research. The first three studies reviewed are international studies whose participants spoke languages other than English; the next are six international studies of English speaking participants; and the last include five studies completed in the United States. The studies in each section are presented in chronological order.

Table 1
Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Regan & Woods (2000)	Understand Teachers' perspectives about psychological assessment, dyslexia, and identification of special education needs in relation the British Psychological Society's Division of Educational and Child Psychology Report (1999).	Two groups of British educators participated in the study. Group 1 consisted of 16 mainstream teachers and group 2 consisted of 20 Learning Support Service teachers (special education teachers).	The researchers relied on two focus groups that followed the same protocol: 1) discussion of the definition of dyslexia & whether differences exist between dyslexic and non-dyslexic poor readers; 2) participants listen to a presentation of dyslexia from the British Psychological Society; 3) Participants discuss the presentation in pairs followed by a whole group discussion. Data was analyzed though a qualitative analysis of themes.	No differences in responses between general and special education teachers.	Detailed description of procedures. Little description of participant demographics. Small sample size limits the generalizability. It is unknown if findings are specific to a few participants' responses or represent many in the group. The working definition of dyslexia used in the study is outdated.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Kerr (2001)	To investigate Adult Behavior Education teachers' attitudes and beliefs about dyslexia in Great Britain.	Twelve in-service teachers of adult basic education who were completing a graduate level literacy course participated in this study.	A 39-item survey was administered and collected through mail and analyzed qualitatively.	Participants demonstrated a great deal of confusion and uncertainty regarding the existence, origins, characteristics, and treatment of dyslexia. Two-thirds of the teachers experienced disempowerment when faced with students who had dyslexia.	Very small sample of teachers from one education class. No inclusion of specific questions or content of the survey. No information regarding the validity or reliability of the instrument used.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Kirby, Davies, & Bryant (2005)	To compare general practitioners and in-service teachers understanding of six different learning disabilities (including dyslexia).	One hundred and five teachers and 105 general practitioners from Scotland, England, Wales, Ireland and Dublin.	An open-ended questionnaire that was coded for qualitative data and then transferred into scores that were analyzed quantitatively.	Teachers scored significantly better than GP's in knowledge of dyslexia but nearly 25% of teachers could not provide a definition and an even greater number of GP's were unable to provide an accurate definition.	Narrow, simplistic focus of dyslexia. Only a small component of the survey was on dyslexia. Simplistic scoring system that does not capture the varied aspects of dyslexia.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Wadlington & Wadlington (2005)	Measured teacher beliefs regarding dyslexia and created and validated a scale measuring such beliefs.	Two-hundred, twenty-five students and 25 faculty members from a college of education at a southern university in the United States; 121 graduate students, 99 undergraduate, and 5 unknown. 51 students were in the general education program, 56 in the secondary general education program, 38 in special education, 30 in administration, 34 in counseling and 11 in speech therapy.	Likert Scale survey of 30 items, demographic sheet, and four open ended items regarding opinions of experiences.	Most teachers and faculty had misconceptions of the origins and characteristics of dyslexia; elementary teachers scored significantly higher than secondary teachers and counselors; those who received more training had fewer misconceptions; 88% of teachers felt that formal education had not prepared them for teaching students with dyslexia.	Both quantitative and qualitative analysis completed, survey provided, criterion score used, pilot testing completed, measurement is from only one university.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Gwerman-Jones & Burden (2009)	Measured pre-service teachers' attitudes of dyslexia before and after student teaching.	Four-hundred, eighty primary and secondary pre-service teachers completing a Postgraduate Certificate of Education from a school of education in England.	A Likert Scale questionnaire based upon the Theory of Planned Behavior including items on the existence of dyslexia, implications of the term dyslexia, and teacher's feelings of competency in supporting students with dyslexia.	Prospective teachers had more confidence in working with students with dyslexia after completing their student teaching than before completion. Participants had mainly positive attitudes toward dyslexia and felt more training and support should be provided.	Participants are only from one school. Only 87 students completed both surveys, which limits comparisons. Strong use of statistical analysis and evidence to support conclusions. Included no measurement of teachers' knowledge of dyslexia.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Carvalhais & Fernandes da Silva (2010)	Investigated in-service teachers' attitudes and perceptions toward their instructional practices, training, and supports received for working with students with dyslexia in Portugal.	Purposeful sample of 50 primary teachers from central Portugal; 34 general education teachers and 16 special education teachers.	A two-part questionnaire of both closed and open ended items measuring teacher background information, experience, training received, and understanding of the definition of dyslexia.	The majority of teachers lacked supports and training opportunities regarding dyslexia, teachers request more training in dyslexia, teachers' definitions demonstrated understanding of the neurobiological origin.	Not all findings were supported with statistical analysis, discussion of how answers were coded was not included.

(continued)

Table 1

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Ness & Southall, (2010)	To explore pre-service teacher knowledge of dyslexia in the United States.	287 pre-service teachers from Alabama, New York, and Virginia.	An open-ended survey requiring participants to identify characteristics, define dyslexia, and provide ideas for effective instruction.	Participants had the greatest level of confusion regarding the phonological processing components of dyslexia.	Only qualitative analysis of the data was completed. Open-ended questions allowed for responses independent of cues or leads from Likert based surveys. All of the survey questions were provided. No discussion of a pilot study to validate the questionnaire.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Bell et al., (2011)	Examined how teachers in Ireland and England described dyslexia and what may have influenced their descriptions.	72 Irish specialist and mainstream teachers of elementary students with dyslexia; 53 English staff who coordinate, teach and/or support elementary students with dyslexia.	Two separate questionnaires, one for England and one for Ireland, were mailed to potential participants. The Irish questionnaire required teachers to describe dyslexia and explain how dyslexia was conceptualized in their students.	Most teachers describe dyslexia from a behavioral perspective. Less than 10% discuss dyslexia as biologically based. Teachers in Ireland were more aware of underlying difficulties and comorbidity with other learning difficulties than teachers in England. Memory difficulties were the most frequently reported difficulty for students with dyslexia.	High level of qualitative and quantitative data, open ended questions did not allow for precise measurement of knowledge, use of two different surveys did not allow for direct comparisons between the English and Irish studies.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Washburn, Joshi, Binks-Cantrell (2011)	Investigated teacher knowledge of basic language constructs and dyslexia.	185 Kindergarten through fifth grade teachers from two different states in the US.	A survey of 61 items, but only five items specifically addressed dyslexia.	-Almost all teachers (91%) believed seeing letters and words backwards is a characteristic of dyslexia, 71% thought that colored lenses and overlays help those with dyslexia, and 87% felt teachers do not receive intensive training to support those with dyslexia.	Survey items were from previous studies and the instrument was validated. Results of statistical analysis was included to support findings. Only five questions were used to measure understanding of dyslexia.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Aladwani & Al Shaye (2012)	Investigated the preparedness of in-service educators from Kuwait to work with students with dyslexia, knowledge and early indicators of the disability, and differences in educator demographics.	75 Kuwaiti primary school language teachers who instructed students learning English and Arabic simultaneously.	A translated version of a previously used research survey containing 25 questions measuring preparedness, knowledge of dyslexia, and the ability to identify early warning signs.	Teachers were lacking in the knowledge, skills, and training to support students with dyslexia. Those teachers with higher education levels were significantly more prepared to support those with dyslexia. No differences were found between preparedness and years of teaching.	Not all findings are reported. The survey used in this study only provided a narrow focus of dyslexia characteristics. Teacher knowledge of dyslexia was based on self-perceptions.

(continued)

Table 1 (continued)
Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Furnam (2013)	Examine the attitudes and beliefs of the origins, characteristics, and treatment of dyslexia among British lay people.	380 British community members participated in this study.	A questionnaire of 62 items based on dyslexia websites, academic research papers, and interviews with non-specialists about dyslexia.	Participants demonstrated confusion about the origins, characteristics, and treatment of the disability. The majority did understand that the disability affects people worldwide.	A comprehensive measurement tool was used containing research-based content. The survey was included as well as the origin of each item on the survey. A pilot study was also completed prior to this study.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Washburn, Binks-Cantrell, & Joshi (2013)	To measure US and UK pre-service teacher understanding of dyslexia as a language based learning disability and to determine if UK & US pre-service teachers have similar knowledge.	171 pre-service teachers from 3 different universities. 101 from the US and 70 from the UK. All participants are from undergraduate programs.	A 22 item survey based upon the work of Wadlington and Wadlington (2005). Eight items were related to the nature of dyslexia as a language based learning disability and 11 items were common misconceptions. Items followed a Likert-scale design.	Both pre-service teachers from the UK and US understood that environment is not a cause of dyslexia. The majority of all participants believed the misconceptions that dyslexia is a problem with visual processing.	Survey was based upon current research-based knowledge of dyslexia and a previous research study. Descriptive statistics was applied to the data. Only close ended questions were included so explanation of why participants chose specific answers is unknown. Only two universities in the US and only one in the UK was used.

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Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Thorwarth (2014)	To measure teacher misconceptions of dyslexia, identify the source of training, compare the beliefs of different types of educators, and to determine if years of experience affects understanding.	26 general education teachers, special education teachers, and speech pathologists, from one school district in Kentucky.	An online survey, emailed to participants. Part one of the survey contained questions about demographics, part two measured beliefs of dyslexia and part three measured training on dyslexia. Beliefs of dyslexia were measured on a five-point scale ranging from strongly agree to strongly disagree.	Most respondents were somewhat comfortable working with students with dyslexia. Less than 1/3 were educated about dyslexia in teacher training programs. Most received knowledge from professional development and seminars. A correlation was found between comfort and knowledge. No significant difference found between types of educators. Greatest misconceptions involved dyslexia as a visual issue.	Very small sample, difficult to generalize the information. Only quantitative measurement so it is unknown why respondents chose the way they did. Survey was online so respondents could search for answers while completing the survey. Data is displayed and explained in a way that is difficult for consumers to easily comprehend.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Soriano-Ferrer, Echegaray-Benoga & Joshi (2016)	To measure and compare pre-service and in-service teachers' knowledge and misconceptions of dyslexia.	Two hundred and forty-six pre-service teachers and 267 in-service, Spanish speaking teachers from Spain and Peru.	The Knowledge and Beliefs about Developmental Dyslexia Scale.	In-service teachers scored significantly higher on the total scale than pre-service teachers. Self-efficacy, years of teaching experience, exposure to students with dyslexia, and post graduate training were all positively related to knowledge of dyslexia.	A pilot study was completed to establish reliability and validity of the survey. A large sample of participants from a variety of schools was included.

(continued)

Table 1 (continued)

Summary of Key Components in Survey Studies of Knowledge and Beliefs of Dyslexia

Author	Purpose	Participants	Measurement	Key Findings	Level of Quality
Worthy et al., (2016)	Explored in-service elementary educators' understandings, perspectives, and experiences around dyslexia in the United States.	Thirty-two K-5 literacy educators with an average of 10 years of teaching experience from schools in Texas.	Qualitative study using a semi-structured interview protocol. Interviews were recorded, transcribed and analyzed using inductive coding.	The participants wanted to know more and do more for their students with dyslexia. However, they felt that barriers such as a lack of information, conflicting information and daunting policies and procedures caused frustration and confusion. Most educators felt confident in their ability to teach reading but few felt confident in their abilities to teach those with dyslexia.	Only qualitative data included. No information regarding the exact interview questions or protocol was included. These facts make it difficult to generalize the findings to other populations.

International Studies with Foreign Language Participants. The first study discussed in this review took place in Portugal, where researchers analyzed teacher perspectives of dyslexia through the use of a detailed questionnaire (Carvalhais & Fernandes da Silva, 2010). The 50 teachers who participated in the study were asked to define dyslexia, identify signs of dyslexia, and discuss the training and support they had received in the area of dyslexia, among other items. Carvalhais and Fernandes da Silva (2010) concluded that the teachers demonstrated understanding of the neurological problems that cause reading and writing difficulties and the impact on learning through the definitions they provided. While it is promising that the teachers in this study seemed to have an understanding of the origins of dyslexia, the authors did not, however, provide any statistical data or figures to support this finding, nor was a discussion of the way in which the answers to the survey were coded to develop such conclusions included. These results should be accepted with caution because of the lack of statistical support.

Conversely, reliable quantitative figures were provided referencing the training and support the teachers received. Analysis revealed that 74% of the teachers felt they had never received support to work with students with dyslexia even though nearly half of the teachers were already working with students with dyslexia (Carvalhais & Fernandes da Silva, 2010). Moreover, 66% of the teachers never received any training in the area of dyslexia. Teaching children with dyslexia how to read is an intricate and complicated topic that requires extensive training (Binks-Cantrell, Washburn, Joshi, & Hougen, 2012; Bos, Mather, Dickson, Podhajski & Chard, 2001; Moats, 2014; Podhajski et. al, 2009; Spear-Swerling & Brucker, 2004). These students need teachers who understand their challenges and know how to provide evidence-based instruction. Carvalhais and Fernandes da Silva (2010) suggest the need to evaluate and possibly revise both teacher preparation programs and in-service teacher support for preparing and

training teachers to work with students with dyslexia. This recommendation appears consistently throughout this review.

In 2012, a similar study in Kuwait investigated 75 primary school teachers' knowledge and awareness of dyslexia (Aladwani & Al Shaye, 2012). The research explored three main questions: a) Were the primary language teachers prepared to work with students with dyslexia?; b) Did these teachers possess adequate knowledge and awareness of the early signs of dyslexia?; and c) Were there differences in knowledge based on demographics (i.e., gender, nationality, and level of education). The authors note that the teachers participating in this survey were teachers of students who were learning both Arabic and English simultaneously, two very different languages with different orthographies. While no discussion was included of how this impacts identification and instruction of those with dyslexia, it seems probable that these teachers would have particular awareness of the components of language and perhaps be more inclined to notice language disabilities. However, the measurement tool and results of this study do not support or refute this assumption.

Using a translated version of a survey developed from previous research, the authors used 25 total items to measure preparedness (11 items), self-perceptions of knowledge (4 items), and the ability to identify early warning signs of dyslexia (10 items). Preparedness questions pertained to the types of trainings and readings that the teachers had completed. Four questions categorized by the authors as knowledge questions required the teachers to rate on a four-point scale how knowledgeable they felt they were in terms of broad categories such as dyslexia, reading, and language acquisition. Only one question included a characteristic of dyslexia and this question pertained to the understanding of letter reversals. Letter reversals, while considered a societal norm of dyslexia, is typically considered a secondary symptom by experts, the result of

orthographic mapping difficulties. No primary symptoms such as problems with phonological awareness, decoding, or spelling were included in the survey. While the authors labeled the items in research question two as measuring teacher knowledge, the results cannot be compared to the knowledge of dyslexia measured and discussed in other studies. The questions were related to the teachers' own opinions of what they knew, and not what the participants actually knew. For this review, these types of questions are categorized as self-perceptions of teacher knowledge of dyslexia. A third section of the survey included items about the early warning signs of dyslexia, but the specific questions were not included in the article.

Results of this study indicated that the teachers had a lack of preparation for working with students with dyslexia. The authors reported that, 43% of the teachers had not taken any, or only one, workshop on dyslexia and 33% had never read a book pertaining to dyslexia. The results of the knowledge section of the study are that more than half of teachers felt they had moderate knowledge of dyslexia (26.9%) and language disorders in language acquisition (31.7%). Many teachers felt they were less knowledgeable about reading and rated themselves as weak (35.7%). They also rated themselves as having a weak level of knowledge pertaining to the "tendency of dyslexics to reverse letters" (25%) (Aladwani & Al Shaye, 2012 p. 509). By analyzing demographic information, the researchers found a statistical difference in awareness of dyslexia within the category of nationality. Those of Mediterranean decent originally had higher mean scores than all other nationalities. A significant difference was also found between those with and without a graduate degree. Those with higher levels of education had been more prepared to work with students with dyslexia. No significant differences were found between gender or years of experience.

The final international study of non-English speaking participants was completed in 2016 in Spain and Peru (Soriano-Ferrer, Echegaray-Benoga, & Joshi. 2016). Participants from both countries spoke the same language (Spanish), but had varying amounts of educational experience and differing cultural backgrounds. Both pre-service (n=246) and in-service (n=267) teachers' understanding of dyslexia was measured and compared using the Knowledge and Beliefs about Developmental Dyslexia Scale (KBDDS). This survey contained 36 statements in which participants had to choose if the statement was true, false, or they did not know. The 36 items were broken down into three broad categories of dyslexia: general information about the origins and outcomes, symptoms and diagnosis, and treatment. The authors included great detail as to how the statements were chosen for the survey and completed a pilot study to establish reliability and validity of the tool.

Soriano-Ferrer et al. obtained interesting results about both teacher knowledge about dyslexia and background characteristics that were related to that knowledge. First, in-service teachers scored higher on the survey overall than pre-service teachers, with pre-service teachers having a greater number of misconceptions than in-service teachers. In-service teachers scored higher in the areas of general information about the origins and outcomes of dyslexia and symptoms and diagnosis. There was no significant difference between the two groups in the area of treatment. Specific item analysis indicated that 75-80% of all of the teachers understood that dyslexia was language based. Also noteworthy is the finding that the majority of all the teachers believed that dyslexia is related to poor visual perception and reversals (Soriano-Ferrer et al., 2016). This confusion is consistent throughout the literature (Wadlington & Wadlington, 2005). Additionally, a relationship was found between in-service teachers' level of confidence to work with a student with dyslexia and their overall knowledge. Those with greater level of confidence

understood more about dyslexia and those with less confidence had lower scores in overall knowledge. Finally, in terms of pre-service teachers, a significant correlation existed between the total score and amount of teacher training in reading and dyslexia. As would be expected, teachers in this study with a greater amount of training and experience had a greater amount of knowledge about dyslexia. This is a central point because it emphasizes the importance of providing pre-service teachers with classes discussing the origins, symptoms, diagnosis, and treatment of dyslexia, as well as opportunities to work with students who have dyslexia.

In this study, teachers' understanding of dyslexia was related to prior experience of those with dyslexia, training about this disability, and years of teaching experience (Soriano-Ferrer et al., 2016). These findings, once again show the need for greater teacher support and training in the area of dyslexia.

International Studies with English Speaking Participants. The next study included in this review was completed in 2000 and is the earliest study to be discussed (Regan & Woods, 2000). This research was completed in Great Britain, the country in which the most studies investigating knowledge of dyslexia have been conducted and published. This qualitative study was designed to understand teachers' perspectives of dyslexia, psychological assessment, and identification of special education needs. Differing from the majority of studies included in this review, these researchers implemented two focus groups instead of using a survey. One group consisted of 16 mainstream teachers and the other consisted of 20 learning support service teachers (special education practitioners). Each focus group contained the same three parts. In the first part, teachers were asked to explain their understandings of dyslexia, as well as their opinions regarding differences between dyslexic and non-dyslexic poor readers. In the second part, teachers watched a brief presentation of a definition of dyslexia proposed by the Division of

Education and Child Psychology (DECP). In the final part of the focus group, the teachers discussed their impressions of the report and opinions of the definition first in pairs and then each pair shared their thoughts with the group. All discussions were recorded, transcribed and coded for themes. Results included two major themes: defining dyslexia and psychological assessment.

Although this study was published nearly 18 years ago and teacher responses were specific to ideas of the time period, the results are relevant to the current proposed study in several ways: 1) the concern that differences in opinion may exist between school psychologists and teachers when working with students with dyslexia is discussed; 2) the issue of a lack of definitional agreement for dyslexia is raised; 3) teachers' definitions of dyslexia are outlined; and 4) teachers' perspectives of what they believe a school psychologist's responsibility is toward those with dyslexia is presented.

Regan and Woods (2000) raised concerns as to the level of shared understanding of dyslexia between school psychologist and teachers. Even so, the sample consisted of only general and special education teachers and school psychologist did not participate in the focus groups. To represent the beliefs of school psychologist at that time, a DECP report issued by the British Psychological Society in 1999 was used to initiate conversations and provide a comparison to teacher responses. This report presented a working definition of dyslexia that defined dyslexia as the presence of inaccurate and disfluent word reading, difficulty with spelling, literacy learning at the word level, and severe and persistent difficulties despite appropriate learning (as cited in Regan and Woods, 2000). Although the components of this definition are still present in the more recent British Psychological Society's 2007 definition, the DECP definition provided a rather narrow view of dyslexia compared to many other working

definitions proposed. For example, the definition proposed by the British Dyslexia Association (2007) includes the above-mentioned details, but with much more specificity to the origins, characteristics, and instruction of those with dyslexia:

Dyslexia is a specific learning difficulty that mainly affects the development of literacy and language related skills. It is likely to be present at birth and to be life-long in its effects. It is characterized by difficulties with phonological processing, rapid naming, working memory, processing speed, and the automatic development of skills that may not match up to an individual's other cognitive abilities. It tends to be resistant to conventional teaching methods, but its effect can be mitigated by the appropriately specific intervention, including the application of information technology and supportive counseling.

The difference between these two definitions highlights a key issue in reviewing all research regarding dyslexia, the myriad definitions present. A universal definition of dyslexia has not been accepted and multiple definitions exist both world-wide and even within the same country (Sawyer, 2006). Differences in definitions will affect the identification of dyslexia, which in turn affects the statistics representing the number of individuals who have dyslexia. If the characteristics of the disability are viewed differently (omission versus inclusion of abilities such as rapid automatized naming, working memory, and processing speed) then differences in how to support and instruct these students will also exist. The variety of available definitions must be taken into consideration when viewing results of all the discussed studies as inevitably this will affect the generalizability of findings.

The teachers' explanations of dyslexia revealed that they had some understanding of dyslexia at the behavioral, cognitive, and biological levels. Features such as difficulties with

phonological awareness, sequencing, memory, and perceptual problems were used to describe the characteristics of dyslexia. As a group the teachers felt that a difference existed between poor readers with and without dyslexia, attributing most of the difference to the origins of the student's difficulties. The teachers also described dyslexia as a disability in which a discrepancy exists between reading achievement and intelligence, but that not all poor readers may have this discrepancy. It is unknown, however, if all teachers understood these concepts about dyslexia, or if this knowledge was provided by only a few participants. The impact dyslexia can have across the curriculum was also discussed and while the authors use this discussion as support for increased teacher training, the included comments also revealed confusion as to how dyslexia may manifest itself in other subjects such as mathematics. The teachers also expressed concern that the definition presented by the DECP was too broad and did not differentiate between students with dyslexia and students with other types of reading disabilities.

The teachers were also asked about the value of psychological assessments and what they hoped to gain from these assessment results. In these discussions, the teachers provided several perspectives of the school psychologists' responsibility toward those with dyslexia. These teachers expressed a desire for the psychologists to "give them the answer and tell them what to do about the problem" (p. 341). The teachers want the psychologists to give them information beyond what they already know and to confirm concerns they have raised about a student. Their comments indicated that they are the ones who first notice a difficulty in a student but the psychologists are the ones who are responsible for providing the answers to how to support these students. These findings suggest that teachers expect school psychologists to have a greater level of knowledge about the diagnosis and treatment of dyslexia than they themselves do. The Regan

and Woods study set the stage for prompting additional research to more accurately and deeply measure school practitioners' understanding and beliefs regarding dyslexia

Following the Regan and Woods study, Kerr (2001) completed a qualitative study in Great Britain. This study measured dyslexia beliefs of 12 in-service teachers of adult basic education, who were all completing the same literacy class as the researcher. A survey was mailed to each of the participants. Kerr described the survey as including 39 "in-depth" items measuring the attitudes and beliefs of dyslexia in relation to the adult students with dyslexia that the participants had previously taught. However, the specific questions used in the survey and examples of participant responses were not included, compromising the generalizability of the results. In addition, the study had a small number of participants.

In contrast to the Regan and Wood (2000) study, results of Kerr's (2001) study indicated alarming confusion about dyslexia and minimal reliance on assessment when working with those with dyslexia. Half of the respondents were unsure if dyslexia was even a real disability and 25% believed dyslexia did not exist (2001). Only one participant provided an appropriate definition of dyslexia and half were unable to even attempt a definition. Confusion was found in total prevalence rates and whether differences existed between genders. Additional confusion was found in regard to the origins of the disability, with only one-third of the respondents understanding that a positive familial history can be indicative of dyslexia (Kerr, 2001). Because the participants in this study were working with adults with dyslexia instead of children, the characteristics of reading difficulties may not be as obvious due to learned compensation skills. However, symptoms such as slow reading rate and spelling difficulties often persist into adulthood (Shaywitz, 2003) and it is of concern that educators working with these adults seem to possess little knowledge of the condition.

Also of concern, is the finding that 8 of the 12 respondents demonstrated feelings of disempowerment and helplessness when faced with supporting their adult students with dyslexia. Kerr included examples such as “reduced confidence and self-esteem, impoverished performance, diminished expectation, lowered motivation, dampened curiosity, lack of engagement, weak persistence, [an] unwillingness to take risks, and passivity” (2001, p. 83) to describe the learned helplessness the teachers revealed. This result highlights a critical reason that educators need an understanding of dyslexia and knowledge of how to support and instruct students with dyslexia.

A third study was completed in England, Scotland, Wales, and Ireland in which the researchers compared teachers’ knowledge to that of general practitioners’ (family doctors’) knowledge in the area of learning disabilities (Kirby, Davies, & Bryant, 2005). Although family doctors are not the subject of the proposed study, they do represent knowledge of those not trained in the field of education and provide a glimpse of societal understanding of dyslexia. Like school psychologists, general practitioners are often sought out by families when difficulties with learning arise and expected to have an understanding of dyslexia in order to provide appropriate referral for identification, support, and intervention. One-hundred and five teachers and one-hundred and five general practitioners completed a simple questionnaire in which they defined six different disabilities such as attention deficit disorder, dyspraxia, and dyslexia. Only the results of dyslexia will be discussed for the purposes of this review. The definitions were coded for key words and scored as either a 1 for including key words or a 0 for incorrect information, lack of a definition, or lack of key words. For dyslexia, participants only had to include the key terms “reading, spelling, and writing difficulties” to obtain a point. These key terms are simplistic, but do indicate a basic understanding of dyslexia.

Kirby and colleagues provided results indicating that more teachers (75.2%) were able to provide a simplistic definition of dyslexia than general practitioners (40%). Although teachers knew more, one quarter of the educators were not able to define dyslexia in the most rudimentary way. Teacher incorrect responses included common myths associated with dyslexia in descriptions such as “word blindness” and “poor script.” General practitioners knew far less and some of the responses were quite alarming, such as “parents dissatisfied with their child’s performance, wanting tests/treatment.” Such responses from both teachers and general practitioners again highlight the need for greater education in the area of dyslexia for proper identification and support. Students who are not identified appropriately could receive delayed or inaccurate interventions which then can contribute to lowered self-esteem, depression, and anxiety that may continue into adulthood (Kirby et al., 2005). This simplistic study may have only measured the most basic understanding of dyslexia but it once again underpins the confusion among educators and general practitioners when it comes to dyslexia.

Just four years after the Kirby et al. study (2005), another English study pertaining to the understanding of dyslexia was completed. This time however, the researchers aimed to gather an estimate of preservice teachers’ (i.e. teachers who had just completed a Post Graduate Certificate in Education) attitudes and beliefs of dyslexia (Gwernan-Jones & Burden, 2009). The authors constructed a questionnaire based upon discussions with university students, their own experiences working with students with dyslexia, and Azjen’s Theory of Planned Behavior. Azjen’s Theory of Planned Behavior suggests that attitudes toward an individual or group significantly affect the way in which a person relates to that individual or group (Gwernan-Jones & Burden, 2009). Ajzen’s Theory of Planned Behavior is based on the principle that behavioral beliefs and values affect attitudes, attitude affects intention, and intention affects behavior. For

example, if an educator holds a negative attitude toward a student with a learning disability, it is likely that the interactions between the student and teacher will also be negative and the student's educational experience will be impacted in an undesirable way. A relationship that a student establishes with his/her teacher can greatly impact the student's motivation and emotional well-being (Carvalhois & Da Silva, 2010). Consequently, the teacher's attitude is linked to the child's self-esteem and perseverance. Students with dyslexia are faced with significant learning challenges and as a result often have to contend with maintaining positive motivation, self-perception, and perseverance beyond what a typical student may experience.

Teacher attitude is not only a major component of a student's educational experience but is directly linked to learning success and the type of instruction students receive. A thorough understanding of teachers' beliefs regarding dyslexia then, is essential to understanding how to best support teachers in their interactions and instruction of those with dyslexia. Moreover, research findings demonstrate that a teacher's perception of a student can affect whether or not that student is referred for and receives special education services (Escobar, Fletcher, Shaywitz, & Shaywitz, 1990).

Gwernan-Jones and Burden's survey was administered twice during the students' academic year and 500 students were invited to complete the survey on both occasions. A total of 87 teachers completed the survey both times. Teachers were asked to answer a series of statements on a Likert Scale ranging from *Strongly Agree* to *Strongly Disagree*. For example, "The word dyslexia is really just an excuse for laziness," "Dyslexic children often do not succeed as adults" and "I feel more training should be given to teachers about dyslexia" are a few of the items included in the questionnaire. This survey resulted in several key findings that are relevant to the purposes of this review. First, of the students who took the surveys during and after their

training, teachers reported being significantly more confident to support a student with dyslexia's learning after completing their program. The authors discuss that the majority of teachers in this study had positive attitudes and beliefs toward dyslexia and had some confidence in their abilities to support students with dyslexia, yet still felt that more training for teachers was needed. The authors in this study focused more upon the opinions teachers had regarding dyslexia and included few questions about the origins of dyslexia or how to provide instruction to students. So while the teachers felt that they could be capable of teaching students with dyslexia, it is unknown whether or not they actually possessed the knowledge needed to do so. In conjunction with attitudes, a teacher's knowledge regarding dyslexia is also central to increasing the school success of students with this learning disability. While teachers' attitudes are a crucial component, the knowledge teachers have is also critical to understand.

In the next study, the work of Bell, McPhillips, and Doveston (2011) focused upon the conceptualizations of dyslexia in Ireland and England. Teachers were surveyed and asked to provide descriptions of terms such as literacy and dyslexia in relation to their students and to identify major areas of difficulty for these students. The authors were interested in linking teachers' answers to Frith's causal modeling framework (1995), which categorizes the interaction of biological, cognitive, and behavioral theories of dyslexia. Teacher answers that were based in neuroscience fit into the biological category. Discussion of intellectual processing abilities often affected by dyslexia such as phonological awareness, memory skills, and processing speed were categorized as cognitive theories. Teacher answers coming from a behavioral perspective included the behaviors observed in students with dyslexia. For example, poor letter-sound knowledge, difficulty reading words, and trouble with spelling were all descriptions that fit into the behavioral component of the framework. The authors took the

position that biological, cognitive, and behavioral factors should all be taken into account when servicing students with dyslexia and teachers should have knowledge in all areas (Bell et al., 2011).

Although Bell and colleagues (2011) used two slightly different surveys for the two different countries, both were intended to measure teachers' conceptualizations of dyslexia. The results of the survey in Ireland indicated that only seven out of 72 described dyslexia at the biological level, 23 described dyslexia as cognitive theories, and most teachers' definitions included information concerning students learning behaviors (39 out of 72 respondents). These responses provide an example of the various definitions used by teachers and inconsistencies when referring to dyslexia. The results also demonstrate that teachers in Ireland were more expressive about the learning behaviors presented by their students with dyslexia and less descriptive about the origins (biological) and cognitive processing abilities of those with dyslexia. The above results alone cannot lead to the conclusion that these teachers do not understand dyslexia at the biological and cognitive level, as the questions in this survey did not directly require the teachers to discuss these three components of dyslexia. It would seem prudent that future researchers directly measure teachers' knowledge of the origins, processing abilities, and characteristics of dyslexia to have a more thorough understanding of how teachers conceptualize dyslexia. Further evidence that suggests confusion about the nature of dyslexia is apparent in the teachers' responses to a question in which they were asked to rank the six areas that they felt contributed the most to dyslexia. Of the 72 responses, 30 selected memory difficulties as the number one reason for students' difficulty. The other 42 responses were mixed among co-existing difficulties, processing difficulties, attention difficulties, and social emotional difficulties (Bell et al., 2011). Agreement regarding the source of difficulty for students with

dyslexia was roughly 42 percent. It could be interpreted that only 42 percent of Irish teachers demonstrated understanding of the cognitive processes affected in those with dyslexia, a key component in the ability to provide successful instruction to students.

The English teachers were asked to choose from nine possibilities to determine the main underlying cause of difficulty in students with dyslexia. The options were listed from the most common response to the least common: memory (n=12), processing (n=10), visual (n=7), sequencing (n=3), auditory (n=2), retrieval (n=1), learning style (n=1), and other (n=1) (Bell et al., 2011). Again, the results showed a wide range of responses. Teachers in England as a group were also quite unclear as to the nature of dyslexia. The authors also note that only two of the respondents specifically discussed phonological awareness skills as a significant underlying difficulty (Bell, 2011). This is extremely worrisome given that the concept of phonological processing difficulties has been widely accepted as a key deficit in students with dyslexia, including the definition accepted by the British Dyslexia Association and the International Dyslexia Association (BDA, 2007; IDA, 2007; Moats, 2009; Sawyer, 2006; Shaywitz, 2003). The results of this study provide a further example of the confusion among educators regarding dyslexia. A lack of cohesive understanding of the origins and characteristics of dyslexia undoubtedly affects the type of instruction and support services students receive. While the design of this survey did not allow for direct, quantifiable measurement of all that teachers know about dyslexia, the authors use the results to emphasize the need for increased teacher training in the underlying causes and difficulties of students with dyslexia. The findings also align with the idea of the Peter Effect (Applegate & Applegate, 2004); if the teachers do not understand the major causes and symptoms of dyslexia, they will be unable to provide appropriate instruction that is based on student needs.

The final international study in this review is the only study found that measured knowledge of dyslexia in lay people, those not in fields associated with teaching and learning (Furnam, 2013). The researchers in this survey study gathered participants in public settings to collect people's perceptions and opinions of dyslexia. Three-hundred and eighty British participants, 155 male and 212 female, completed the comprehensive, 62-item questionnaire. Details of participant background such as religion, educational level, marital status, political affiliation, and connection to those with dyslexia were collected as well. For each statement, participants determined whether they agreed, disagreed, or were not sure. The statements were based upon websites that provided specific lists of myths and facts of dyslexia, journal articles in the mental health industries, and interviews with ten non-specialists about dyslexia. The author includes the entire questionnaire as well as the source of each item, demonstrating transparency of the research. The survey includes topics about the origins, characteristics, prevalence, and treatment of dyslexia but does not cover all main components of the disability. Some opinion statements such as, "students claim dyslexia simply to get extra time" were also included (Furnam, 2013, p. 943).

Participant responses indicate that only half of lay people agree that dyslexia is a language-based learning disability, although 76% understood it to be world-wide (Furnam, 2013). Many had confusion about the neurobiological cause of dyslexia and 67.9% agreed that those with dyslexia should be seen by optometrists regularly to prevent poor eye sight. Put differently, more than half of lay people believe visual difficulties to be a characteristic of dyslexia. While most of the participants believed those with dyslexia would benefit from specialized help, only 28.9% supported the need for individualized instruction.

The Furnam study (2013) demonstrated general societal confusion about dyslexia. Similar to previous studies addressing teacher knowledge, lay people also still believe dyslexia to be a visual problem and hold misconceptions about the origins, characteristics, and treatment of the disability. When comparing the results of the research in Great Britain, it is disconcerting that teachers do not seem to have any greater knowledge of dyslexia than those without an educational background and training in dyslexia. It would be prudent for future research to directly compare teacher and lay persons' knowledge and to consider the impact societal portrayals of dyslexia have on viewpoints of dyslexia.

National Studies. Only five studies measuring teacher understanding of dyslexia have been completed in the United States between 2005 and 2016, each providing a unique angle on the topic. In a 2005 study by researchers Wadlington and Wadlington, 250 university faculty and students in a college of education were surveyed. Of all the surveys discussed thus far, the instrument developed and used by Wadlington and Wadlington (2005) appears to be the most comprehensive in terms of covering evidence-based components of dyslexia. The researchers not only asked participants' opinions of dyslexia, but also included evidence-based statements regarding the nature and treatment of dyslexia. The structure of the Wadlington survey was created in a way that allowed for quantitative and qualitative analysis to take place. These researchers discovered that the participants had a significant number of misconceptions regarding dyslexia. More than half of all types of educators had confusion about the identification, origins, and characteristics of dyslexia.

Participants incorrectly believed that word reversal was a major criterion used to identify dyslexia, that the disability was not hereditary, and that individuals with dyslexia typically exhibit the same characteristics. Analysis also revealed that 88% of teachers answered false to a

question stating that formal education had prepared them to work with individuals with dyslexia. As with the previously discussed studies, the abundant need for increased training and understanding of educators regarding dyslexia is apparent. The researchers also discovered that those educators who had received more training had fewer misconceptions regarding the disability than those who had not, supporting the finding that more education leads to increased understanding.

Five years later, a qualitative study investigating pre-service teacher understanding of dyslexia and the source of that understanding was completed (Ness & Southall, 2010). The researchers used an open-ended questionnaire to measure understanding of 287 education students from universities in Alabama, New York, and Virginia. These students were participating in both undergraduate and graduate programs and were at various stages of completion. However, every participant had completed all the literacy and special education courses required by their programs at the time of the study. The questionnaire required participants to define dyslexia, list traits of students with dyslexia, discuss how to identify students in a classroom, provide ways to instruct those with dyslexia, and identify experiences that may have influenced their beliefs. Ness and Southall read repeatedly the participant responses and coded for themes in order to analyze the data. They discussed results in terms of definitions, providing support, and sources of misunderstanding. Some interesting and significant results were found.

First, great confusion was noted in regard to defining and understanding primary symptoms of dyslexia. Only 2% of participants defined it as a language-based learning disability with a large number attributing difficulties to visual problems. Many (74%) listed letter reversals as a characteristic and almost half (40%) described dyslexia as reading or writing words out of

order or in the wrong direction. Eight actually used the label “visual processing deficiency.” Letter word and number confusion was the most common method listed to identify students with dyslexia.

Within the theme of providing help, the participants listed supports such as one-to-one assistance, time with reading specialists, and additional time to complete activities. Nineteen percent felt they could not provide any instructional support. It is alarming that the participants did not mention any evidence-based reading practices provided by the national reading panel ten years prior, such as phonological awareness, letter-sound correspondences, decoding instruction, fluency, or comprehension (NRP, 2000).

Participants reported several sources of influence for their understandings of dyslexia such as experience in university coursework, interactions with family and friends. However, the largest amount, 33% could not identify a source. The researchers used this result to demonstrate that one-third of the pre-service teachers self-reported a lack of preparedness.

The results of the Ness and Southall study (2010) demonstrated that pre-service teachers have a basic understanding that dyslexia is a difficulty with literacy. However, the study also reveals that many future educators do not understand critical characteristics of dyslexia and the appropriate ways to support these students. As has been shown in many of the aforementioned studies, such results indicate a need to increase instruction regarding dyslexia in teacher preparation programs.

A third study completed by Washburn and colleagues builds upon the research of Wadlington and Wadlington (2005) but applies their survey research to pre-service teachers both in the United States and England. This is the only study to compare US teacher knowledge to another country (Washburn, Binks-Cantrell, & Joshi, 2013). The researchers examined what US

and UK pre-service teachers understood about dyslexia as a language-based learning disability, as well as what similarities in knowledge did the teachers from each country have.

Undergraduate students, 101 from two universities in the United States and 70 from a university in England, completed a 22-item survey. Eight of the items were related to the fact that dyslexia is a language-based learning disability, 11 items pertained to common misconceptions, and 3 questions measured demographic information. For the 19 statements, participants chose whether a statement was definitely false, probably false, probably true, and definitely true. The researchers assigned points to each response and descriptive statistics were applied to the results.

Washburn and colleagues discovered that three-fourths of all participants understood that dyslexia is not due to a poor literacy environment. From this result the researchers concluded that the pre-service teachers understood that environment is not a cause of dyslexia. Similar numbers of pre-service teachers reported that dyslexia exists in all languages and the majority understood that difficulty with spelling is a characteristic of dyslexia. Another positive result was that 70% answered definitely or probably false to a statement that visual problems is one of the major characteristics of dyslexia. However, other results from the survey demonstrated that the participants did not fully understand visual difficulties and the relationship to dyslexia. For instance, approximately 70% felt that colored overlays and tinted lenses could be helpful to those with dyslexia and 90% of US participants reported that eye movement or tracking exercises could be beneficial. Moreover, 162 of the participants thought seeing letters and words backward to be a characteristic of dyslexia. These results once again demonstrate confusion about dyslexia and the visual myths surrounding the nature of the disability.

Thorwarth (2014) completed a small study measuring the misconceptions of teacher knowledge using a survey similar to the Wadlington study (2005). However, Thorwarth also

investigated the source of the participants' training, compared the knowledge of different grade levels of teachers, as well as teachers' years of experience to understanding. Twenty-six general education, special education, and speech pathologist teachers completed an online-survey they received via email. Most of the participants were female elementary teachers. The survey was broken into three parts. Part one of the survey contained questions about demographics, part two measured beliefs of dyslexia, and part three measured training on dyslexia. Beliefs of dyslexia were measured on a five-point Likert scale ranging from strongly agree to strongly disagree. All items were close-ended.

The results of the survey showed that the majority of respondents were slightly or very comfortable working with students with dyslexia. This is surprising given that less than 1/3 were educated about dyslexia in their teacher training programs. Most received their knowledge from professional development and seminars. Yet despite these trainings, the participants still had a number of misconceptions about dyslexia. Exact numbers were not provided, but Thorwarth discussed that a large amount had confusion about dyslexia as a visual problem and believed that those with dyslexia see numbers and letters backward. This finding is consistent with previous research (Furnan, 2013; Kirby 2005, Ness & Southall, 2010; Wadlington & Wadlington, 2005, Washburn et al., 2013). However, a correlation was found between comfort with dyslexia and knowledge. The more comfortable an educator felt, the greater understanding of dyslexia they had. Participants also were confused about specific symptoms of dyslexia such as immaturity, and difficulty with phonological processing. Again, such findings were surprising given that most participants had received professional development about dyslexia. The content of the professional development did not, however, result in a robust understanding of dyslexia.

Thorwarth also compared the knowledge between elementary, middle, and secondary teachers but no significant differences were found between the educators.

The final study in this review explored teacher understanding, perspectives, and experiences with dyslexia through qualitative research (Worthy et al., 2016). Worthy and colleagues felt that teachers' voices were missing in previous studies using surveys. Thus, they interviewed thirty-two public school teachers in the state of Texas to explore their beliefs. The majority of participants were general education teachers, but several special education teachers and reading specialist also participated. The researchers provided great detail about the methodology of the study, but the actual interview questions were not provided, so it is not clear what specifically the teachers were asked. School educators' responses were transcribed and coded for themes and the researchers found two major themes: a sense of responsibility and barriers to meeting students' needs.

This is the first study of dyslexia knowledge to present the concept of responsibility. The participants were portrayed as having a sense of responsibility for supporting all of their students, including those with dyslexia. The educators discussed complying with dyslexia laws and regulations and the importance of providing students with modifications and accommodations. Participants also discussed ways in which they sought information about dyslexia, beyond what was provided by their districts, through internet research, books, and seeking of advice from specialists. The responses also described the barriers that were preventing the educators from meeting their responsibility. The researchers demonstrated that many of the teachers have confusion about characteristics and treatment of dyslexia and labeled this confusion as a result of conflicting information between societal portrayals and what is research-based. As in past research (e.g., Furnan, 2013; Kirby 2005, Ness & Southall, 2010; Wadlington

& Wadlington, 2005, Washburn et al., 2013), these participants discussed visual deficits and the myths that those with dyslexia see backward, reverse letters and numbers, and respond to colored overlays (Worthy et al., 2016). The researchers also presented teachers' frustrations and confusion with identification procedures, ineffective interventions, service qualifications, high-stake testing, and professional development lacking in the knowledge needed to support students with dyslexia. It is unknown however, how many of the participants held misconceptions or expressed concern for the abovementioned barriers. This study does highlight the fact that a great deal of confusion about dyslexia exists, even in a state such as Texas, where dyslexia laws and regulations are in place. It would be prudent for future researchers to further explore the notions of responsibility and barriers to providing responsibility in a quantitative study to substantiate these findings.

Pilot Studies

In response to the aforementioned literature, several pilot studies were conducted to prepare for the research being discussed in this dissertation. First, a survey was developed to measure knowledge of dyslexia based upon information from the literature. The Knowledge and Insights of Dyslexia Survey (*KIDS*) was created to measure knowledge of dyslexia based upon brain science and research based evidence about the origins, characteristics, prevalence, and treatment of dyslexia. Version one of *KIDS* consisted of twenty-five statements that participants rated as true or false. For each item participants also rated how sure they felt of his/her answer on a four-point scale: Not at all sure, Somewhat sure, Pretty sure, or Positive. In the first pilot study, twenty-four pre-service special and general education teachers from two courses in a southwest university completed the first version of *KIDS*. Based on results, two items were deleted and

phrasing of two items were altered. The purpose of this pilot-study was simply to adjust the items on the survey for use in future studies.

The goal of the second pilot study was to further validate the survey and to investigate the following questions: a) What do preservice teachers know about the origins, prevalence, characteristics, and instruction of dyslexia? b) How confident are preservice teachers in their responses? c) Is there a difference in knowledge between preservice teachers majoring in Special Education than those majoring in General Education? d) Do preservice teachers feel educators are prepared to teach students with dyslexia?

To address these questions, 44 pre-service General and Special Education Teachers were administered an updated version of *KIDS*, based on changes from the previous pilot study. The participants in this study were graduate and undergraduate students enrolled in one of two courses from a university in Colorado. After approval from the university's Internal Review Board, students were asked to complete a paper version of the survey in their courses. The survey was optional, anonymous, and had no effect on student's grade or participation in the class. Students who did not want to participate were given the option to read an article.

To determine what the participants knew about dyslexia, each item on the survey was scored as either right or wrong and analysis was completed based on the type of question. Participants answered the most questions correctly in the area of dyslexia origins and missed the most questions about instruction of individuals with dyslexia. 84.5% of teachers understood that dyslexia is neurobiological, cannot be outgrown, and is not the result of poor instruction. 57.1% incorrectly believed colored overlays improved dyslexia and 68.1% did not understand the concept of phonemic awareness. However, when comparisons were made amongst different

question types, no significant difference were found between origins and characteristics, and between prevalence and treatment, based on *t*-tests of average percent correct.

Secondly, for each respondent, both the percentage of correct answers and the percentage of confidence in each answer were calculated. In this case, percent correct was the independent variable, whereas the percentage confidence was the dependent variable. Analyses resulted in a positive correlation between these variables. In other words, the more correct answers a participant had, the more confident they were in their responses. It was also determined that preservice teachers were the least confident in their knowledge of instruction/treatment of dyslexia. This was an accurate self-perception, as instruction / treatment resulted in the category with the lowest score. Preservice teachers had the greatest level of confidence in knowledge of characteristics, but this was not the category that teachers demonstrated the most knowledge.

The third research question about comparison of Education Majors was addressed through the use of descriptive statistics, namely *t*-tests. It was determined that a significant difference existed between knowledge of dyslexia and different majors. Special Education Majors were found to have more knowledge than General Education Majors. However, there was no significant difference between years of experience and knowledge of dyslexia. This is particularly noteworthy given that the majority of preservice Special Education Teachers had more experience than the General Education Teachers.

Participants answers to survey items about research question four, teacher preparedness, resulted in 88.6% expressing a belief that teachers were not prepared to teach students with dyslexia. Many pre-service teachers made statements about how they felt they had not been provided the training needed to work with student with dyslexia. For instance, participants made comments, such as: "I have learned little to nothing about [dyslexia] in my teacher program."; "I

am a fourth-year student about to begin student teaching and know very little about dyslexia.” Participants also made statements about whose responsibility it was to work with those with dyslexia. One pre-service teacher stated, “Most General Education Teachers expect Special Education Teachers to teach students with disabilities.” This statement is particularly alarming because most students with dyslexia spend the majority of their time in the general education classroom.

The results of this pilot-study led to changes in the survey design for the current, proposed study. First, four items were deleted: three of which everyone got right, and one that a large number of participants answered incorrectly and thus was considered confusing. Data analysis also revealed that there was no need to measure confidence for approximately half the questions, so the final survey was redesigned with the confidence built into the response in a Likert-scale design, instead of measuring it separately from the true/false answer format. In addition, based on participants’ open-ended responses to feeling prepared, the concept of responsibility toward educating those with dyslexia was added to the survey.

Discussion

The fifteen aforementioned research projects and two pilot studies, although differing in design, location, and focus, revealed several consistent findings and set the stage for future studies. Essentially, pre-service teachers, teachers, and teacher educators, have demonstrated a lack of adequate knowledge of dyslexia, typically in the areas of origin and characteristics. Educators provided myriad definitions that often included historical misconceptions such as the notion that dyslexia is a visual difficulty and visual therapies are an appropriate intervention. Teachers in multiple countries repeatedly felt that their education and training had been insufficient in preparing them to work with students with dyslexia and the majority requested

more support and training. Since the publication of the first study, abundant contributions have been made to understanding the complexities of dyslexia. Inquiry now exists as to whether or not teachers in the United States currently have adequate knowledge of the disability, or if such misconceptions and lack of preparedness still persist. In addition, the stage has been set to investigate who is perceived to be responsible for providing support to those with dyslexia. The development of *KIDS* is intended to measure such knowledge and sense of responsibility and is based upon the findings of the previously discussed studies. The development of and method for administration of this survey will be discussed in detail in the following chapter.

CHAPTER 3: METHOD

A review of the literature indicates a critical need for further investigation of current pre-service school practitioner knowledge of dyslexia and conceptualizations of responsibility. The purpose of this chapter is to describe the methods used to answer the following four research questions:

Research Questions

1. What do pre-service school practitioners (Education Majors) and students not majoring in education (Non-Education Majors) understand about dyslexia?
2. Is there a difference in knowledge of dyslexia between different Education Majors (general Education Majors, Special Education Majors, and school psychologists)?
3. Is there a difference in knowledge of dyslexia between Education Majors and non-Education Majors?
4. How do pre-service school practitioners (Education Majors) and Non-Education Majors view responsibility toward educating those with dyslexia?

Research Design

To answer these research questions, a quantitative survey design was implemented. A survey entitled, KIDS (the Knowledge and Insights of Dyslexia Survey), was developed to measure understanding of the origins, prevalence, characteristics and treatment of dyslexia. This survey research provided a numeric description of trends in knowledge about dyslexia, and included participant demographics, experiences with dyslexia, and conceptualizations of responsibility. Two groups of participants (Education Majors and Non-Education Majors) were administered KIDS. Comparisons were made across multiple measures within and between the Education Majors and Non-Education Majors. For this study, a cross-sectional survey design was the preferred methodology. This type of survey research was economical, required few personnel resources and allowed for rapid turnaround of large amounts of data. Approval from the

University Institutional Review Board from the Office for the Responsible Conduct of Research was obtained before the study began.

Participants and Setting

Participants included 243 university students from a public university in the southwestern United States. All participants were recruited in their classes by professors who agreed to distribute the survey. Sixteen professors were recruited to distribute the survey. Of those 16, eight professors in the college of education and four non-education professors agreed to distribute the survey in their courses.

Participants were categorized into two main groups: Education Majors ($n = 154$) and Non-Education Majors ($n = 89$). Education Majors (EM) included pre-service school practitioners who were majoring in General Education, Special Education, or School Psychology from the College of Education. These participants were included to represent the views of pre-service practitioners in the field of education.

Non-Education Majors (NEM) included students majoring in degrees offered by the College of Architecture. These participants were included in the study to represent the societal views of dyslexia, or the views of those who had not had training in the field of education.

Instrument

The *Knowledge and Insights of Dyslexia Survey (KIDS)* is a self-administered questionnaire consisting of three parts (Appendix B). Part I includes open-ended questions regarding demographic information such as subject of study, years of teaching, and whether or not the participant is an undergraduate or graduate student. Part II consists of open-ended questions about experiences, definitions, and beliefs of responsibility toward dyslexia. Part III consisted of twenty-four Likert items. For these items, participants are asked to rate statements

about dyslexia on a four-point scale: Definitely True, Somewhat True, Somewhat False, and Definitely False. Each of these 24 items were categorized into four areas of dyslexia knowledge: origins (6 items), characteristics (6 items), prevalence (3 items), and instruction / treatment of dyslexia (9 items).

Two forms of the *KIDS* were developed: Survey A for NEM (Appendix A) and Survey B for EM (Appendix B). The two forms were identical except that Form B contained two additional Likert-Scale items to measure self-preparedness and responsibility of working with those with dyslexia. These two items were not relevant to NEM and were therefore left off of Survey A.

As discussed in Chapter 3, *KIDS* was developed for the purpose of this research and was based on previous research studies about knowledge of dyslexia, myths about dyslexia present in the literature, and evidence-based facts of dyslexia. Prior to the present study, two pilot studies of the survey were completed to validate the instrument and a panel of three specialists reviewed and edited each item after the pilot studies.

Data Collection

Sixteen professors within the university, ten from the College of Education and six from the College of Architecture were asked via email to distribute the survey during their courses at the beginning of the Fall semester, 2018. The email described the details of the study and the professor's role in the study. The professors who agreed to participate received an instructor script to read before distribution, paper copies of the survey to distribute, as well as consent forms. Professors distributed the survey in their classes the first two weeks of the semester. Participation in the survey was anonymous, voluntary, and had no effect on student grades or class performance. The survey took approximately 20 minutes to complete. Those who chose not

to participate in the study read a relevant course article provided by each professor. All completed surveys were placed in a labeled envelope by class, and consent forms were placed in a second envelope. In-person surveys were chosen over internet surveys to minimize the risk of participants researching answers or discussing the questions with others. Results of the survey were entered into an Excel spreadsheet by the researcher. A second researcher reviewed the spreadsheet and any inconsistencies were checked against the original surveys and corrections were made. The results were then entered into a Google Docs Spreadsheet with the XLMiner Analysis Tool Pak add-on, with R statistical programming as a countercheck.

Data Analysis

Descriptive statistics

Descriptive statistics were used to explain basic features of the data and to provide a simple summary about the sample and measures in a meaningful way (Gravetter & Wallnau, 2009). Means, standard deviations, and frequencies were calculated for each Likert-scale item on the survey, for participant demographics, participant definitions, as well as for category of questions (origins, prevalence, characteristics, and instruction of dyslexia).

Z-test

A Z-test is appropriate to evaluate the mean difference between two groups when a large sample size ($n > 30$) and normal distribution of data are present. In this case, a Z-test was used for two purposes. First, to compare if a difference in knowledge of dyslexia existed between EM and NEM. Secondly, to determine if a difference existed between the opinions of NEM and EM of responsibility toward students with dyslexia.

ANOVA

Analysis of Variance (ANOVA) is used to determine if there are any statistical differences between the means of three or more unrelated groups (Gravetter & Wallnau, 2009). ANOVA was used for three different analyses in this study. First, ANOVA was used to determine differences among Education Majors (general Education Majors, Special Education Majors, and school psychologists). Secondly, the statistic was used to compare knowledge strands of dyslexia (origins, prevalence, characteristics, and treatment). Finally, ANOVA was used to determine if any differences existed between EM who had taken courses about dyslexia and students who had not had any courses.

Chi-Square Test

The Chi-Square Test for Goodness of Fit is used to compare proportions of a distribution (Gravetter & Wallnau, 2009). The Chi-Square Test was used to compare the proportion of Education Majors with specific perceptions of responsibility to the proportion of Non-Education Majors with specific perceptions of responsibility.

CHAPTER 4: RESULTS

This survey study had four main purposes: a) to investigate what university students understand about dyslexia; b) to determine if there were differences in dyslexia knowledge among Education Majors; c) to determine if differences in dyslexia knowledge existed between Education Majors (EM) and Non Education Majors (NEM); and d) to examine perceptions of responsibility toward educating students with dyslexia. This chapter includes the results of the survey items organized by participant demographics, overall knowledge of dyslexia (research question 1), differences between Education Majors (research question 2), differences between education and Non-Education Majors (research question 3), and perceptions of responsibility (research question 4).

Participants and Setting

As was discussed in the previous chapter, 243 students from one southwestern university participated in the study. Surveys were completed in-person, during regular scheduled classes the first few weeks of the fall semester. All classes took place on the campus of the university and no participant took longer than 30 minutes to complete the survey. Participants were divided into two groups based upon academic major. The first group consisted of 154 students majoring in degrees from a college of education and were labeled Education Majors (EM). A second group consisted of 89 surveys of students majoring in degrees from a college of architecture and were labeled Non-Education Majors (NEM). Following is a summary of demographics for EM and NEM.

Education Majors

One hundred and fifty-four of the participants were pursuing degrees within the College of Education. Table 2 contains the types of Education Majors and number of students working toward each degree. Ninety-six (62%) of EM were seeking undergraduate degrees. EM reported an average completion of 43.6% of their program requirements. However, there was variability in the amount of program completion amongst participants. Table 3 presents the amount of program completion on a four-point scale, 25%, 50%, 75% or 100%. Additionally, EM had an average of 0.97 years teaching experience. However, only 26% ($n = 40$) of EM had any teaching experience, with the majority ($n = 36$) having spent between 1-5 years teaching.

Table 2

Education Programs of Study

Major	<i>n</i>
Special Education	55
Elementary Education	47
School Psychology	16
Literacy, Learning, & Leadership (LLL)	9
Art Education	5
Deaf Studies	4
Speech, Language & Hearing	2
Counseling & Rehabilitation	2
Music Education	1
Family Studies	1
Psychology	1
Dual Major	
Deaf Studies & Creative Writing	1
LLL & Creative Writing	1
LLL & Political Science	1
LLL & Deaf Studies	1
Elementary & Special Education	1
Elementary & Communication	1
Elementary & English as Second Language	3

Note. Two participants had no major.

Table 3

Program Completion of EM

Percentage of Completion	25%	50%	75%	100%
<i>n</i>	72	47	27	3
<i>M</i>	0.48	0.31	0.18	0.02

Ten of EM self-identified as definitely having dyslexia and three thought they might possibly have dyslexia. Seventy-two knew someone with dyslexia and 48 had experience working with an individual with dyslexia. Courses covering dyslexia topics had been taken by 21 of the EM participants. Table 4 displays percentages of EM and NEM who have had specific experiences with dyslexia.

Table 4

Percent of Participant Experiences with Dyslexia

	Self-Identified	Know Someone	Worked With	Taken Courses
EM	8.4%	46.8%	31.2%	13.6%
NEM	9%	49.4%	23.6%	0%

Non-Education Majors

Eighty-nine of the participants were pursuing degrees within the College of Architecture. Table 5 contains the different architecture majors and number of students working toward each

degree. Most NEM, 76.4% ($n = 68$), were seeking undergraduate degrees and all students had completed at least 54% of their program requirements. NEM had an average of 0.73 years teaching experience. However, only three NEM accounted for all of the teaching experience. The first NEM had between 1-5 years, the second between 5-10, and the third had more than 10 years teaching experience.

Table 5

Architecture Programs of Study

Major	<i>n</i>
Architecture	50
Sustainable Built Environment	26
Urban Planning	9
Real Estate Development	2
Dual Major	
Urban Planning /MBA	2

Eight of NEM self-identified as having dyslexia and three thought they might possibly have dyslexia. As was the case with EM, almost half ($n = 44$) of NEM knew someone with dyslexia and 21 had experience working with an individual with dyslexia. None of the Architect students had taken any courses covering dyslexia. Again, Table 4 provides the percentage of EM and NEM that had experiences with dyslexia.

Research Question 1: Overall Knowledge of Dyslexia

Two components of the survey were used to measure overall student knowledge of dyslexia: participant definitions and responses to 24 Likert-Scale items. The results of each are discussed in turn.

Participant Definitions of Dyslexia

Overall, 239 definitions (4 participants left this item blank), were examined for common key concepts and totaled. A second reviewer then examined all the definitions and counted for the same key concepts. The two lists of labeled definitions were compared for consistency and differences were discussed and corrected. Inconsistencies in labeling were found in 3.3% ($n=8$) of the definitions. Key concepts did not have to have exact wording. For example, the concept “dyslexia is a learning disability” was identified and definitions that included synonyms such as “disorder” or “condition” were included as part of the same concept. The most common key concepts included: visual difficulties, learning disability, difficulty in reading, neurological components, and reading skills (i.e. decoding, fluency, comprehension).

Surprisingly, only 17.6% ($n = 42$) of definitions included the basic concept that “dyslexia is a learning disability.” Many participants, 58.2%, ($n = 139$) included concepts of visual difficulties such as “reading things backwards,” “numbers and letters flip,” and “seeing words jumbled.” Visual concepts were discussed even more than the term “reading” was used ($n = 105$, 43.9%). Moreover, while 10.9% ($n = 26$) included concepts of brain functioning or a neurological component to their definitions, only 2.9% ($n = 7$) included at least one specific reading skill that those with dyslexia have difficulty with. For example, problems with “phonological awareness”, “decoding”, or “spelling.” Given these counts, EM and NEM in this study most commonly define dyslexia as a reading disability in which the individual reads backwards or flip words and letters around.

Responses to Likert Items

Twenty-four Likert items represent four knowledge strands of dyslexia: origins (6 items), characteristics (6 items), prevalence (3 items), and instruction / treatment of dyslexia (9 items). Each of the 24 Likert-scale items were scored as either correct or incorrect. Overall, participants

answered 70% of the Likert items correctly ($M = 0.69$, $SD = 0.22$). Percentages of correct responses for each item were also calculated. Table 6 lists each of the 24 Likert items with percentage of correct responses and corresponding knowledge strand. Participants had the most correct responses (95.89%) on the item, *dyslexia exists only in English speaking countries*, a statement about prevalence. Whereas, the item, *students with dyslexia need instruction primarily in reading comprehension strategies*, received the least amount of correct responses (18.41%). This is an item measuring treatment. In fact, the six items with the lowest obtained scores were all items about treatment.

Table 6

Likert-scale Items by Knowledge Strand and Percent Correct

Item	Correct Response	Percentage Correct	Knowledge Strand
Dyslexia exists only in English speaking countries	False	95.89%	Prevalence
An individual can be diagnosed with both ADHD and dyslexia	True	93.41%	Characteristics
Dyslexia can contribute to low self-esteem	True	92.16%	Characteristics
Dyslexia is neurological in origin	True	90.94%	Origins
Medication, when taken consistently can cure dyslexia	False	86.83%	Treatment
Having below average intelligence is a common characteristic of individuals with dyslexia	False	86.82%	Characteristics
Difficulty with phonological processing is a major contributing factor to dyslexia	True	86.43%	Origins

Poor spelling is one symptom of dyslexia	True	86.02%	Characteristics
If parents read to their children, then their children will likely not develop dyslexia	False	85.19%	Origins
Poor instruction is one cause of dyslexia	False	85.16%	Origins
Students with dyslexia should be taught how to read using a systematic and explicit phonics approach	True	83.46%	Treatment
Most individuals with dyslexia are naturally left handed	False	82.66%	Characteristics
Dyslexia is usually outgrown	False	75.32%	Origins
Students with dyslexia learn to read most quickly through the use of decodable text	True	73.95%	Treatment
More females than males have dyslexia	False	72.24%	Prevalence
Dyslexia is hereditary	True	61.58%	Origins
Less than 5% of the population has dyslexia	False	57.62%	Prevalence
Most students with dyslexia have difficulty with listening comprehension	False	55.36%	Characteristics
Colored lenses or overlays help improve reading in people with dyslexia	False	46.50%	Treatment
In most cases, it is not possible to diagnose a child with dyslexia until the third grade	False	46.09%	Treatment

Most pediatricians perform diagnostic evaluations to determine if a child has dyslexia	False	44.03%	Treatment
Students with dyslexia will learn to read most quickly through the use of authentic text	False	43.19%	Treatment
Phonological awareness is another term for phonics	False	29.42%	Treatment
Students with dyslexia need instruction primarily in reading comprehension strategies	False	18.41%	Treatment

After individual item analysis, each of the four knowledge strands (origins, prevalence, characteristics, and treatment) were also analyzed. Table 7 includes the means and standard deviations of correct responses for each strand. The analysis of variance revealed significant differences among the four knowledge strands, $F(3,20) = 4.42, p = .015, \eta^2 = 0.66$. Overall, participants demonstrated the greatest level of knowledge about characteristics of dyslexia and knew the least about treatment.

Table 7

Knowledge of Dyslexia by Strand

	Origins	Prevalence	Characteristics	Treatment
<i>M</i>	0.81	0.75	0.83	0.52
<i>SD</i>	0.90	0.87	0.91	0.72

Research Question 2: Knowledge Differences Between Education Majors

Participant responses to the Likert-scale items were analyzed to see if a difference in knowledge existed between the three main Education Majors: General Education ($n=72$), Special

Education ($n = 65$) and School Psychology Majors ($n = 17$). All EM were categorized in one of these general groups, regardless of listing a more specific major, such as Deaf Studies or Elementary Education, on the survey. Percentages of correct responses for each item were calculated and the means and standard deviations for the three Education Majors are presented in Table 8. According to analysis of variance, there were no significant differences among the three Education Majors, $F(2, 69) = 3.13$, $p = .076$, $\eta^2 = 0.008$.

Table 8

Overall Knowledge of Dyslexia by Education Majors

	General Education	Special Education	School Psychologist
<i>M</i>	0.70	0.75	0.75
<i>SD</i>	0.25	0.20	0.25

However, when EM responses were organized by the four knowledge strands, significant differences were noted using a Z-test of two proportions (of correct responses), with probability below the usual significance level of $\alpha = 0.05$. Significant differences were found between General Education Majors and Special Education Majors on four specific items. There were also statistical differences between School Psychology Students and Special Education Students on two specific questions. Table 9 displays the items with significant differences between EM, the percentage of correct scores for each major, and corresponding Z-scores and *p-values*. There were no statistical differences on items between General Education Students and School Psychology Students. All of the items with significant differences were categorized in the knowledge strand of treatment and in each case the special education students had more correct responses than the General Education Majors and School Psychology Majors. In general, the

Special Education Majors had more correct responses to items about treatment of dyslexia than any other EM.

Table 9

Items with Significant Differences in Response Between EM

Item	General Education	Special Education	Z-Score	p-value
Phonological awareness is another term for phonics	20.8%	39.1%	-2.3367	0.0195
Colored lenses or overlays help improve reading in people with dyslexia	43.1%	63.1%	-2.3434	0.5840
Students with dyslexia need instruction primarily in reading comprehension strategies	13.9%	30.8%	-2.3857	0.0170
In most cases, it is not possible to diagnose a child with dyslexia until the third grade	38.9%	61.54%	-2.6477	0.0081

Item	School Psychology	Special Education	Z-Score	p-value
An individual can be diagnosed with both ADHD and dyslexia	94.1%	100%	1.9674	0.0491
In most cases, it is not possible to diagnose a child with dyslexia until the third grade	35.3%	63.08%	2.0620	0.0392

Research Question 3: Differences Between NEM and EM

To determine if any differences in knowledge of dyslexia existed between Education Majors (EM) and Non-Education Majors (NEM), a Z-test was used. Due to the size of the samples of EM ($n = 154$) and NEM ($n = 89$) normality was assumed. No statistical differences

were found in overall knowledge between EM ($M = 0.73$, $SD = 0.22$) and NEM ($M = 0.65$, $SD = 0.22$). However, statistical differences were found between responses to some specific items. Using a Z-test of two proportions (of correct responses), with probability below the usual significance level of $\alpha = 0.05$, seven items were found to have a statistical difference between EM and NEM. Table 10 displays the significant items in order from least difference to greatest difference, as well as the average scores for EM and NEM on each item, Z-scores and p -values. For each of the items with a significant difference in response, EM had a higher percentage of accuracy than NEM. So while there is no overall statistical difference between EM and NEM in dyslexia knowledge, EM did have more correct responses than NEM.

Table 10

Items with significant differences in responses between EM and NEM

Item	EM	NEM	Z-Score	p -value
Most Pediatricians perform diagnostic evaluations to determine if a child has dyslexia	48.7%	35.9%	-1.9306	0.0535
Dyslexia can contribute to low self-esteem	94.8%	87.6%	-1.9935	0.0462
Students with dyslexia need instruction primarily in reading comprehension strategies	22.4%	11.5%	-2.1155	0.0344
If parents read to their children, then their children will likely not develop dyslexia	89.7%	87.7%	-2.1805	0.0292
Dyslexia exists only in English speaking countries	99.4%	90.0%	-3.5738	0.0004
An individual can be diagnosed with both ADHD and dyslexia	98.1%	85.4%	-3.8347	0.0001

Medication, when taken consistently, can cure dyslexia	94.8%	73.0%	-4.8394	0.0000
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Research Question 4: Perceptions of Responsibility

Two items on the survey were used to measure participants' perceptions of practitioner responsibility for students with dyslexia. First, on one item EM and NEM had to determine which school practitioner they felt was the most responsible for supporting students with dyslexia: general education teachers, special education teachers, or school psychologists. Second, EM were asked to rate their own level of responsibility toward supporting students with dyslexia. Results of each item are provided in the next section.

EM and NEM Assignments of Responsibility

Both EM and NEM answered an item in which they identified which school practitioner was the most responsible for supporting students with dyslexia. Overall, 45% ($n = 110$) of participants felt Special Education teachers were the most responsible and 38.2% ($n = 93$) felt General Education teachers were the most responsible. Only 7% ($n = 17$) assigned School Psychologists with the greatest level of responsibility. The remaining participants did not choose a provided answer, but rather provided their own suggestions in an explanation section.

Responses were also analyzed by each major. Approximately 50% ($n = 78$) of EM felt special education teachers were the most responsible for supporting students with dyslexia. Thirty-four percent ($n = 53$) felt general educators were the most responsible and 3.2% ($n = 5$) identified school psychologists as the most responsible. Eighteen (11.7%) of EM did not choose a school practitioner, but in the explanation section indicated "all teachers" were responsible. One participant did not respond to this item.

Forty-five percent of NEM ($n = 40$) identified general education teachers as the most responsible and 35.9% ($n = 32$) identified special education teachers as the most responsible. School Psychologists were identified by 13.4% ($n = 12$) of NEM. Five participants did not indicate a choice and wrote in either the words “all” or “specialists.”

Comparing EM views of responsibility to NEM views of responsibility reveals a difference of opinion. Figure 2 displays a visual representation of EM and NEM perceptions of responsibility, with more EM perceiving special education teachers to be most responsible and NEM perceiving General Education to be the most responsible.

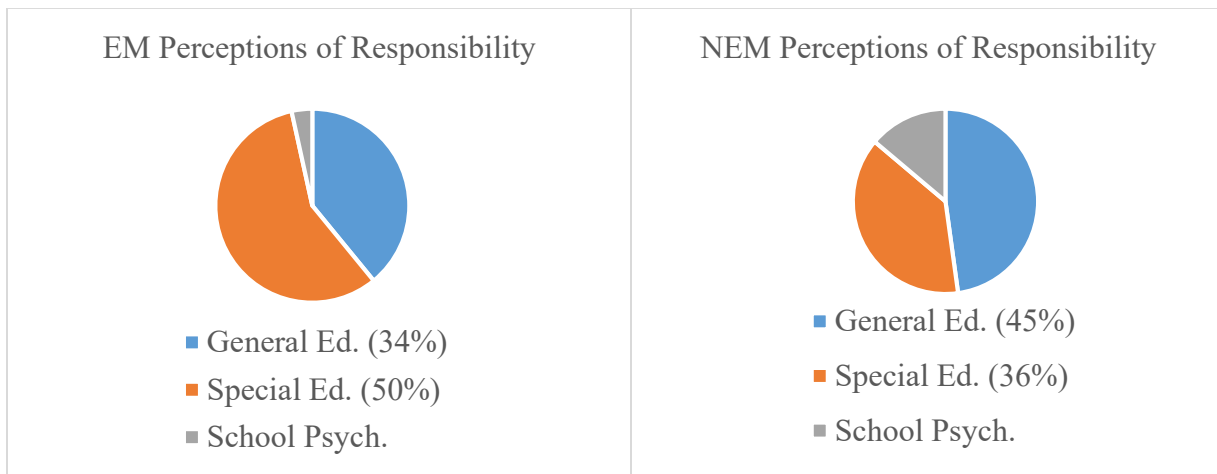


Figure 2. EM and NEM Perceptions of Responsibility

A chi-square test of goodness-of-fit was performed to determine whether the three school practitioners were equally preferred. Preference for special education teachers, general education teachers, and school psychologists was not equally distributed in the population, $X^2(2, n = 220) = 4.27, p = .04$. In sum, EM believe special education teachers have the most responsibility and NEM believe general education teachers have the most responsibility.

EM Assignments of Responsibility by Major

Views of responsibility of EM were analyzed further by reviewing the views of the three majors within EM: general education, special education, and school psychology. In sum, of the 72 majoring in General Education the majority believe General Educators are the most responsible for educating those with dyslexia ($n = 32, 44\%$). Most of the 65 students majoring in Special Education believe Special Educators are the most responsible ($n = 38, 58\%$). Finally, most of the 17 majoring in School Psychology believe Special Educators are the most responsible ($n = 11, 65\%$). Students majoring in School Psychology are the only students who did not choose their own major as being the most responsible.

Self-Perceptions of Responsibility

Students majoring in Education responded to one survey item in which they had to rate their own level of responsibility toward supporting students with dyslexia, given the following scale: 1(not at all), 2 (slightly), 3 (moderately), 4 (very), and 5 (extremely). NEM were not asked this question because they are not majoring in degrees intended to prepare them for teaching. One-hundred forty EM rated their own perception of responsibility and provided an explanation for their rating. The overall group had an average rating of 3.5, expressing feelings of moderately to very responsible for educating those with dyslexia. However, the range of self-ratings provided more detail about perceptions of responsibility.

Table 11 displays the percentage of EM that selected each rating of responsibility. Approximately nine percent ($n = 12$) of EM rated themselves as “not at all” responsible. Five (3.6%) felt they did not have enough information or experience yet, six (4.2%) explained that it was not part of their job description, and one (0.7%) did not understand the question. Of those who rated themselves “slightly responsible,” ($n = 21, 15\%$), five (4.2%) felt their job did not

require working with individuals with dyslexia and five (4.2%) wanted more information. Nineteen (13.6%) of EM rated themselves “moderately responsible.” Twelve (9%) felt it was the role of a teacher to work with all students, four (2.9%) felt it was not in their job description, and two (1.4%) wanted more information. A rating of “very responsible” was selected by 44 EM (31.4%). Of those who rated themselves a three, 38 (27.1%) provided explanations that it was the job of a teacher to provide instruction to all students. A rating of “extremely responsible” was also selected by 44 (31.4%) EM. Similarly, 41 (29.2%) of the participants felt it the role of the teacher to support students with dyslexia. Interestingly, three (2.1%) of participants described their own learning experiences with dyslexia and did not want other students to experience difficulties. From total counts, most EM felt very or extremely responsible. Moreover, most EM explained that as educators they feel it is their role to educate all of their students.

Table 11

EM Self-Ratings of Responsibility Supporting Students with Dyslexia

1 Not at All	2 Slightly	3 Moderately	4 Very	5 Extremely
8.6%	15%	13.6%	31.4%	31.4%

Self-perceptions of different Education Majors. Perceptions of responsibility were also organized by the three Education Majors: General Education, Special Education and School Psychology. Table 12 provides each major and average rating of self-perception of responsibility as well as which school practitioner each EM believed is the most responsible for educating students with dyslexia.

Table 12

Average Ratings of Self-Perception and Assignment of Responsibility by EM

Major	General Education	Special Education	School Psychologists
Self-Ratings	3.75	3.49	2.81
Assigned Responsibility	General education Teachers (44%)	Special Education Teachers (58%)	Special Education Teachers (65%)

Note. Self-rating scores: 1=Not at all, 2=Slightly, 3=Moderately, 4=Very, 5=Extremely

Overall, General Education Majors feel the most responsible and think General Education Teachers have the greatest level of responsibility. School Psychology Majors feel the least responsible and think Special Education Teachers are the most responsible for educating students with dyslexia.

CHAPTER 5: DISCUSSION

Dyslexia is a language-based learning disability that has historically been misunderstood (Anderson & Meier-Hedde, 2001; Christo, Davis, & Brock, 2009; Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-Cantrell, 2011). At least 8% of students have dyslexia, which causes difficulties with both reading and spelling (Pennington, 2009) and some researchers estimate that up to 20% of the population displays some symptoms of dyslexia (Yale Center for Dyslexia and Creativity, 2015). Understanding of this disability is critical to ensure that students are identified early and receive evidence-based instruction (Griffiths & Stuart, 2013; NRP, 2003; Rose, 2006; Shaywitz, 2003). Without intervention, students with dyslexia are often substantially behind in reading and are at a greater risk for school dropout, substance abuse, and developing a criminal record (Lyon, 2002). Moreover, previous research on teacher knowledge of dyslexia has shown that educators demonstrate a lack of understanding about dyslexia and feel unprepared to adequately teach and support students with this disability (Moats, 1994; Ness & Southall, 2010; Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-Cantrell, 2011).

The present study used a survey to explore university students' knowledge of dyslexia and their perceptions of responsibility toward supporting students with dyslexia. More specifically, the following questions were investigated: a) What do pre-service school practitioners (Education Majors) and students not majoring in education (Non-Education Majors) understand about dyslexia? b) Is there a difference in knowledge of dyslexia between different Education Majors (general Education Majors, Special Education Majors, and school psychologists)? c) Is there a difference in knowledge of dyslexia between Education Majors (EM) and non- Education Majors (NEM)? d) How do EM and NEM view responsibility toward educating those with

dyslexia? This chapter includes a summary of findings for each research question, the study limitations, and the implications for future research and practice.

Summary of Findings

Overall Knowledge of Dyslexia

Definitions of dyslexia provided by participants and responses to Likert items were used to investigate EM and NEM understandings of dyslexia. As was found in previous research examining definitions of dyslexia (Carvalhais & Fernandes da Silva, 2010), some EM and NEM described dyslexia as a learning disability (17.6%) that affects reading (43.9%) and is of neurological origin (10.9%). Responses to Likert items substantiated this finding. Most participants (91%) answered the item *dyslexia is neurological in origin* correctly and approximately 85% understood that dyslexia is not caused by poor teacher instruction or parents' limited involvement with their children's reading development.

Participants' understanding of the origins of dyslexia is critical for both educators and parents alike. A diagnosis of a learning disability can be an emotional and confusing experience for the individual, parents, and teachers. Recognizing that dyslexia is not the fault of the family, school, or students is key to being able to take the necessary steps for supporting students with dyslexia. Though environmental factors such as reading to children and providing evidence-based instruction may increase the likelihood of reading success in students, dyslexia is congenital and those with dyslexia have the disability regardless of parent and school decisions (Olson, 2005; Shaywitz, 2003). Many participants also understood important facts such as: dyslexia affects individuals around the world (96%), those with dyslexia can have comorbidity with ADHD (93%), and dyslexia can lead to low self-esteem (92%).

In contrast, participants did not understand many other components on the survey. The most common definitions of dyslexia (58.2%) included visual misinterpretations of the disability, which is in alignment with the pop-culture definition. Participants believed that those with dyslexia “see backwards,” and that “words and letters jump off the page” and that “their brains jumble letters and numbers.” These inaccurate depictions of dyslexia are consistently documented in previous studies as well (e.g., Carvalhais & Fernandes da Silva, 2010; Furnan, 2013; Kirby 2005, Ness & Southall, 2010; Wadlington & Wadlington, 2005; Worthy et al., 2016). Both EM and NEM described the visual myths of dyslexia much more than evidenced-based symptoms such as problems with phonology and organizing sounds in words (2.9%). Answers to Likert-scale items also substantiated this confusion. Roughly 54% incorrectly believe that colored overlays and visual therapies are helpful for treating dyslexia, even though vision therapies such as the use of colored lenses have been found to be ineffective (Henderson, Tsogka, & Snowling, 2013; Hyatt, Stephenson, & Carter, 2009; Ritchie, Della Sala, & McIntosh, 2011).

More than any other knowledge strand, participants missed the most questions about the instruction and treatment of dyslexia. In fact, the six items with the lowest corresponding correct responses were all in the knowledge strand of treatment. Only 18.1% of participants understood that students with dyslexia do not need instruction primarily in reading comprehension. This item had the lowest amount of correct responses. Difficulty comprehending information is not a primary symptom of dyslexia. Most individuals with dyslexia do not have difficulty understanding content when it is read to them. Rather, those with dyslexia have difficulty understanding phonology, sound-symbol relationships, and decoding words, which causes problems with learning to read (Moats, 1994; NRP, 2003; Rose, 2006). Comprehension

strategies such as finding the main idea and drawing conclusions, while important tools for understanding, will do little to correct the underlying reading and spelling difficulties impeding those with dyslexia.

Responses to other survey items about instruction also revealed that the participants did not fully understand the fundamental components needed to teach reading to students with dyslexia. Participants did not know the difference between phonics and phonological awareness (71%) and many had confusion about the appropriate types of text to use in instruction (57%). Moreover, only 2.9% of student definitions included accurate reading skills that are difficult for those with dyslexia (i.e. phonological awareness, decoding, spelling). These findings are consistent with the abundant research on teacher knowledge of essential reading components (Bos et al., 2001; Cunningham et al., 2004; Moats, 1994; Ness & Southall, 2010; Spear-Swerling & Brucker, 2003).

Also of immense concern was the result that many participants had confusion about the diagnosis of dyslexia. More than half (56%), incorrectly thought that pediatricians perform evaluations to diagnose dyslexia, when in reality testing is usually completed by a licensed or certified educational or school psychologist. Additionally, approximately 54% of participants believed it is not possible to diagnose someone with dyslexia until the third grade. Research has demonstrated that an individual can be screened as early as five years to determine high-risk for reading difficulties and that reading interventions are most successful when implemented at an early age (Griffiths & Stuart, 2013; NRP, 2003; Rose, 2006; Shaywitz, 2003). However, this is also a conflation of dyslexia with special education eligibility. Students with dyslexia receive special education services in schools under the label of Specific Learning Disabilities (SLD). A label of SLD requires significant educational impact, which appears differently in younger

versus older students. The precision of early intervention demands retraining about how educational impact varies in different ages. Early intervention is one of the most critical components of reading success for those with dyslexia and it is vital that school practitioners provide interventions as early as possible.

Although 37% of the participants were NEM and thus are likely to not be educators, having accurate understanding of the disability is important for the general public as well. Nearly half of NEM (49.4%) knew someone with dyslexia and nine percent identified themselves as having dyslexia. Given dyslexia's high level of prevalence, it is quite likely that some NEM will have children with dyslexia or will have friends and family who do. The greater societal understanding of early intervention and where and how to get support, the greater the likelihood of success for individuals with dyslexia. Lack of reading achievement affects all members of a society and the consequences of illiteracy are not just limited to those in education.

Overall, participants demonstrated a rudimentary understanding of dyslexia as a reading disability but continued to believe societal myths about the characteristics and treatment of dyslexia. This finding is consistent with previous studies investigating knowledge of dyslexia (e.g., Bell, McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silvia, 2010; Furnham, 2013; Gwerman-Jones & Burden, 2010; Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-Cantrell, 2011). Despite advances in research, the participants do not seem to show any more knowledge than the participants of studies from over fifteen years ago.

Comparisons of Knowledge Between Education Majors

No significant differences were found among overall knowledge of dyslexia within different Education Majors. That is, there were no statistical differences between knowledge of students majoring in School Psychology, Special Education, and General Education. These results are

surprising. Many of the Special Education Majors were near the end of their coursework and had already completed courses covering dyslexia. One would believe because Special Education Teachers provide more targeted interventions to those with learning disabilities that they would have a greater understanding of dyslexia. A lack of significant difference may be due to the fact that students had not finished all the requirements of their program. It is possible that once students complete all their coursework, a significant difference may be found. However, analysis revealed that no statistical differences were found between students who had identified taking course work covering dyslexia than those who had not. Thus, the students who had completed courses including topics of dyslexia did not know significantly more than those who had not taken courses.

Analyzing individual survey items did result in some statistical differences between specific Likert-scale items. Namely, Special Education Majors had significantly more correct responses than General Education Majors on four items and Special Education Majors had significantly more correct responses than School Psychology Majors on two items. Every item with a statistically significant difference between EM was a treatment question. Therefore, it could be concluded that the students majoring in Special Education knew more about the treatment and instruction of dyslexia than those majoring in General Education or School Psychology.

Comparisons of Knowledge Between EM and NEM

No statistical differences were found between the overall knowledge of EM and NEM on the survey. In other words, those preparing to become school practitioners did not know significantly more about dyslexia than those who were not preparing to become school practitioners. This result was disheartening. It was expected that future educators would understand more about a disability that affects learning than individuals who are not preparing to

be educators. As before, some of the lack of difference may be due to the fact that some EM had not completed all of their coursework and may possibly learn more about dyslexia in future courses. However, on average, EM had completed 44% of their program. It would be reasonable to think that those who are nearly half way through an educational program would know more about an education topic than students who had had no education courses at all. A promising result was that EM did have significantly more correct responses on seven specific items. Thus, EM knew more than NEM on 29% of the survey items.

The Peter Effect

The findings of a lack of knowledge about dyslexia in pre-service school practitioners can be applied to the theoretical framework that was presented in Chapter 2. The Peter Effect is the concept that one cannot give what one does not possess (Applegate & Applegate, 2004; Binks-Cantrell & Washburn, 2012). The pre-service school practitioners in this study do not yet understand the key knowledge needed to identify dyslexia and/or provide evidence-based instruction to students with dyslexia. Alarming, 61% of General Education Majors, 38% of Special Education Majors, and 65% of School Psychology Majors incorrectly believed that those with dyslexia cannot be identified until the third grade. Moreover, six of the nine items about treatment of dyslexia resulted in average scores below 50%. Thus, if the EM in this study do not possess understanding of identification and instruction of dyslexia, then they will not be able to successfully recognize the disability or provide evidence based.

Perceptions of Responsibility

Overall, Special Education Teachers were assigned with the greatest level of responsibility for educating those with dyslexia by 45% of participants. Roughly 38% of participants felt General Educators have the greatest level of responsibility. This is an interesting result, given the

fact that most students with dyslexia spend the majority of the day in the General Education class with General Education Teachers (Clark, 1997). General Education Teachers are also typically the first to notice that a student is having difficulty. Thus, they need to be able to identify the student's difficulties and take initial steps for early intervention. Interestingly, when EM and NEM perceptions of responsibility are compared, NEM believed General Education Teachers have the most responsibility. Because NEM are not part of an educational program, this view is representative of societal views and could be compared to expectations that those who are not in education have of practitioners. NEM believe and therefore may expect, teachers in General Education to be knowledgeable about dyslexia. EM on the other hand, believed that Special Educators hold the greatest level of responsibility. However, an analysis of EM views of responsibility by major provides greater insight into these perceptions.

Each EM determined which school practitioner they felt was the most responsible for educating students with dyslexia as well as rated how responsible they perceived themselves to be. A snapshot of the results are available in Table 13. Both General Education and Special Education Majors felt moderately responsible for supporting those with dyslexia and believed practitioners in their own field to hold the greatest level of responsibility. Only School Psychologists did not feel as responsible and assigned this responsibility to Special Education Teachers. This may be due to terminology in the question. Several School Psychology Majors implied that it was their role to "assess" students and thus they were not the practitioner who would be responsible for providing the actual teaching of students. However, these individuals seemed to not fully recognize their roles in consultation. As School Psychologists they will be responsible for identifying evidence based interventions, providing ongoing data monitoring and analysis of progress, as well as completing more comprehensive evaluations.

Table 13

Assignment of Responsibility by EM and Ratings of Self-Perception

Major	General Education	Special Education	School Psychologists
Self-Ratings	3.75	3.49	2.81
Assigned Responsibility	General Education Teachers	Special Education Teachers	Special Education Teachers
Percentage	(44%)	(58%)	(65%)

Note. Self-rating scores: 1=Not at all, 2=Slightly, 3=Moderately, 4=Very, 5=Extremely

Network of Responsibility

Lauerma's Network of Responsibility (2014), as discussed in Chapter 2, demonstrates how teacher knowledge, responsibility, and student success are linked. Those who feel responsible toward a particular task are more willing to invest the time and energy needed for positive results (Ryan & Deci, 2006). Lauerma suggests teacher skills (training, expertise in subject area, and experience) are some of the factors that influence responsibility (2014). The results of this study can be applied to this theory as well. Figure 3 provides a theorized model of responsibility for supporting students with dyslexia, based upon Lauerma's Network of Responsibility.

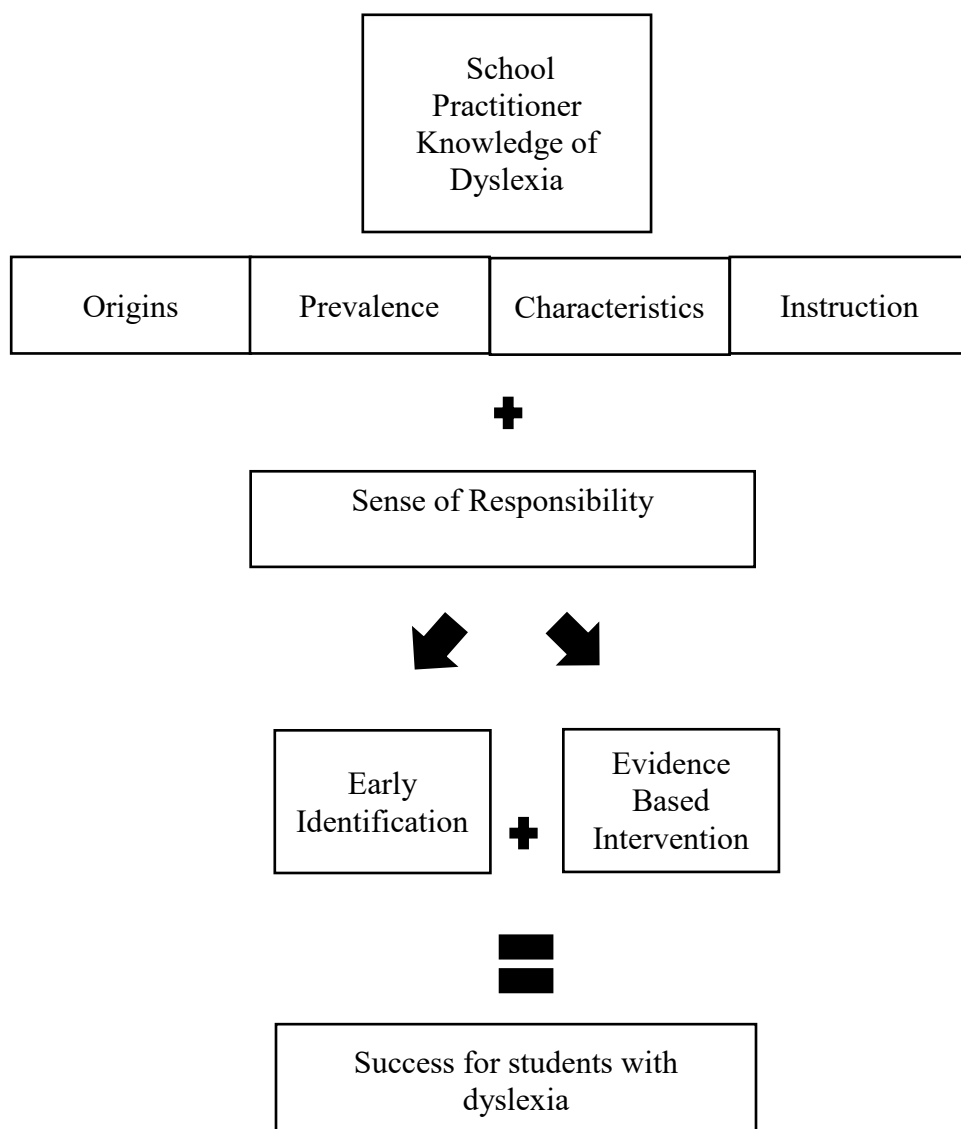


Figure 3. Network of Responsibility and Dyslexia

Using this model as a guide, the school practitioners from this study demonstrated an understanding of 73% of the items on the survey, missing the most items about treatment, and felt moderately responsible for educating students with dyslexia. As Laurerman hypothesized, knowledge is an antecedent to responsibility. Most EM who rated themselves as “not at all”

responsible or “slightly” responsible on the survey also explained that they did not have enough information or experience to support students with dyslexia. The majority of participants felt a sense of responsibility to educating students with dyslexia, but 36% felt they were not prepared at all and 43% felt they were only slightly prepared. These results are in alignment with what Worthy and colleagues (2016) determined in their qualitative study. Generally, educators feel a sense of responsibility toward educating students with dyslexia but feel they do not have enough training and support to do so (Worthy et al., 2016). The same is true for this study, pre-service school practitioners felt a sense of obligation for educating students with dyslexia but did not feel they were prepared to do so. Furthermore, the results also show that they do not have enough knowledge about how to support students with dyslexia.

Limitations and Recommendations for Future Research

This study contributes to the body of evidence supporting the need for increased teacher preparation in the area of dyslexia. However, several limitations should be taken into consideration when interpreting results.

Sample

First, the number of participants for this study produced relatively good power statistically, but all were from one southwestern university. This limits the generalizability of the study. Having participants from a number of universities across the United States would provide a better representation of what students understand about dyslexia. Moreover, sampling bias was present with participants. While a number of professors were contacted, only those who wanted to participate in the study provided their surveys to students. It is possible that more students may have completed the survey if it had been made available to them. Furthermore, generalizability and validity of the results would have been increased if students from other Non-

Education Majors had participated. Sampling of non-education students was of convenience, due to limited resources. Future studies comparing societal views of dyslexia to those in the education field should consider other programs of study such as business, engineering, etc. Finally, an uneven number of participants existed in each Education Major. Due to the small size of programs such as School Psychology, it was not possible to obtain equal numbers of participants of each major. The views and scores of those majoring in School Psychology should be interpreted within the context of the study. Again, by obtaining participants from multiple schools a more thorough representation of those in the field of School Psychology could be obtained.

Data Collection

The percentage of program completion was collected for each participant on the survey. However, it is unknown what participants will learn in the remainder of their program. It is possible that students will learn more about dyslexia in future coursework, which could alter results of the study. Future studies measuring pre-service knowledge should attempt to measure pre-service school practitioners' knowledge upon completion of their program, just before entering the field. In addition, a study that measured students' knowledge upon entering their program as well as upon completion of their program would be of interest. This would provide a more valid representation of what university students know about dyslexia and the degree to which teacher preparation programs are contributing to that knowledge.

Data Analysis

Z-tests were used as the most efficient test to compare large amounts of data. However, Z-tests compare proportions of responses (proportion of EM who answered an item correctly to the proportion of NEM) and when multiple Z-tests are completed some Z-tests are significant by

chance (1/20, 5%). Multiple Z-tests were run to compare responses of different majors on each of the Likert-scale items. It is probable that at least some of the tests resulted in a significant score because of chance. However, the Z-tests were used for secondary research questions only, such as differences between specific survey items. Overall results of primary research questions were not affected. Tests such as ANOVA and Chi-Square were also used to confirm results of primary research questions.

Practical Implications

This study provided new insights pertaining to the knowledge of dyslexia. It was the first study to compare NEM to EM and the first quantitative study to investigate perceptions of responsibility toward dyslexia. A lack of statistical differences between NEM and EM suggests that preparation programs in education need to expand coverage on the topic of dyslexia (Bell, McPhillips, & Doveston, 2011; Carvalhais & Fernandes da Silvia, 2010; Furnham, 2013; Gwerman-Jones & Burden, 2010; Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-Cantrell, 2011). Future studies should investigate best practices for teaching school practitioners about the origins, prevalence, characteristics, and instruction of dyslexia. Moreover, more advocacy and presentation of dyslexia needs to take place publicly. Pervasive societal myths of dyslexia continue to be believed and interfere with evidence-based knowledge that is linked to identification and treatment for those with dyslexia. Finally, efforts should be made to bridge the research to practice gap in dyslexia. Abundant research is available about effective ways to teach those with dyslexia to read and write. The results of this study indicate however, that evidence-based knowledge is not common knowledge. In order for all individuals to learn to read, educational professionals need to acquire a deeper understanding of dyslexia, as well as the implementation of evidence-based identification procedures and interventions.

Appendix A

**The Knowledge and Insights of Dyslexia Survey
(Form A –NEM)**

1. What is your major?

2. What level of degree are you seeking?

Undergraduate degree

Graduate Degree

Non-Degree Seeking

3. Approximately what percentage of your program have you completed?

25%	50%	75%	100%
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. How many years teaching experience do you have?

0	1-5	5-10	Greater than 10
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Have you taken any courses about dyslexia?

Yes

No

If yes, please describe the course(s).

6. Have you had any experience working with someone with dyslexia?

Yes

No

If yes, please describe the relationship.

7. Do you have dyslexia?

Yes

No

8. Does anyone you know have dyslexia?

Yes

No

If yes, please describe the relationship.

9. How would you define dyslexia?

10. In your opinion, which school practitioner has the greatest responsibility towards supporting students with dyslexia?

General Education Teacher

Special Education Teacher

School Psychologist

Please explain

11. Most school psychologists are knowledgeable about dyslexia.

Definitely True

Possibly True

Possibly False

Definitely False

12. Most teachers are knowledgeable about dyslexia.

Definitely True

Possibly True

Possibly False

Definitely False

13. Dyslexia is neurobiological in origin.

Definitely True

Possibly True

Possibly False

Definitely False

14. Difficulty with phonological processing is a major contributing factor to dyslexia.

Definitely True

Possibly True

Possibly False

Definitely False

15. Most students with dyslexia have difficulties with listening comprehension.

Definitely True

Possibly True

Possibly False

Definitely False

16. Dyslexia is usually outgrown.

Definitely True

Possibly True

Possibly False

Definitely False

17. Poor spelling is one symptom of dyslexia.

Definitely True

Possibly True

Possibly False

Definitely False

18. Poor instruction is one cause of dyslexia.

Definitely True

Possibly True

Possibly False

Definitely False

19. Most individuals with dyslexia are naturally left handed.

Definitely True

Possibly True

Possibly False

Definitely False

20. Students with dyslexia need instruction primarily in reading comprehension strategies.

Definitely True

Possibly True

Possibly False

Definitely False

21. Dyslexia can contribute to low self-esteem.

Definitely True

Possibly True

Possibly False

Definitely False

22. Phonological awareness is another term for phonics.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. If parents read to their children, then their children will likely not develop dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. Medication, when taken consistently, can cure dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. More females than males have dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Dyslexia is hereditary.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. Having below average intelligence is a common characteristic of individuals with dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Less than 5% of the population has dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. An individual can be diagnosed with both ADHD and dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. Dyslexia exists only in English speaking countries.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31. Most pediatricians perform diagnostic evaluations to determine if a child has dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

32. Students with dyslexia learn to read most quickly through the use of decodable or predictable text.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. Students with dyslexia will learn to read most quickly through the use of authentic text.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34. In most cases it is not possible to diagnose a child with dyslexia until the third grade.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

35. Colored lenses or overlays help improve reading in people with dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

36. Students with dyslexia should be taught how to read using a systematic and explicit phonics approach.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Do you have dyslexia?

Yes

No

8. Does anyone you know have dyslexia?

Yes

No

If yes, please describe the relationship.

9. How would you define dyslexia?

10. How prepared do you feel you are to work with students with dyslexia?

1 Not at all prepared

2 Slightly prepared

3 Moderately prepared

4 Very prepared

5 Extremely prepared

Please explain

11. How responsible do you feel you are for educating those with dyslexia?

1 Not at all responsible

2 Slightly responsible

3 Moderately responsible

4 Very responsible

5 Extremely responsible

Please explain your choice

12. In your opinion, which school practitioner has the greatest responsibility towards supporting students with dyslexia?

- General Education Teacher
- Special Education Teacher
- School Psychologist

Please explain

13. Most school psychologist are knowledgeable about dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Most teachers are knowledgeable about dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. Dyslexia is neurobiological in origin.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Difficulty with phonological processing is a major contributing factor to dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. Most students with dyslexia have difficulties with listening comprehension.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. Dyslexia is usually outgrown.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Poor spelling is one symptom of dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. Poor instruction is one cause of dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. Most individuals with dyslexia are naturally left handed.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. Students with dyslexia need instruction primarily in reading comprehension strategies.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. Dyslexia can contribute to low self-esteem.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. Phonological awareness is another term for phonics.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. If parents read to their children, then their children will likely not develop dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Medication, when taken consistently, can cure dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. More females than males have dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Dyslexia is hereditary.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. Having below average intelligence is a common characteristic of individuals with dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. Less than 5% of the population has dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31. An individual can be diagnosed with both ADHD and dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

32. Dyslexia exists only in English speaking countries.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. Most pediatricians perform diagnostic evaluations to determine if a child has dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34. Students with dyslexia learn to read most quickly through the use of decodable, or predictable text.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

35. Students with dyslexia will learn to read most quickly through the use of authentic text.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

36. In most cases it is not possible to diagnose a child with dyslexia until the third grade.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

37. Colored lenses or overlays help improve reading in people with dyslexia.

Definitely True	Possibly True	Possibly False	Definitely False
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

38. Students with dyslexia should be taught how to read using a systematic and explicit phonics approach.

Definitely True

Possibly True

Possibly False

Definitely False

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