



January 2021

## K-3 Teacher And Administrator Knowledge Of Dyslexia And Foundational Reading Skills

Pam Jean Krueger

[How does access to this work benefit you? Let us know!](#)

Follow this and additional works at: <https://commons.und.edu/theses>

---

### Recommended Citation

Krueger, Pam Jean, "K-3 Teacher And Administrator Knowledge Of Dyslexia And Foundational Reading Skills" (2021). *Theses and Dissertations*. 3930.  
<https://commons.und.edu/theses/3930>

This Dissertation is brought to you for free and open access by the Theses, Dissertations, and Senior Projects at UND Scholarly Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of UND Scholarly Commons. For more information, please contact [und.common@library.und.edu](mailto:und.common@library.und.edu).

K-3 TEACHER AND ADMINISTRATOR KNOWLEDGE OF DYSLEXIA  
AND FOUNDATIONAL READING SKILLS

by

Pamela Jean Krueger  
Bachelor of Science, Andrews University, 1980  
Master of Education, York University, 1982

A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Grand Forks, North Dakota

May  
2021



## PERMISSION

Title           K-3 Teacher and Administrator Knowledge of Dyslexia and Foundational Reading Skills

Department   Teaching and Learning

Degree         Doctor of Philosophy

In presenting this dissertation in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my dissertation work or, in his absence, by the chairperson of the department or the dean of the School of Graduate Studies. It is understood that any copying or publication or other use of this dissertation or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my dissertation.

Pamela Jean Krueger

April 28, 2021

TABLE OF CONTENTS

ACKNOWLEDGMENTS ..... v

ABSTRACT ..... vi

INTRODUCTION ..... 1

    Dyslexia..... 2

    Reading Instruction ..... 3

    Statement of the Problem ..... 4

    Purpose of the Research ..... 5

    Research Topics ..... 6

    Organization of the Study ..... 6

ARTICLE #1: TEACHER KNOWLEDGE OF DYSLEXIA: A REPORT FROM ONE  
NORTHERN PLAINS STATE ..... 8

ARTICLE #2: ADMINISTRATOR KNOWLEDGE OF DYSLEXIA: A REPORT FROM ONE  
NORTHERN PLAINS STATE ..... 32

ARTICLE #3: TEACHER KNOWLEDGE AND SKILLS FOR TEACHING READING TO  
STUDENTS WITH DYSLEXIA: A STUDY OF ONE UPPER PLAINS STATE ..... 54

CONCLUSIONS..... 80

REFERENCES ..... 83

## ACKNOWLEDGMENTS

I would like to thank Dr. Steven LeMire for his patience and guidance as the chairman of my Dissertation Committee at the University of North Dakota. Thank you to my Dissertation Committee for your guidance and encouragement while preparing this dissertation: Dr. Bonni Gourneau, Dr. Pamela Beck, and Dr. Sarah Robinson. Thank you, Dr. Katherine Terras, for being my original chairperson and for continuing to be a colleague and supporter.

My biggest thanks go to my husband, Kimber Krueger, for always supporting and encouraging me throughout the busy last five years.

I would also like to thank the Bismarck cohort of doctoral students that I was a part of. The colleagues and friends that I have gained through this program will last a lifetime.

*“When you know better, you do better”.*  
*Attributed to Maya Angelou*

*To all the students with dyslexia and their parents  
that I have worked with in the past  
and will work with in the future,  
you inspire me to learn more and do better.*

## ABSTRACT

In recent years, the scientific community has provided a great deal of knowledge about the brain and how we learn. Included in this research is a clear explanation of how people learn to read and also what happens in the brain of a person with dyslexia. Because of the great strides that have been made through research, most students can become successful readers, including those with dyslexia. A very large part of this success is the result of knowledgeable teachers using research-based reading instruction beginning in kindergarten. Dyslexia is a common language-based learning disability that affects students' reading, writing, and spelling abilities in school. I studied current K-3 general education, reading/Title 1, and special education teacher knowledge about dyslexia, language constructs, and reading research/researchers by surveying a random sample of teachers in North Dakota. I also surveyed a random sample of elementary administrators in North Dakota on their knowledge of dyslexia. I have written the results in three articles: article #1 focuses on K-3 general, reading/Title 1, and special education teacher knowledge about dyslexia, article #2 focuses on elementary administrator knowledge about dyslexia, and article #3 focuses on K-3 general education, reading/Title 1, and special education teacher knowledge of language constructs and reading research/researchers. I found that there are gaps in knowledge of dyslexia by K-3 general education, reading/Title 1, special education teachers, and administrators. In addition, concerns were raised about where knowledge about dyslexia is received. I also found that K-3 general education, reading/Title 1, and special education teachers lack a strong knowledge base of language constructs and reading research/researchers.

*Key Words:* dyslexia, reading instruction, teacher knowledge, literacy, reading, teacher preparation, professional development

## INTRODUCTION

Equity in education has been a discussion in the field of education since Colonial Times, according to Rossmiller (1987). Equity moves beyond simple equality where every student is given the same resources and instruction. Equity means that students have equal access to quality instruction that leads to their academic and life success (Brookover & Lezotte, 1981). Federal laws, including the Every Student Succeeds Act [ESSA] (2015), the Individual with Disabilities Education Act [IDEA] (108<sup>th</sup> Congress, 2004), and the Rehabilitation Act of 1973, Section 504 (Rehabilitation Act, 1973), mandate equitable opportunity for all students, including those with disabilities. This opportunity includes equal access to learning to read which has a major impact on success in academics and life (Ritchie & Bates, 2013).

For over twenty years the discussion of equity in education has moved into the realm of human rights and social justice. It has been theorized that the ability to read is a basic human right, not a privilege, in the United States (Greene, 2008; Lunsford et al., 1990). If learning to read is considered a civil right, then it stands to reason that the high rates of students graduating from high school who have not acquired proficient reading skills is a social and civil issue (NAEP, 2019). Plaut (2009) discussed what schools look like when literacy is treated as a right. These schools provide what is needed for every student to become literate. The overall theoretical framework that lays the foundation for this research is the belief in equity in education and the belief that learning to read is a right for all children. According to writer, Garrison Keillor, (2005), “Teaching children to read is a fundamental moral obligation of the society.”

Reading is one of the first skills that children learn in school, and it is also the skill that eludes many children. Although often thought of as a natural, simple skill, reading is actually a

very difficult feat for many students to master and is extremely complicated (Horowitz et al., 2017; Lyon, 1998). In fact, the skill of reading has been described by Moats as “rocket science” (2020).

According to the National Assessment of Educational Progress [NAEP] (2019), scores have dropped in the last two years for both fourth and eighth graders in reading. Currently only 35% of fourth graders and 34% of eighth graders read at or above a proficient level in the United States. In North Dakota, the percentage of students in grade eight who performed at or above the proficient level was 32 percent. This percentage was not significantly different from that in 2017 (33 percent) and in 2002 (35 percent). The percentage of students in grade four who performed at or above proficient was 34% (NAEP, 2019).

### **Dyslexia**

Approximately 14% of children in public school received special education services in the 2018-19 school year. Approximately 33 percent of these students had specific learning disabilities which is the most common type of disability from those outlined in the federal Individuals with Disabilities Education Act [IDEA] (Hussar, 2020). The most common type of learning disability is a reading disability (Snyder & Dillow, 2015). According to the National Institute of Child Health and Development [NICHD], 17% to 20% of the population have a reading disability (National Reading Panel, 2000). Reading disabilities fit under three categories: word level (dyslexia), language comprehension, or a combination of both (Kilpatrick, 2015; Gough & Tunmer, 1986; Spear-Swerling, 2015).

According to the American Academy of Pediatrics (Handler & Fierson, 2020), dyslexia is the most common reading disability, yet there is still a great deal of confusion in the community and in the field of education about dyslexia. The term “dyslexia” is sometimes used

interchangeably with reading disability (IDEA), specific reading disability, specific learning disorder (DSM-5), and learning difference, but they all refer to the same disability (Pennington et al., 2019).

Dyslexia is a word level reading disability caused by a difficulty learning the sound system of English (Torgesen et al., 1994). In recent years there has been a great deal of research on dyslexia, including proof of a neurological basis, specific genes involved, early warning signs, and impact beyond literacy. Dyslexia has been found to occur in many languages, not just English, and to have less of an impact in languages that have more of a one to one correspondence between letters and sounds, such as German (Pennington et al., 2019; Vellutino et al., 2004).

In addition to the large number of students with dyslexia receiving special education services, there are also many students who struggle with reading who do not qualify for special education. These students receive most of their reading instruction and interventions from their classroom teacher (Moats, 1999). Research has shown that often general education teachers have incorrect beliefs about dyslexia (Wadlington & Wadlington, 2005). Washburn et al. (2017) found that fifty-four percent of teachers had one or more common misconceptions about dyslexia. Worthy et al. (2016) found that most teachers reported that dyslexia was not addressed in the teacher education program they attended.

### **Reading Instruction**

Research indicates that the early identification of dyslexia and immediate interventions for children as young as preschool has a direct effect on later success in learning to read (Torgesen, 1998). Research has also shown that all students benefit from the type of reading instruction that is imperative for students with dyslexia – structured literacy (IDA, 2018).

Structured Literacy, also called the Orton-Gillingham Approach, (Orton-Gillingham Academy, 2018) is direct, explicit, systematic, structured, and sequential instruction in the structure of English, including phonemic awareness, phonics skills, and morphology (IDA, 2018; Orton-Gillingham Academy, 2018). Research has shown that often teachers lack the knowledge of the structure of English and best practices in reading instruction required to teach students with dyslexia (Washburn et al., 2017).

### **Statement of the Problem**

Teacher knowledge is critical in order to help all students develop literacy, including those with dyslexia (Piasta et al., 2009). Research has shown there are specific knowledge and skills required by teachers to develop literacy for all students, including those with dyslexia (Moats, 1999). Often elementary teachers do not have the required knowledge and skills (Binks-Cantrell et al., 2012; Moats, 2009). Although there has been a vast amount of research on reading instruction, according to Kilpatrick (2015), very little makes it into classrooms.

As proposed legislation is currently being considered that would require schools to screen for dyslexia and provide remediation and professional development in North Dakota (ND) through Bill 1461 (ND 66<sup>th</sup> Legislative Session, 2019), there is a need to understand general education, reading/Title 1, special education teachers', and administrators' preparedness for this future requirement. Studies have been completed in some areas in North America and in other countries which reveal misconceptions about dyslexia and lack of crucial reading instruction skills by teachers (Allington, 2013; Wadlington & Wadlington, 2005; Washburn et al., 2011, 2014; Worthy et al., 2016). In addition, administrator support is an important part of successful adaptation of a school-wide program (Glasman, 1984). A lack of accurate knowledge about

dyslexia by administrators in public schools could produce a roadblock to implementation of services.

### **Purpose of the Research**

The three purposes of this research are to identify North Dakota K-3 teacher knowledge about dyslexia, administrator knowledge about dyslexia, and K-3 teacher knowledge of language constructs and reading research/researchers.

Current legislation in North Dakota from House Bill 1461 and House Bill 1131 makes these three studies timely. House Bill 1461 (ND 66<sup>th</sup> Legislative Session, 2019) has provided for a pilot study in three North Dakota school districts. Schools are now implementing screening for dyslexia, remediation for dyslexia, and professional development for teachers. If the pilot study leads to further legislation requiring all schools to provide these services, baseline data of the current knowledge of teachers about dyslexia, language constructs, and reading research/researchers will be required in order to design professional development. Teachers will need to be prepared for these new requirements. Knowledge about dyslexia is also required by administrators to ensure their support for future programs (Glasman, 1984). In addition, these studies may show the need for potential changes to teacher education programs in North Dakota.

In the 2021 Legislative Session, House Bill 1131 (ND 67<sup>th</sup> Legislative Session, 2021) passed the House and the Senate. House Bill 1131 amends Section 15.1-02-16 of the North Dakota Century Code, adding credentials for specialists trained in dyslexia. This research could help in the development of courses for training specialists in the future.

My hypothesis is that there is still a disconnect between current research about dyslexia and foundational reading skills, and knowledge of that research by K-3 general education, reading/Title 1, special education teachers, and administrators in North Dakota schools.

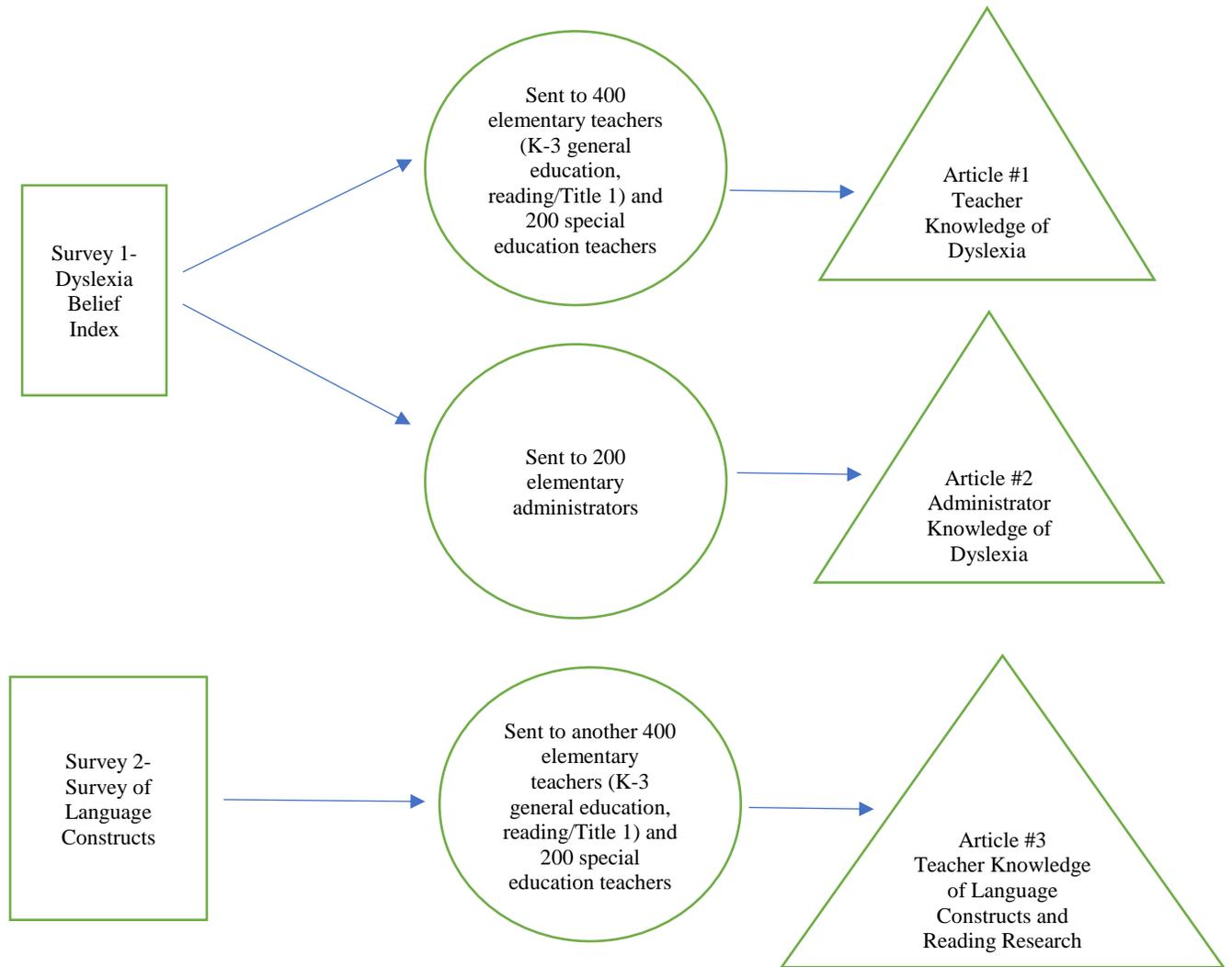
## **Research Topics**

This study was guided by three research topics:

1. What do North Dakota K-3 general education, reading/Title 1, and special education teachers know about dyslexia?
2. What do North Dakota elementary school administrators know about dyslexia?
3. What knowledge and skills do K- 3 general education, reading/Title 1, and special education teachers in North Dakota schools have about language constructs and reading research/researchers?

## **Organization of the Study**

These three research topics are addressed in three separate manuscripts which follow this introduction. I used two previously validated surveys for this research. The first survey was the previously validated revised survey Dyslexia Belief Index (Washburn et al., 2014). This survey was emailed to a random sample of 400 K-3 general education and reading/Title 1 teachers, 200 special education teachers, and 200 elementary administrators in North Dakota schools. The results from this survey were used for Article #1 (teachers) and Article #2 (administrators). A second survey, the Survey of Language Constructs Related to Literacy Acquisition (Washburn et al., 2011), with five additional questions on reading research/researchers, was sent to a separate random sample of 400 K-3 general education and reading/Title 1 teachers, and 200 special education teachers in North Dakota schools. The results of this survey are reported in Article #3. The last section of this document is a discussion of the results of the three studies and implications for practice, followed by references for the Introduction and Conclusion sections. Figure 1 shows how the research is organized into three articles.

**Figure 1***Organization of the Research*

ARTICLE #1: TEACHER KNOWLEDGE OF DYSLEXIA: A REPORT FROM ONE  
NORTHERN PLAINS STATE

**Teacher Knowledge of Dyslexia: A Report from One Northern Plains State**

Pamela Krueger, Dickinson State University  
Steven LeMire, University of North Dakota

### **Abstract**

Dyslexia is a common language-based learning disability that affects students' reading, writing, and spelling abilities in school. Although there has been a great deal of research about dyslexia, research does not always reach teachers in the field. Previous research has shown a growth in knowledge but the persistence of some myths about dyslexia in the field of education. The researchers in this study gathered data from an anonymous survey sent to a random sample of K-3 general education, reading/Title 1, and elementary special education teachers. The research questions were: what do teachers know about dyslexia, is there a difference in the amount of correct knowledge between the three groups of teachers, and do more recent graduates from teacher education programs have more accurate knowledge about dyslexia. The results showed an average to high degree of knowledge about dyslexia but the persistence of the myth of a visual connection. No significant difference in the amount of knowledge about dyslexia was found between the types of teachers, except for the knowledge of the nature of dyslexia was higher for reading/Title 1 teachers. There was no significant difference in knowledge of dyslexia between the two groups of number of years since graduating from a teacher education program. All three types of teachers reported a lack of training for general education and special education teachers for working with students with dyslexia.

Keywords: dyslexia, teacher knowledge, reading, learning disability, reading disability

## **Teacher Knowledge of Dyslexia: A Report from One Northern Plains State**

Reading is one of the first skills that children learn in school, and it is also the skill that eludes many children. Although often thought of as a natural, simple skill, reading is actually a very difficult feat for many students to master and is extremely complicated (Moats, 2020).

National assessments of reading proficiency highlight the difficulty in mastering the skill of reading. According to the National Assessment of Educational Progress [NAEP] (2019), scores have dropped in the last two years for both fourth and eighth graders in reading. Currently only 35% of fourth graders and 34% of eighth graders read at or above a proficient level in the United States.

According to the National Center for Education Statistics [NCES], 14% of children in school required special education services, and 33% of this population had a specific learning disability in 2018-19 (2020). In fact, specific learning disabilities are the most common type of disability from those outlined in the federal Individuals with Disabilities Education Act [IDEA] (Lyon et al., 2001; NCES, 2020). The most common type of learning disability is a reading disability (NCES, 2020). According to the National Institute of Child Health and Development [NICHD], 17% to 20% of the population have a reading disability (2000). Reading disabilities fit under three categories: word level (dyslexia), language comprehension, or a combination of both (Kilpatrick, 2015). According to the American Academy of Pediatrics (Handler & Fierson, 2014), dyslexia is the most common reading disability. They state that 80% of those with a learning disability have dyslexia.

The underlying theoretical framework that is the basis for this study is the belief in equity in education. Equity means that students have equal access to quality instruction that leads to their academic and life success (Brookover & Lezotte, 1981). This includes all students even

those with a learning disability, such as dyslexia, as mandated by federal law. These laws include Every Student Succeeds Act [ESSA] (2015), the Individual with Disabilities Education Act [IDEA] (108<sup>th</sup> Congress, 2004), and the Rehabilitation Act of 1973, Section 504 (Rehabilitation Act, 1973).

Equity in education, in particular learning to read, has become a civil issue and is considered a human right (Greene, 2008). If learning to read is considered a civil right, then it stands to reason that the high rates of students graduating from high school who have not acquired proficient reading skills is a social and civil issue (NAEP, 2019). Winn and Behizadeh (2011) describe the lack of opportunities for youth to read and write as a school-to-prison pipeline. A federal criminal justice reform act was passed in 2018 which included a provision for screening inmates for dyslexia and providing supports for those with dyslexia to complete their GED due to a high rate of dyslexia among incarcerated individuals (IDA, 2021).

Dyslexia is a word level reading disability caused by a difficulty learning the sound system of English (Kilpatrick 2015; Handler & Fiererson, 2014; IDA, 2018; Torgesen et al., 1994). A disconnect between what research has shown about students with dyslexia and what teachers know has been highlighted in the past (Allington, 2013). Washburn et al. (2017) found that fifty-four percent of teachers had one or more common misconceptions about dyslexia. Worthy et al. (2016) found that most teachers reported that dyslexia was not addressed in the teacher education program they attended.

In the past ten years public information about dyslexia has increased. In the U.S., a large part of this increase in information is from a network of parent-led groups called Decoding Dyslexia. The goals of this group are to increase awareness of dyslexia, empower families, and educate policy-makers about the needs of students with dyslexia (Decoding Dyslexia, 2014).

As a result of their leadership, there are now only four states that do not have laws pertaining to dyslexia (Dyslexic Advantage, 2019).

As information about dyslexia has increased and the dissemination of that knowledge to the general public has increased, research is needed to analyze if that knowledge is now reaching teachers in the field.

### **Literature Review**

One of the theories of scientifically-based reading instruction that is the overarching guideline for the literature review and research in this study is the Simple View of Reading which was first outlined by Gough and Tunmer (1986). This theory suggests that comprehension in reading is the product of word recognition multiplied by language comprehension. Although this framework was designed in 1986, it has since been verified in over 100 studies (Kilpatrick, 2015). The Simple View of Reading outlines three types of reading difficulties: difficulty with decoding words (dyslexia), a difficulty with language comprehension, and a combination of the two (includes those with intellectual disabilities and many speech or language impaired) (Catts, et al., 2006; Kilpatrick, 2015). Scarborough (2001) developed the Simple View of Reading into the Reading Rope Model. The two parts in the Simple View of Reading, language comprehension and word recognition, were further delineated into the many aspects of reading. Dyslexia is a difficulty with word recognition, specifically the phonological aspects of reading (Kilpatrick, 2015; IDA, 2002).

Washburn et al. (2011) suggested that teachers need to understand what dyslexia is and is not in order to be able to help students with dyslexia succeed. Wadlington et al. (2008) pointed out the need for knowledgeable teachers to teach students with dyslexia. Earlier, Wadlington and Wadlington (2005) stated that students with dyslexia are greatly impacted by what their teachers

believe about dyslexia. Research has shown that attitudes and beliefs affect how a person acts which is the basis of the Theory of Planned Behavior (Ajzen, 1985).

According to Washburn et al. (2011), it is estimated that one in five people in the U.S. have some degree of dyslexia or specific learning disability in reading. According to the International Dyslexia Association [IDA] Board of Directors (2002):

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (IDA, 2002).

Although this definition is concise, and ample research has been completed to support each section (Denton & Meindl, 2016; Kilpatrick, 2015; Ferrer et al., 2010; Shaywitz, 2003; Vellutino, 2004; Wadlington & Wadlington, 2005), misconceptions about dyslexia persist in the community, and more importantly for this research, in the education system. Worthy et al. (2016) noted that among researchers, dyslexia, specific learning disability, and reading disability are used interchangeably. Some educators and researchers avoid the use of the word dyslexia while others demand that it should be used (Wadlington & Wadlington, 2005). In the most recent study identified, Washburn et al. (2017) found that teachers early in their career had clear understandings of reading disabilities but not the term dyslexia. Fifty-four percent of teachers had one or more common misconceptions about dyslexia. Worthy et al. (2016) found that

teachers were committed to helping students with dyslexia, but they reported confusion and concern about the policies, procedures, and lack of information about dyslexia from their districts. Professional development was not provided in the schools, and, in addition, the teachers felt capable of working with other struggling readers but did not feel confident working with students with dyslexia. Teachers reported that dyslexia was rarely addressed in their training to become teachers.

The most persistent and common misconception about dyslexia is that people see letters or words in reverse. In fact, letter reversal is often believed to be the signature manifestation (Wadlington & Wadlington, 2005). In an extensive review of four decades of research, Vellutino et al. (2004) pointed out that research in neuroscience, psychology, and education has clearly shown that reading is a linguistic skill not a visual skill, and that reading disabilities are not caused by a visual deficit or spatial confusion, but by a phonological processing difficulty. Specific areas of the brain have been shown to be used by good readers as opposed to those with dyslexia (Shaywitz, 2004). A strong neural basis for dyslexia has been discovered, along with visual evidence, using fMRI's, that neural networks can be improved for word recognition in individuals with dyslexia (Vellutino et al., 2004).

Another common misconception related to a belief in a visual cause for dyslexia is that vision therapy and wearing tinted glasses or using tinted overlays while reading improves reading for children with dyslexia. According to Denton and Meindl (2016), colored overlays do not improve reading skills. According to a joint statement by the American Academy of Pediatrics, the American Academy of Ophthalmology, the American Association for Pediatric Ophthalmology and Strabismus, and the Association of Certified Orthoptists (Handler & Fierson,

2014), dyslexia is not a visual problem and that vision therapy, tinted lenses and filters are not useful in treating reading disabilities.

A third common misconception is that those who have dyslexia have a lower intelligence, yet research has shown that dyslexia is not related to intelligence. People with dyslexia can appear along the entire continuum of intelligence (Ferrer et al., 2010). Dyslexic students can be talented or gifted, and often excel in the fields of science, technology, and creativity (Wadlington & Wadlington, 2005).

A fourth common misconception is that dyslexia is caused by a lack of reading at home with and to a child. Solid scientific evidence of a neurological basis for the phonological coding deficit theory contradicts this belief (Vellutino et al., 2004).

Washburn et al. (2011) call the available data on teacher knowledge of dyslexia piecemeal information. We set out to assess K-3 general education, reading/Title 1, and special education teacher knowledge of dyslexia with the hope to shed light on the need for professional development and changes in teacher education programs.

## **Method**

### **Participants**

The North Dakota Department of Public Instruction provided the email addresses for a random sample of 400 general education (including reading/Title 1 teachers) and 200 special education teachers. One-hundred and fifty-five teachers out of 600 responded for a 26% response rate. Although 155 people participated, 32 did not complete the survey to the end, and one respondent was an administrator; those responses were deleted. A total of 123 participants completed the survey. This study was approved by an Institutional Review Board.

### **Instrument**

The previously validated revised survey, The Dyslexia Belief Index (Washburn et al., 2014) was used with permission from the authors. The survey has previously demonstrated an internal validity of Cronbach's alpha .737 (Washburn et al., 2014). Three statements for participants to analyze as true or false were added to this survey. The statements were: "dyslexia is the leading cause for reading failure in the United States", "special education teachers receive intensive training about dyslexia", and "most teachers receive training to work with children with dyslexia as a part of their certification."

The survey uses a Likert-type scale for responses, including definitely true (coded 4), probably true (3), probably false (2), and definitely false (1). The researchers added the demographic items of number of years teaching (less than five years, coded 2 and five years or more, coded 1) and position in the elementary school (general classroom teacher, coded 1, special education, coded 2, reading specialist/Title 1 teacher, coded 3).

### **Analysis/Design**

**Research Question 1:** What do North Dakota elementary general education, reading/Title1, and special education teachers know about dyslexia?

The hypothesis for research question 1 is that teachers have accurate knowledge about dyslexia. The rationale for this hypothesis is that there has been a great deal of research about dyslexia in the past five decades and this knowledge should have moved into teacher education programs (Ferrer et al., 2010; Gray, 2008; Lyon et al., 2001; Shaywitz, 2003; Snowling, 2012; Vellutino et al., 2004). This question is important because, as Washburn et al. (2011) theorized, K-12 teachers must have knowledge of dyslexia in order for their students to be successful.

**Research Question 2:** Is there a difference between the knowledge of teachers who have recently graduated from a teacher education program (within five years) and those who took their training five or more years ago?

The hypothesis for research question 2 is that teachers who graduated from a teacher education program less than five years ago have more knowledge of recent research about dyslexia. The rationale for the hypothesis is that recent research has shown a growth in some areas of knowledge of dyslexia (Allington, 2013; Washburn et al., 2014, 2017; Worthy et al., 2016). In addition, knowledge of dyslexia has expanded to the general public through parent led groups (Decoding Dyslexia, 2014), state legislation (Dyslexic Advantage, 2019), and journalism (Hanford, 2017).

One-tailed independent samples *t*-tests were used to determine if there was a significant difference in the means of the answers to the questions in the survey between group 1, teachers who graduated from a teacher education program less than five years ago, and group 2, teachers who graduated from a teacher education program five years or more ago. Responses were divided into the three constructs of knowledge of the nature of dyslexia, belief in myths about dyslexia, and beliefs about teacher training (dependent variables).

**Research Question 3:** Is there a difference between the knowledge of general classroom, reading/Title 1, and special education teachers?

The hypothesis was that there would be a difference between the knowledge about dyslexia for classroom teachers, reading/Title 1 teachers, and special education teachers. The rationale for this hypothesis is the assumption that Teacher Training Programs generally provide more coursework in dyslexia for reading and special education teachers than general education teachers. This is important because as Moats (1999) theorized, most children with dyslexia will

be taught to read by the general classroom teacher. A one-tailed independent samples *t*-test was used to identify statistically significant differences in the answers to the questions in the survey divided into the three constructs of the nature of dyslexia, belief in myths about dyslexia, and beliefs about teacher training about dyslexia (dependent variables) and whether the participant is a general classroom, reading/Title 1, or a special education teacher (independent variables).

### **Procedure**

The researchers emailed a link to an anonymous survey to a random sample of 400 elementary general education teachers, including reading/Title 1 teachers, and 200 elementary special education teachers in North Dakota. In order to encourage a higher response rate, participants were offered a chance to have their name put in a draw for a \$50 Amazon gift card through a separate link at the end of the survey.

### **Results**

A total of 123 participants completed the survey. Table 1 shows the demographics of those who responded to the survey.

**Table 1**

*Dyslexia Belief Index Demographics*

Position	#	%
General Education Teacher	57	46.3
special education Teacher	46	37.4
Reading/Title 1 Teacher	13	10.5
Other	7	5.7
Number of Years Since Graduating	#	%
Five years or more	85	69.1
Less than five years	38	30.9

Table 2 shows the percentage of some form of truth for each statement within the constructs of the nature of dyslexia, belief in common myths, and training received by teachers.

Percentage of some form of truth added the scores of definitely true and probably true for each statement, coded 4 for definitely true and 3 for probably true.

**Table 2**

*Percentage of Some Form of Truth (definitely true and probably true) for Statements on Knowledge of the Nature of Dyslexia, Common Myths, and Training for Teachers*

Question	% Some Form of Truth	M	SD
<b>C1. Knowledge of the Nature of Dyslexia</b>			
q1 Leading cause for reading failure in the U.S.	72.4	2.8	0.6
q2 Emotional/social problems highly correlated	82.8	3.0	0.7
q6 Also have problems with spelling	95.1	3.4	0.6
q7 Affects exclusively reading/language arts subjects	26.8	2.0	1.0
q8 Affects language processing	68.3	2.9	0.8
q12 Occurs more frequently in boys	61.5	2.6	0.7
q13 Have difficulty with decoding/word recognition	97.6	3.5	0.6
q16 Dyslexic parents more likely	68.0	2.8	0.8
q18 Need more systematic and explicit reading instruction	96.7	3.5	0.6
q21 Can cause difficulty with writing	98.4	3.6	0.6
<b>C2. Belief in Common Myths</b>			
q4 Due to visual problems.	32	2.1	0.7
q9 Certain medications effective	12.2	1.8	0.6
q10 Lower IQ scores	9.8	1.6	0.7
q11 Specific to the English language	5.7	1.6	0.6
q14 Reading ability and intellectual ability related	26.0	1.9	0.9
q15 Eye-tracking exercises are effective	69.7	2.7	0.6
q17 Can be helped by using colored lenses/overlays	61.0	2.6	0.7
q19 Caused by literacy-poor home environment	15.4	1.7	0.8
q20 Children can outgrow	15.4	1.9	0.7
q22 Seeing letters backwards is a characteristic	86.2	3.2	0.7
<b>C3. Teacher Training</b>			
q3 Most special education teacher receive intensive training in dyslexia	16.4	1.8	0.7
q5 Most teachers receive training in dyslexia	19.5	1.8	0.8

A high percentage (72%) of participants scored some form of truth for the statement that dyslexia is the leading cause of reading failure in the U.S. Although only 32% of participants

scored some form of truth to the statement that dyslexia is caused by visual problems, 86% percent scored some form of truth to the myth that a characteristic of dyslexia is seeing letters backwards. Remediation techniques guided by a vision connection persist, with 69.7% percent of all teachers surveyed scoring some form of truth to the myth that eye-tracking exercises would remediate dyslexia-caused difficulties. In addition, 61% percent of all teachers surveyed scored some form of truth for the myth that colored overlays and lenses can help dyslexia.

Only 9.8% of all teachers surveyed scored some form of truth to the statement that students with reading disabilities have a lower IQ, and only 26% scored some form of truth to the statement that reading ability and intellect are related.

The reliability of the 22 items was analyzed and found to have a Cronbach's Alpha of 0.615. The individual items within the constructs were averaged. The reliability and correlations for each of the constructs are shown in Table 3. The correlation between knowledge of the nature of dyslexia and belief in myths about dyslexia was  $r = .04$ , the correlation between knowledge of dyslexia and beliefs about teacher training on dyslexia was  $r = .07$ , and the correlation between belief in myths and teacher training was  $r = .12$ .

**Table 3**

*Correlation between 3 constructs*

Constructs	Question #'s	C1	C2	$\alpha$
C1 Nature	q1, q2, q6, q7, q8, q12, q13, q16, q18, q21			.51
C2 Myths	q4, q9, q10, q11, q14, q15, q17, q19, q20, q22	.04		.70
C3 Training	q3, q5	.07	.12	.17

*\*Correlation is significant at the 0.05 level (2 tailed)*

The researchers compared the scores of the various groups within the 3 constructs. The researchers compared the answers for those who received their Teacher Training in the last five

years or more and less than five years ago to test the hypothesis that teachers who have received training less than five years ago would have more accurate knowledge about dyslexia, possibly due to the recent increase in research and dissemination of knowledge of dyslexia. For construct 1, the nature of dyslexia, the participants who graduated from a Teacher Training program five or more years ago, the mean was  $M=3.0$ . For those who graduated less than five years ago, the mean was  $M=3.06$ . An independent samples *t*-test was used to observe if there was a significant difference in the scores of the two groups.  $t(121)=-1.528, p>.05 (p=.129)$ . For construct 2, belief in myths about dyslexia, for the participants who have received their training five years or more ago, the mean was  $M=2.1$ , and for those who received their training less than five years ago, the mean was  $M=2.2$ . A *t* score was used to test for significant differences in scores between the two groups.  $t(121)=-1.799, p>.05 (p=.076)$ . There was not a significant difference in the scores of those who received their training more or less than five years ago. For construct 3, training, for participants who received their training five years or more ago, the mean was  $M=1.7$ , and for those who received their training less than five years ago, the mean was  $M=1.9$ .  $t(121)=-1.256, p>.05 (p=.212)$ . There was no significant difference in the scores.

The researchers then compared the scores of those who were K-3 general classroom teachers to those of special education teachers to test the hypothesis that special education teachers have more knowledge of dyslexia. For construct 1, the nature of dyslexia, participants who are general education teachers, the mean was  $M=2.986$ . For special education teachers, the mean was  $M=2.982$ . An independent samples *t*-test was calculated.  $t(101)=.05, p>.05 (p=.334)$ . For construct 2, belief in myths about dyslexia, participants who were general education teachers, the mean was  $M=2.12$ . For special education teachers, the mean was  $M=2.05$ . There was no significant difference between the two types of teachers.  $t(101)=.97, p>.05 (p=.334)$ . For

construct 3, training, the mean scores for general education teachers was  $M=1.754$  and for special education teachers was  $M=1.750$ .  $t(101)=.038$ ,  $p>.05$  ( $p=.97$ ). There was no significant difference in the mean scores of the two groups.

In addition, the researchers compared the scores of reading/Title 1 teachers to general education teachers. For construct 1, nature of dyslexia, general education teachers had a mean score of  $M=3.0$  and reading/Title 1 teachers had a mean score of  $M=3.2$ .  $t(68)=-2.247$ ,  $p<.05$  ( $p=.028$ ). There was a significant difference between the scores for knowledge of the nature of dyslexia between reading/Title 1 teachers and general education teachers. For belief in myths, construct 2, the mean score for general education teachers was  $M=2.1$  and for reading/Title 1 teachers was  $M=2.3$ .  $t(68)=-1.447$ ,  $p>.05$  ( $p=.152$ ). There was no significant difference in the score for belief in myths. For construct 3, training, the mean score for general education teachers was  $M=1.75$  and for reading/Title 1 teachers was  $M=1.92$ .  $t(68)=.954$ ,  $p>.05$  ( $p=.343$ ). There was no significant difference in the scores of the two groups.

Another important observation of the results was that only 16% of all participants stated that general education teachers receive training about dyslexia in teacher education programs, and 20% of all participants stated that special education teachers receive training about dyslexia in teacher education programs. In addition, when asked to identify where they learned the most about dyslexia, 37% of participants said from “my own research and reading”, 24% said from “professional development”, 17% said from “a teacher education program”, 12% said “I have no knowledge about dyslexia”, and 9% said from “personal experience”.

### **Discussion**

The results of this research show that there continues to be a lack of connection between research in education and actual teaching practice as pointed out long ago (Burkhardt &

Schoenfeld, 2003). This research showed that teacher belief in the common misconception that dyslexia is associated with a visual difficulty persists today despite the increase in knowledge now available (Washburn et al., 2014, 2017; Worthy et al., 2016). Research has clearly shown that dyslexia is not a visual disability (Vellutino et al., 2004). Although only 32% of participants scored some form of truth to the statement that dyslexia is caused by visual problems, 86% percent scored some form of truth to the myth that a characteristic of dyslexia is seeing letters backwards. Belief in remediation techniques guided by a vision connection persist, with 70% percent of all teachers surveyed scoring some form of truth to the myth that eye-tracking exercises would remediate dyslexia-caused difficulties. In addition, 61% percent of all teachers surveyed scored some form of truth for the myth that colored overlays and lenses would remediate dyslexia. Yet, 98% of participants agreed that dyslexia is a difficulty that affects decoding/word recognition, and 97% agreed that students with dyslexia require more systematic, explicit instruction in reading.

Some results show that knowledge is improving in the education world. As with previous studies, only 9% of teachers believed there is a connection between intelligence and dyslexia (Washburn et al., 2017). Research has shown that intelligence is not linked to dyslexia (Ferrer et al., 2010). Many teachers (68%) agreed that parents of children with dyslexia are more likely to have dyslexia, and only 15% thought that a poor literacy environment was a cause of dyslexia. Research has clearly shown the neurological basis of dyslexia (Vellutino et al., 2004).

A high percentage, 72%, of teachers acknowledged that dyslexia is the leading cause of reading disability (Handler & Fierson, 2014). Yet, only 20% had some form of agreement to the statement that general education teachers receive training about dyslexia. The researchers suggest that the knowledge breakdown may be in teacher education programs and suggest further

studies should investigate what is being taught about dyslexia in teacher education programs. In addition, research on education faculty knowledge about dyslexia would be valuable.

### **Conclusions**

Washburn et al. (2011) suggested that teachers need to understand what dyslexia is and is not in order to be able to help students with dyslexia succeed. This success includes learning to read which is a basic civil right (Greene, 2008). When citizens do not learn to read beyond a basic level, which is happening in the U.S. (NAEP, 2019), their degree of success in society is affected (Winn & Behizadeh, 2011). In order to provide for the basic rights of students with dyslexia, teachers in the U.S. should understand the characteristics of dyslexia. According to this study, teachers continue to believe in the myth of a visual connection for dyslexia which leads to the use of remediation practices that according to research do not work and waste time and money. In addition, teachers are often not receiving instruction on dyslexia in teacher education programs or professional development.

### **Implications for Practice**

Since, according to the International Dyslexia Association (2017), as many as 15 to 20% of the population could have some degree of dyslexia, general education, reading/Title 1, and special education teachers are all likely to have students with dyslexia in a typical Response to Intervention (RTI) school. Yet, only 16% of participants in this study scored some degree of truth to the statement that general education teachers receive training about dyslexia in teacher education programs, and only 20% that special education teachers receive training. In addition, when asked where participants received their knowledge of dyslexia, the highest response rate of 37% said from “my own research and reading.” Only 24% said they received their knowledge from “professional development”, and 17% said from “a teacher education program.” These

responses clearly show that teachers are not receiving enough training in order to work with students with the most common reading disability, dyslexia, from either teacher education programs or professional development (Handler & Fierson, 2014).

We suggest a two-pronged approach to increasing teacher knowledge about dyslexia. First, we suggest that teacher education programs look at the instruction they are providing about dyslexia. In addition, we suggest that state and local education systems take part of the responsibility to continue training teachers about dyslexia. As Darling-Hammond and Bransford (2005) point out, teachers continue to learn while teaching and are not experts from the beginning.

## References

- 108<sup>th</sup> Congress, (2004). *Public Law 108-446 [IDEA]*. <https://idea.ed.gov/part-c/downloads/IDEA-Statute.html>
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In Kuhl, J., & Beckmann, J. (Eds.), *Action control: From cognition to behavior* (pp. 11-39). Springer.
- Allington, R. (2013). What really matters when working with struggling readers. *Reading Teacher, 66*(7), 520-530.
- Brookover, W. B., Lezotte, L. (1981). Educational equity: A democratic principle at a Crossroads. *Urban Rev, 13*, 65–71.
- Burkhardt, H., & Schoenfeld, A. H. (2003). Improving educational research: Toward a more useful, more influential, and better-funded enterprise. *Educational Researcher*.
- Catts, H. W., Adlof, S. M., & Weismer, S. E. (2006). Language deficits in poor comprehenders: A case for the simple view of reading. *Journal of Speech, Language, and Hearing Research, 49*(2), 278–293.
- Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. Jossey-Bass.
- Decoding Dyslexia (2014). *Home*. Decoding dyslexia.  
<http://www.decodingdyslexia.net/home.html>
- Denton, T. F., & Meindl, J. N. (2016). The effect of colored overlays on reading fluency in individuals with dyslexia. *Behavior analysis in practice, 9*(3), 191-198.
- Dyslexic Advantage (2019). *Dyslexia laws*.
- Every Student Succeeds Act [ESSA] (2015). <https://www.ed.gov/essa?src=rn>

- Ferrer, E., Shaywitz, B. A., Holahan, J. M., Marchione, K., & Shaywitz, S. E. (2010).  
 Uncoupling of reading and IQ over time: Empirical evidence for a definition of dyslexia.  
*Psychological Science, 21*(1), 93-101.
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and special education, 7*, 6-10.
- Gray, E. (2008). Understanding dyslexia and its instructional implications: A case to support intense intervention. *Literacy Research and Instruction, 47*(2), 116-123.
- Greene, S. (2008). Introduction. In S. Greene (Ed.), *Literacy as a civil right: Reclaiming social justice in literacy teaching and learning*. Peter Lang.
- Handler, S. M., & Fierson, W. M. (2014). Joint technical report: Learning disabilities, dyslexia, and vision. Reaffirmed. *Pediatrics, 127*(3), e819-e856.
- Hanford, E. (2017). Hard to read: how American schools fail kids with dyslexia. *APM Reports*.  
<https://www.apmreports.org/episode/2017/09/11/hard-to-read> .
- International Dyslexia Association [IDA] (2002). *Definition of dyslexia*.  
<https://dyslexiaida.org/definition-of-dyslexia/>
- International Dyslexia Association [IDA] (2017). *Dyslexia basics*.
- International Dyslexia Association [IDA] (2018). *Knowledge and practice standards for teachers of reading*.
- International Dyslexia Association [IDA] (2021). *Senate passes first step act*.  
<https://dyslexiaida.org/senate-passes-first-step-act/>
- Kilpatrick, D. A. (2015). *Essentials of assessing, preventing, and overcoming reading difficulties*. John Wiley & Sons.

- Lyon G. R., Fletcher, J., Shaywitz, S. E., & Shaywitz, B. (2001). Rethinking learning disabilities. *Rethinking special education for a new century*, Thomas B. Fordham Foundation, 259-287.
- Moats, L. (2020). Teaching reading is rocket science: What expert teachers of reading should know and be able to do. *American Educator*, American Federation of Teachers.  
<https://www.aft.org/ae/summer2020/moats>
- Moats, L. (1999). *Basic facts about dyslexia part II: What every professional ought to know*. International Dyslexia Association.
- National Association of Educational Progress [NAEP] (2019). *The nation's report card: Reading*. National Center for Educational Statistics.  
<https://www.nationsreportcard.gov/reading/nation/scores/?grade=4>
- National Center for Education Statistics [NCES] (2020). *Students with disabilities*.  
[https://nces.ed.gov/programs/coe/indicator\\_cgg.asp](https://nces.ed.gov/programs/coe/indicator_cgg.asp)
- National Institute of Child Health and Human Development [NICHD] (2000). *Report of the National Reading Panel--Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. National Reading Panel.
- NPR (2016). *Special Series: Unlocking dyslexia*. NPR.  
<https://www.npr.org/series/503544816/unlocking-dyslexia>
- Rehabilitation Act, Section 504 (1973). <https://www2.ed.gov/about/offices/list/ocr/504faq.html>
- Scarborough, H. (2001). *Handbook of early literacy*. Guilford Press.
- Shaywitz, S. E. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level*. Knopf.

- Shaywitz, S. E., & Shaywitz, B. A. (2004). *Neurobiologic basis for reading and reading disability*. In McCardle, P. & Chhabra, V. (Eds.), *The voice of evidence in reading research*, 417–442. Paul H Brookes Publishing Co.
- Snowling, M. (2012). Early identification and interventions for dyslexia: A contemporary view. *Journal of Research in Special Education Needs*, 13(1), 7-14.
- Vellutino, F., Fletcher, J., Snowling, M., & Scanlon, D. (2004). Specific reading disability (dyslexia): What have we learned in the past four decades? *Journal of Child Psychology and Psychiatry*, 45(1), 2-40.
- Wadlington, E. M, Elliot, C., & Kirylo, J. (2008). The dyslexia simulation: Impacts and implications. *Literacy Research and Instruction*, 47, 264-272.
- Wadlington, E., & Wadlington, P. (2005). What educators really believe about dyslexia. *Reading Improvement*, 42(1), 16-33.
- Washburn, E., Joshi, R., & Binks-Cantrell, E. (2010), Are preservice teachers prepared to teach struggling readers? *Annals of Dyslexia*, 61, 21–43.
- Washburn, E., Joshi, R., & Binks-Cantrell, E. (2011). Teacher knowledge of basic language concepts and dyslexia. *Dyslexia*, 17(2), 165-183.
- Washburn, E., Binks-Cantrell, E., & Joshi, R. (2014). What do preservice teachers from the US and UK know about dyslexia? *Dyslexia*, 20, 1-18.
- Washburn, E., Mulcahy, C., & Musante, G. (2017). Novice teacher’s knowledge of reading-related disabilities and dyslexia. *Learning Disabilities: A Contemporary Journal*, 15(2), 169-171.
- Winn, M. T. & Behizadeh, N. (2011). The right to be literate: Literacy, education, and the school-to-prison pipeline. *Review of Research in Education*, 35, 147-173.

Worthy, J., DeJulio, S., Svrcek, N., Villarreal, D., Derbyshire, C., LeeKeenan, K., Wiebe, M., Lammert, C., Rubin, J., & Salmer, C. (2016). Teachers' understandings, perspectives, and experiences of dyslexia. *Literacy Research: Theory, Method and Practice*, 65(1), 436-453.

ARTICLE #2: ADMINISTRATOR KNOWLEDGE OF DYSLEXIA: A REPORT FROM ONE  
NORTHERN PLAINS STATE

**Administrator Knowledge of Dyslexia: A Report from One Northern Plains State**

Pamela Krueger, Dickinson State University  
Steven LeMire, University of North Dakota

### **Abstract**

Dyslexia is a common language-based learning disability that affects students' reading, writing, and spelling abilities in school. Although there has been a great deal of research about dyslexia, research does not always adequately reach those in the field of education. Research shows that administrator knowledge and beliefs influence the success of programs and students. Previous research has shown a growth in teacher knowledge but the persistence of belief in some common myths about dyslexia. We gathered data from an anonymous survey sent to a random sample of elementary administrators. The research questions were: what do administrators know about dyslexia, do more recent graduates from teacher education programs have more knowledge about dyslexia, and is there a relationship between knowledge of dyslexia and support for screening, remediation, and professional development on dyslexia. The results showed a moderate level of administrator knowledge about dyslexia but the persistence of the myth of a visual connection. No evidence of a difference was found for the number of years since graduating from a teacher education program. A high percentage of administrators were in support of screening, remediation, and professional development on dyslexia.

Keywords: dyslexia, administrator knowledge, reading, learning disability, reading disability

### **Administrator Knowledge of Dyslexia: A Report from One Northern Plains State**

Reading is one of the first skills that children learn in school, and it is also the skill that eludes many children. Although often thought of as a natural, simple skill, reading is actually a very difficult feat for many students to master and is extremely complicated (Moats, 2020). National assessments of reading proficiency highlight this difficulty. According to the National Assessment of Educational Progress [NAEP] (2019), only 35% of fourth graders and 34% of eighth graders read at or above a proficient level in the United States.

The underlying theoretical framework that is the basis for this study is the belief in equity in education. Equity means that students have equal access to quality instruction that leads to their academic and life success (Brookover & Lezotte, 1981). This includes all students even those with a learning disability, such as dyslexia, as mandated by federal law. These laws include Every Student Succeeds Act [ESSA] (2015), the Individual with Disabilities Education Act [IDEA] (108<sup>th</sup> Congress, 2004), and the Rehabilitation Act of 1973, Section 504 (Rehabilitation Act, 1973).

Equity in education, in particular learning to read, has become a civil issue and is considered a human right (Greene, 2008). If learning to read is considered a civil right, then it stands to reason that the high rates of students graduating from high school who have not acquired proficient reading skills is a social and civil issue (NAEP, 2019). Winn and Behizadeh describe the lack of opportunities for youth to read and write as a school-to-prison pipeline (2011). A federal criminal justice reform act was passed in 2018 which included a provision for screening inmates for dyslexia and supports for those with dyslexia to complete their GED due to a high rate of dyslexia among incarcerated individuals (IDA, 2021).

According to the National Institute of Child Health and Development (NICHD), 17% to 20% of the population have a reading disability (2000). Reading disabilities fit under three categories: word level (dyslexia), language comprehension, or a combination of both (Kilpatrick, 2015; Gough & Tunmer, 1986). According to the American Academy of Pediatrics (Handler & Fierson, 2020), dyslexia is the most common reading disability.

Dyslexia is a word level reading disability caused by a difficulty learning the sound system of English (Kilpatrick, 2015; IDA, 2002; Torgesen et al., 1994). A disconnect between what research has shown about students with dyslexia and what teachers know has been highlighted by research (Allington, 2013; Washburn et al., 2017, 2010; Worthy et al., 2016).

In the past ten years, public information about dyslexia has increased (Hanford, 2017; NPR, 2016). A large part of this increase in information is from a parent-led movement called Decoding Dyslexia (Decoding Dyslexia, 2014). As a result of their leadership, there are now only four states that do not have laws pertaining to dyslexia (Dyslexic Advantage, 2019).

As some states are now requiring screening and remediation programs for students with dyslexia and professional development for teachers, school districts are now implementing these requirements. This study is based on the premise that there needs to be buy-in by the entire school, including administrators, in order for the success of a school-wide program to help students with dyslexia learn to read. Research shows that administrators influence the success of programs and students (Silins & Mulford, 2002). Therefore, knowledge about dyslexia by school administrators is important. As information about dyslexia has increased and the dissemination of that knowledge to the general public has increased, research is needed to analyze if that knowledge is currently reaching administrators in the field.

## Literature Review

One of the theories of scientifically-based reading instruction that is the overarching guideline for the literature review and research in this study is the Simple View of Reading which was first outlined by Gough and Tunmer (1986). This theory suggests that comprehension in reading is the product of word recognition multiplied by language comprehension. Although this framework was designed in 1986, it has since been verified in more than 100 studies (Kilpatrick, 2015, p. 47). The Simple View of Reading outlines three types of reading difficulties: difficulty with decoding words (dyslexia), a difficulty with language comprehension, and a combination of the two (includes those with intellectual disabilities and many speech or language impaired) (Catts, et al., 2006; Kilpatrick, 2015).

Scarborough (2001) developed the Simple View of Reading into the Reading Rope Model. The two parts in the Simple View of Reading, language comprehension and word recognition, were further delineated into the many aspects of reading. Dyslexia is a difficulty with word recognition, specifically the phonological aspects of reading (Kilpatrick, 2015; IDA, 2002). This literature review will look at the past three decades of research about dyslexia and teacher knowledge about dyslexia.

According to Washburn et al. (2011), it is estimated that one in five people in the U.S. have some degree of dyslexia or specific learning disability in reading. According to the International Dyslexia Association [IDA] Board of Directors:

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other

cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (IDA, 2002).

Although this definition is concise, and ample research has been completed to support each section (Denton & Meindl, 2016; Ferrer et al., 2010; Kilpatrick, 2015; Shaywitz, 2003; Vellutino et al., 2004; Wadlington & Wadlington, 2005), misconceptions about dyslexia persist in the community and more importantly in the education system. In the most recent study identified, Washburn et al. (2017) found that teachers early in their career had clear understandings of reading disabilities but not dyslexia. Fifty-four percent of teachers had one or more common misconceptions about dyslexia. Worthy et al. (2016) found that teachers were committed to helping students with dyslexia, but they reported confusion and concern about the policies, procedures, and lack of information from their districts. Professional development was not provided in the schools, and in addition, the teachers felt capable of working with other struggling readers but did not feel confident working with students with dyslexia. Teachers reported that dyslexia was rarely addressed in their training to become teachers. We did not find any research on administrator knowledge of dyslexia.

The most persistent and common misconception about dyslexia is that people see letters or words in reverse. In fact, letter reversal is often believed to be the signature manifestation of dyslexia (Denton & Meindl, 2016; Wadlington & Wadlington, 2005). In an extensive review of current research, Vellutino et al. (2004) pointed out that research in neuroscience, psychology, and education has clearly shown that reading is a linguistic skill, not a visual skill, and that dyslexia is not caused by a visual deficit or spatial confusion, but by a phonological processing

difficulty. A strong neural basis for dyslexia has been discovered, along with visual proof, using fMRI's, that neural networks can be improved for word recognition in individuals with dyslexia. Specific areas of the brain have been shown to be used by proficient readers as opposed to those with dyslexia (Shaywitz, 2003; Vellutino et al., 2004).

Another common misconception is that vision therapy and wearing tinted glasses or using tinted overlays while reading improves reading for children with dyslexia. According to Denton and Meindl (2016), colored overlays do not improve reading skills for students with dyslexia. According to a joint statement by the American Academy of Pediatrics, the American Academy of Ophthalmology, the American Association for Pediatric Ophthalmology and Strabismus, and the Association of Certified Orthoptists (Handler & Fierson, 2020), dyslexia is not a visual difficulty and remediation that includes vision therapy or tinted lenses and filters will not be beneficial.

A third common misconception is that those who have dyslexia have a lower intelligence, yet research has shown that dyslexia is not related to intelligence (Ferrer et al., 2010). People with dyslexia can appear along the entire continuum of intelligence. Dyslexic students can be talented or gifted, and often excel in the fields of science, technology, and creativity (Wadlington & Wadlington, 2005).

A fourth common misconception is that dyslexia is caused by a lack of reading at home with and to a child. Solid scientific evidence of a neurological basis for the phonological coding deficit theory contradicts this belief (Vellutino et al., 2004).

We set out to analyze elementary administrator (superintendents and principals) knowledge of dyslexia with the hope to shed light on the need for professional development.

Administrators have direct influence on student and program success (Leithwood et al., 2010; Silins & Mulford, 2002; Waters et al., 2003).

## **Method**

### **Participants**

The North Dakota Department of Public Instruction provided email addresses for a random sample of 200 elementary administrators. A total of 134 participants responded to the survey (67% response rate). Twenty participants did not complete the survey to the end, and 8 respondents identified as teachers not administrators; 106 responses were analyzed in this study. This work was approved by an Institutional Review Board.

### **Instrument**

The previously validated revised survey, The Dyslexia Belief Index (Washburn et al., 2014) was used with permission from the authors. The survey has demonstrated an internal validity of Cronbach's alpha .737 (Washburn et al., 2014). Three statements for participants to analyze as true or false were added to this survey. The statements were: "dyslexia is the leading cause for reading failure in the United States", "special education teachers receive intensive training about dyslexia", and "most teachers receive training to work with children with dyslexia as a part of their certification."

The survey uses a Likert-type scale for responses, including definitely true (coded 4), probably true (3), probably false (2), and definitely false (1). The first demographic item analyzed in this study was amount of agreement for two statements: "As an administrator, I support required early screening and remediation measures for dyslexia in my school or district", and "As an administrator, I support professional development for teachers in my school or district on dyslexia." Answers were strongly agree, coded 5, somewhat agree, coded 4, neither

agree nor disagree, coded 3, somewhat disagree, coded 2, and strongly disagree, coded 1. The second demographic item analyzed was number of years teaching (less than five years- coded 2 and five years or more- coded 1).

### **Analysis/Design**

The first research question was, what do elementary administrators know about dyslexia? The hypothesis for research question 1 was that administrators have accurate knowledge about dyslexia. The rationale for this hypothesis is that there has been a great deal of research about dyslexia in the past five decades (Ferrer et al., 2010; Gray, 2008; Lyon et al., 2001; Shaywitz, 2003; Snowling, 2012; Vellutino et al., 2004).

The second research question in this study was if there was a difference between the knowledge of administrators who graduated from a teacher education program within five years and those who took their training more than five or more years ago. The hypothesis for research question 2 was that administrators who graduated from a teacher education program less than five years ago would have more knowledge of recent research about dyslexia. The rationale for the hypothesis is that recent research has shown growth in some areas of knowledge of dyslexia with teachers (Allington, 2013; Washburn et al., 2014, 2017; Worthy et al., 2016), and there has been an increase in public information about dyslexia in the last ten years. This question is important since administrators have a direct effect on success of students and programs (Leithwood et al., 2010; Silins & Mulford, 2002). One-tailed independent samples *t*-tests were used to determine if there was a significant difference in the means of the answers to the questions in the survey between group one, administrators who graduated from a teacher education program less than five years ago, and group two, administrators who graduated from a teacher education program five years or more ago. Responses were divided into the three

constructs of knowledge of the nature of dyslexia, belief in myths about dyslexia, and beliefs about teacher training (dependent variables).

The third research question was if there was a difference between the amount of knowledge of administrators about dyslexia and the amount of support for programs and professional development on dyslexia. The hypothesis was that more knowledge about dyslexia would be associated with a higher amount of support for programs and professional development. The rationale for this is that buy-in requires understanding (Silins & Mulford, 2002). A one-tailed independent samples *t*-test was used to identify statistically significant differences in the number of correct answers to the questions in the survey (dependent variables) and whether the participant supported programs for students with dyslexia and professional development on dyslexia (independent variables).

### **Procedure**

The researchers emailed a link to an anonymous survey to a random sample of 200 elementary administrators (superintendents and principals) in North Dakota. The link in the email led participants to a survey in the Qualtrics application. In order to encourage a higher response rate, participants were offered a chance to have their name put in a draw for a \$50 Amazon gift card through a separate link at the end of the survey. In addition, three regional educational associations emailed their administrator members and asked them to participate in the study.

### **Results**

The researchers analyzed a total of 106 responses in this study. Table 1 shows the demographics of those who responded to the survey.

**Table 1.***Dyslexia Belief Index Demographics*

Position	#	%
Elementary Principal or Vice-principal	29	27.4
Other Administrator	77	72.6
Number of Years Since Graduating	#	%
Five years or more	95	90.5
Less than five years	10	9.5
		1 missing
Rural or Urban District	#	%
Rural	94	89.6
Urban	11	10.9
Highest Degree	#	%
Bachelors of Education	3	2.8
Masters of Education	87	82.1
PhD or EdD	15	14.2
Other	1	0.9
Teacher Training Taken	#	%
In North Dakota	82	77.4
Outside North Dakota	23	21.7

Table 2 shows the percentage of some form of truth for each statement within the constructs of the nature of dyslexia, common myths, and training received by teachers.

Percentage of some form of truth was calculated by adding the scores of definitely true and probably true for each statement, coded 4 for definitely true and 3 for probably true.

**Table 2***Percentage of Some Form of Truth (definitely true and probably true) for Statements on Knowledge of the Nature of Dyslexia, Common Myths, and Training for Teachers*

Question	% Some Form of Truth	M	SD
<b>C1. Knowledge of the Nature of Dyslexia</b>			
q1 Leading cause for reading failure in the U.S.	78.3	2.8	0.5
q2 Emotional/social problems highly correlated	88.5	3.1	0.6
q6 Also have problems with spelling	94.3	3.2	0.6
q7 Affects exclusively reading/language arts subjects	24.5	1.9	1.0
q8 Affects language processing	81.0	3.0	0.7

**Table 2 continued**

Question		% Some Form of Truth	M	SD
q12	Occurs more frequently in boys	59.4	2.6	0.6
q13	Have difficulty with decoding/word recognition	96.2	3.3	0.6
q16	Dyslexic parents more likely	57.5	2.6	0.7
q18	Need more systematic and explicit reading instruction	95.3	3.2	0.5
q21	Can cause difficulty with writing	98.1	3.3	0.6
<b>C2. Belief in Common Myths</b>				
q4	Due to visual problems.	46.2	2.4	0.7
q9	Certain medications effective	15.1	2.0	0.5
q10	Lower IQ scores	21.9	1.8	0.8
q11	Specific to the English language	8.5	1.7	0.7
q14	Reading ability and intellectual ability related	34.0	2.0	0.9
q15	Eye tracking exercises are effective	84.0	2.9	0.5
q17	Can be helped by using colored lenses/overlays	65.1	2.7	0.6
q19	Caused by literacy-poor home environment	13.2	1.8	0.7
q20	Children can outgrow	25.5	2.1	0.7
q22	Seeing letters backwards is a characteristic	86.8	3.1	0.6
<b>C3. Teacher Training</b>				
q3	Most special education teachers receive intensive training in dyslexia	10.5	1.9	.66
q5	Most teachers receive training in dyslexia	23.6	2.0	.82

A high percentage, 78% of participants, scored some form of truth for the statement that dyslexia is the leading cause of reading failure in the U.S. Although only 46% of participants scored some form of truth that dyslexia is caused by visual problems, 87% percent scored some form of truth for the myth that a characteristic of dyslexia is seeing letters backwards. Eighty-four percent of all administrators surveyed scored some form of truth that eye tracking exercises would remediate dyslexia-caused difficulties. In addition, 65% percent of all administrators surveyed scored some form of truth that colored overlays and lenses can help dyslexia. Only 22% of administrators in this study scored some form of truth for the statement that students with

reading disabilities have a lower IQ, and only 34% scored some form of truth for the statement that reading ability and intellect are related.

The individual items within the constructs were averaged. The reliability and correlations for each of the constructs are shown in Table 3. The correlation between knowledge of the nature of dyslexia and belief in myths about dyslexia was  $r = .10$ . The correlation between knowledge of dyslexia and beliefs about teacher training on dyslexia was  $r = -.03$ , and the correlation between belief in myths and teacher training was  $r = .36$ . The overall reliability of the 22 questions was calculated with a Cronbach's alpha of .573.

**Table 3**

*Pearson Correlation and 2 tailed significance between 3 constructs*

Constructs	Question #'s	C1	C2	$\alpha$
C1 Nature	q1, q2, q6, q7, q8, q12, q13, q16, q18, q21			.526
C2 Myths	q4, q9, q10, q11, q14, q15, q17, q19, q20, q22	.10		.624
C3 Training	q3, q5	-.03	.36*	.546

*\*Correlation is significant at the 0.05 level (2 tailed)*

We compared the answers for those who received their Teacher Training in the last five years or more and less than five years ago to test the hypothesis that administrators who have received training less than five years ago would have more knowledge about dyslexia. For construct one, the nature of dyslexia, the participants who graduated from a Teacher Training program five or more years ago, the mean was  $M=2.89$ . For those who graduated less than five years ago, the mean was  $M=2.9$ .  $t(103)=-707$ .  $p > .05$  ( $p = .889$ ). There was not a significant difference between the two groups. For construct two, belief in myths about dyslexia, for the participants who have received their training five years or more ago, the mean was  $M=2.25$ , and for those who received their training less than five years ago, the mean was  $M=2.3$ .  $t(103)=-.553$ ,

$p > .05$  ( $p = .735$ ). There was not a significant difference in the scores of those who received their training more or less than five years ago. For construct three, training, for participants who received their training five years or more ago, the mean was  $M = 1.9$ , and for those who received their training less than five years ago, the mean was  $M = 2.0$ .  $t(103) = -.039$ ,  $p > .05$  ( $p = .961$ ). There was no significant difference in the scores.

We analyzed participant answers to the two questions of support for screening and remediation measures for students with dyslexia and support for professional development for teachers on dyslexia. The results are presented in Table 4. The participants answered the questions on a scale of strongly agree (coded 5), somewhat agree (coded 4), neither agree or disagree (coded 3), somewhat disagree (coded 2), and strongly disagree (coded 1). For administrator support of early screening and remediation measures for students with dyslexia the mean was  $M = 4.4$ . We then compared the scores of the participants on the three constructs of nature of dyslexia, belief in myths about dyslexia, and belief about training in dyslexia together with the degree of support for early screening and remediation measures using a one-way Anova.  $F = .463$ ,  $p > .05$  ( $p = .763$ ). There was no significant difference.

For administrators who support professional development for teachers on dyslexia, the mean score for some form of agreement was  $M = 4.4$ . Eighty-six percent of all administrators surveyed had some form of agreement to support screening and remediation for dyslexia in their district. Ninety-two percent of all administrators surveyed had some form of agreement to support professional development about dyslexia in their district. The significance of the difference between the amount of support for professional development for teachers on dyslexia and the constructs of nature of dyslexia, belief in myths about dyslexia, and belief about training was calculated using a one-way Anova.  $F = .202$ ,  $p > .05$  ( $p = .895$ ). There was no significant

difference in the scores between the those who support and do not support professional development for teachers about dyslexia.

**Table 4**

*Support for early screening and remediation measures and professional development on dyslexia*

Support for Programs and Professional Development	#	Percent	Mean Score	SD
% of some form agreement for screening and remediation	91	85.9	4.4	0.9
% of some form agreement for professional development	97	91.5	4.5	0.7

Another important observation of the results was that only 24% of all participants stated that general education teachers receive training about dyslexia in teacher education programs, and 11% of all participants stated that special education teachers receive training about dyslexia in teacher education programs. In addition, when asked to identify where they learned the most about dyslexia, 40% of participants said from “my own research and reading”, 27% said from “professional development”, and only 11% said from “a teacher education program.” In addition, 9% said “I have no knowledge about dyslexia”, and 12% said from “personal experience”.

### **Discussion**

The results of this study show that the common misconception that people with dyslexia see letters backwards persists today with 87% of administrators (Wadlington & Wadlington, 2005; Washburn et al., 2017). In addition, administrators continue to believe that eye-tracking exercises (84%) and colored overlays/lenses (65%) will help dyslexia. In spite of this belief, 96% of participants scored some degree of truth to the statement that dyslexia is a difficulty that affects decoding/word recognition. In addition, 95% scored some degree of truth to the statement that students with dyslexia require more systematic, explicit instruction in reading. The concern

is that if the myth of a visual connection persists, it could take time and money away from remediation that works.

Belief in the myth of a connection between intellect and dyslexia was not strong at 22%. Fifty-eight percent believed that dyslexia runs in families and only 13% believed there is some truth to the statement that dyslexia is caused by a lack of reading at home. A high percentage, 78%, of administrators acknowledged some degree of truth to the statement that dyslexia is the leading cause of reading disability. Yet, only 11% scored some truth to the statement that general education teachers and 24% scored some truth to the statement that special education teachers receive training in dyslexia. We suggest that the knowledge breakdown may be in teacher education programs and suggest further studies should investigate what is being taught about dyslexia in teacher education programs, and the amount of knowledge that education faculty have about dyslexia. This research suggests that teacher education programs and administrator programs need to take a look at their training to ensure that they are presenting current research on dyslexia.

## **Conclusions**

Success in life including an education and learning to read is a basic civil right (Greene, 2008). When citizens do not learn to read beyond a basic level, which is happening in the U.S. (NAEP, 2019), their degree of success in society is affected (Winn & Behizadeh, 2011). Knowledge of administrators has been shown to be crucial for success of programs in schools (Silins & Mulford, 2002; Waters et al., 2003). According to this study, administrators continue to believe in the myth of a visual connection for dyslexia which leads to the promotion of remediation practices that according to research do not work and waste time and money. In

addition, administrators are often not receiving instruction on dyslexia in teacher education programs or professional development.

### **Implications for Practice**

Since dyslexia is the most common cause of reading disability (Handler & Fierson, 2011), and it is estimated that one in five people have dyslexia (Washburn et al., 2011), administrators will have students with dyslexia in their schools and districts. In order for administrators to lead out in providing services for students with dyslexia, they need to have a basic understanding of dyslexia and the best practices for helping students with dyslexia to be successful. This study brings to light the continuing need for training about dyslexia for administrators. Since current administrators have completed their original training, there is now an urgent need for professional development about dyslexia for all current administrators. We recommend a two-pronged approach where teacher education programs and administrator programs add current knowledge about dyslexia to their curriculum. In addition, state and local education systems should provide ongoing professional development on dyslexia.

## References

- 108<sup>th</sup> Congress, (2004). *Public Law 108-446 [IDEA]*. <https://idea.ed.gov/part-c/downloads/IDEA-Statute.html>
- Allington, R. (2013). What really matters when working with struggling readers. *Reading Teacher*, 66(7), 520-530.
- American Academy of Ophthalmology (2014). *Joint Statement: Learning disabilities, dyslexia, and vision- reaffirmed 2014*. American Academy of Ophthalmology.
- Brookover, W. B., Lezotte, L. (1981). Educational equity: A democratic principle at a Crossroads. *Urban Rev*, 13, 65–71.
- Decoding Dyslexia (2014). *Home*. Decoding dyslexia.  
<http://www.decodingdyslexia.net/home.html>
- Denton, T. F., & Meindl, J. N. (2016). The effect of colored overlays on reading fluency in individuals with dyslexia. *Behavior analysis in practice*, 9(3), 191-198.
- Dyslexic Advantage (2019). *Dyslexia laws*.  
<https://www.dyslexicadvantage.org/dyslexia-laws-2018/?cn-reloaded=1>
- Every Student Succeeds Act [ESSA] (2015). <https://www.ed.gov/essa?src=rn>
- Ferrer, E., Shaywitz, B. A., Holahan, J. M., Marchione, K., & Shaywitz, S. E. (2010). Uncoupling of reading and IQ over time: Empirical evidence for a definition of dyslexia. *Psychological Science*, 21(1), 93-101.
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and special education*, 7, 6-10.
- Gray, E. (2008). Understanding dyslexia and its instructional implications: A case to support intense intervention. *Literacy Research and Instruction*, 47(2), 116-123.

- Greene, S. (2008). Introduction. In S. Greene (Ed.), *Literacy as a civil right: Reclaiming social justice in literacy teaching and learning*. Peter Lang.
- Handler, S. M., & Fierson, W. M. (2020). Joint technical report: Learning disabilities, dyslexia, and vision. *Pediatrics* 127(3), e819-e856.
- Hanford, E. (2017). Hard to read: How American schools fail kids with dyslexia. *APM Reports*. Retrieved from: <https://www.apmreports.org/episode/2017/09/11/hard-to-read> .
- International Dyslexia Association [IDA] (2002). *Definition of dyslexia*. Retrieved from <https://dyslexiaida.org/definition-of-dyslexia/>
- International Dyslexia Association [IDA] (2021). *Senate passes first step act*. <https://dyslexiaida.org/senate-passes-first-step-act/>
- Kilpatrick, D. A. (2015). *Essentials of assessing, preventing, and overcoming reading difficulties*. Hoboken, NJ: John Wiley & Sons.
- Leithwood, K., Patten, S., & Jantzi, D. (2010). Testing a conception of how school leadership influences student learning. *Educational Administration Quarterly*, 46(5), 671-706.
- Lyon G. R., Fletcher, J., Shaywitz, S. E., & Shaywitz, B. (2001). Rethinking learning disabilities. *Rethinking special education for a New Century*, Thomas B. Fordham Foundation, 259-287.
- Moats, L. (2020). Teaching reading is rocket science: What expert teachers of reading should know and be able to do. *American Educator*, American Federation of Teachers. <https://www.aft.org/ae/summer2020/moats>
- National Association of Educational Progress [NAEP] (2019). *The nation's report card: Reading*. National Center for Educational Statistics. Retrieved from: <https://www.nationsreportcard.gov/reading/nation/scores/?grade=4> .

NPR (2016). Special Series: Unlocking dyslexia. *NPR*.

<https://www.npr.org/series/503544816/unlocking-dyslexia>

Rehabilitation Act, Section 504 (1973). <https://www2.ed.gov/about/offices/list/ocr/504faq.html>

Scarborough, H. (2001). *Handbook of Early Literacy*. Guilford Press.

Shaywitz, S. E. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level*. Knopf.

Silins, H., & Mulford, B. (2002). Schools as learning organizations: The case for system, teacher and student learning. *Educational Administration*, 40, 425-446.

Snowling, M. (2012). Early identification and interventions for dyslexia: A contemporary view. *Journal of Research in Special Education Needs*, 13(1), 7-14.

Torgesen, J., Wagner, R., & Rashotte, C. (1994). Longitudinal Studies of Phonological Processing and Reading. *Journal of Educational Psychology*, 2, 276-86.

Vellutino, F., Fletcher, J., Snowling, M., & Scanlon, D. (2004). Specific reading disability (dyslexia): What have we learned in the past four decades? *Journal of Child Psychology and Psychiatry*, 45(1), 2-40.

Wadlington, E., & Wadlington, P., (2005). What educators really believe about dyslexia. *Reading Improvement*, 42(1), 16-33.

Washburn, E., Joshi, R., & Binks-Cantrell, E. (2010). Are preservice teachers prepared to teach struggling readers? *Annals of Dyslexia*, 61, 21-43.

Washburn, E., Joshi, R., & Binks-Cantrell, E. (2011). Teacher knowledge of basic language concepts and dyslexia. *Dyslexia*, 17(2), 165-183.

Washburn, E., Binks-Cantrell, E. & Joshi, R. (2014) What do preservice teachers from the US and UK know about dyslexia? *Dyslexia*, 20, 1-18.

- Washburn, E., Mulcahy, C., & Musante, G. (2017). Novice teacher's knowledge of reading-related disabilities and dyslexia. *Learning Disabilities: A Contemporary Journal, 15*(2), 169-171.
- Waters, Marzano, & McNalty (2003). *Balanced leadership: What 30 years of research tells us about the effect of leadership on student achievement: A working paper*. Mid-Continent Research for Education and Learning.
- Winn, M. T. & Behizadeh, N. (2011). The right to be literate: Literacy, education, and the school-to-prison pipeline. *Review of Research in Education, 35*, 147-173.
- Worthy, J., DeJulio, S., Svrcek, N., Villarreal, D., Derbyshire, C., LeeKeenan, K., Wiebe, M., Lammert, C., Rubin, J., & Salmer, C. (2016). Teachers' understandings, perspectives, and experiences of dyslexia. *Literacy Research: Theory, Method and Practice, 65*(1), 436-453.

ARTICLE #3: TEACHER KNOWLEDGE AND SKILLS FOR TEACHING READING TO  
STUDENTS WITH DYSLEXIA: A STUDY OF ONE UPPER PLAINS STATE

**Teacher Knowledge and Skills for Teaching Reading to Students with Dyslexia: A  
Study of One Northern Plains State**

Pam Krueger, Dickinson State University

Steven LeMire and Sarah Robinson, University of North Dakota

### **Abstract**

Research over the past twenty years clearly outlines the knowledge and skills required by teachers in order to guide all of their students to be successful readers, including those with dyslexia (IDA, 2018; Moats, 2009; National Reading Panel, 2000; Torgesen, 2002). Yet, elementary teachers often do not have the required knowledge and skills (Binks-Cantrell et al., 2012; Moats, 2009; Washburn et al., 2010, 2011). As research continues to confirm and expand on what is required, research is needed to analyze if early elementary teachers currently have the required knowledge to teach the foundational skills of reading to students with dyslexia. A random sample of K-3 general education teachers, reading/Title 1 teachers, and special education teachers in North Dakota schools were surveyed. The research questions were: What knowledge do K-3 teachers have about language constructs and reading research/researchers, is there a difference in knowledge for K-3 teachers who received training within the last five years and those who received training five years or more ago, and is there a difference between reading/Title 1 teachers and K-3 general classroom teacher knowledge? Results showed that teachers do not have a high degree of knowledge of language constructs necessary to teach reading to students with dyslexia. In addition, we found that teachers rated their knowledge moderate or below in all areas of reading. We discuss possible implications for teacher education programs and professional development.

Keywords: Teacher knowledge, structure of English, teaching reading, reading instruction

## **Teacher Knowledge and Skills for Teaching Reading to Students with Dyslexia: A Study of One Northern Plains State**

Equity in education, in particular learning to read, has become a civil issue and is considered a human right (Greene, 2008). If learning to read is considered a civil right, then it stands to reason that the high rates of students graduating from high school who have not acquired proficient reading skills is a social and civil issue (NAEP, 2019). Winn and Behizadeh (2011) describe the lack of opportunities for youth to read and write as a school-to-prison pipeline. A federal criminal justice reform act was passed in 2018 which included a provision for screening inmates for dyslexia and supports for those with dyslexia to complete their GED due to a high rate of dyslexia among incarcerated individuals (IDA, 2021).

Research clearly outlines the knowledge and skills that teachers require in order to teach all of their students to be successful readers, including those with dyslexia (Binks-Cantrell et al., 2012; Brady, 2011; Ehri et al., 2014; Moats, 1999, 2009; Shanahan & Lonigan, 2010; NICHD, 2000; Shaywitz, 2003). In fact, researchers have proposed for over 20 years that most children who struggle to learn to read can be taught if teachers use evidence-based instruction when they begin school (National Reading Panel, 2000; Shaywitz, 2003; Snowling, 2012; Torgesen et al., 1994, 1998, 2001; Vellutino et al., 2004). Researchers suggest that skilled, explicit delivery of a balanced program of word-level and comprehension instruction is required in kindergarten through third grade, and if done to fidelity, reading difficulties could almost be eliminated (Foorman & Torgesen, 2001; Torgesen, 2002). Yet, according to the National Assessment of Educational Progress, only 34% of fourth graders in the U.S. read at or above a basic level (NAEP, 2019).

Snow et al. (1998) suggested that teacher knowledge is a major variable in whether students learn to read. Previous research has shown that often elementary teachers do not have

the required knowledge and skills to teach reading to ensure that all students are successful (Binks-Cantrell et al., 2012; Joshi et al., 2009, 2019; Moats, 2009; Washburn et al., 2010, 2011). Although research about best practices in reading instruction is available, this knowledge does not always reach teachers in the field. According to Kilpatrick (2015), research from scientific journals do not reach K-12 classrooms.

Research is needed to show if this lack of knowledge persists today. This research could suggest changes to teacher education programs and the need for professional development for current teachers. We sent a survey to a random sample of K-3 teachers in North Dakota in order to assess their knowledge of language constructs and reading research/researchers. The four level-two constructs were phonemic, phonological, morphological, and reading research/researchers knowledge.

### **Literature Review**

The International Dyslexia Association [IDA] Standards for Teachers of Reading are based on the belief that reading is the responsibility of general classroom teachers first in a Response to Intervention (RtI) framework (IDA, 2018). Response to Intervention is a framework suggested by the Individuals with Disabilities Education Act (IDEA) that has been adopted by many schools. The purpose of this framework is to improve instruction for students through early identification and immediate interventions with a goal to have the least number of students in the top tier of special education (Spear-Swerling, 2015). According to Moats (1999), most children with dyslexia will be taught to read by general classroom teachers which is Tier 1 in the RtI framework. Reading/Title 1 teachers and special education teachers are involved in reading remediation in Tier 2, and special education teachers would be responsible for reading remediation in Tier 3 (Moats, 2017; Spear-Swerling, 2015).

One of the theories of scientifically-based reading instruction that is the overarching guideline for the literature review and research in this study is the Simple View of Reading which was first outlined by Gough and Tunmer (1986) and reaffirmed by others (Catts et al., 2006; Garcia & Cain, 2014). This theory suggests that comprehension in reading is the product of word recognition multiplied by language comprehension. The simple view of reading explains three types of reading difficulties: difficulty with decoding words (dyslexia), a difficulty with understanding language, and a combination of the two (Kilpatrick, 2015). Scarborough (2001) developed the simple view of reading into the reading rope model. The two parts in the simple view of reading, language comprehension and word recognition, were further delineated into the many aspects of reading (IDA, 2018). Dyslexia is a difficulty with word recognition, specifically the phonological aspects of reading (Kilpatrick, 2015).

According to Washburn et al. (2011), it is estimated that one in five people in the U.S. have some degree of dyslexia or specific learning disability in reading. According to the International Dyslexia Association Board of Directors (2002):

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (IDA, 2002).

Studies show that in order to teach all children to read, including those with dyslexia, teachers need an understanding of basic language concepts, including phonemes, graphemes, syllables, morphemes, basic parts of speech, sentence structures, narrative/expository writing, and speaking organization (Carlisle, 2010; Goodwin & Ahn, 2013; Grace, 2006; Henry, 2010; IDA, 2018; International Reading Association, 2003). Children need to be taught oral language, phonemic awareness, phonics, word identification, fluency, vocabulary, and comprehension (Binks-Cantrell et al., 2012; Foorman, et al., 2016; McCardle & Chabra, 2004; Moats, 2009; Shanahan & Lonigan, 2010; Spear-Swerling, 2004, 2012). These areas were first pointed out over twenty years ago in the landmark meta-analysis of research on reading up to that time by the National Institute of Child Health and Development, known as the National Reading Panel (2000). Piasta et al. (2009) found that students who had teachers who were knowledgeable in decoding instruction and who devoted more time to it, made significantly greater improvement in word reading. In addition, those who had teachers who spent more time on explicit instruction but who were less knowledgeable of language structure had weaker decoding skills. Denton et al. (2003) and McCutchen et al. (2009) demonstrated that knowledgeable teachers can make a difference.

Research has also shown that all students benefit from the type of reading instruction that is imperative for students with dyslexia (IDA, 2018; Moats, 2012). Structured Literacy is an umbrella term recently chosen by the International Dyslexia Association to include various terms being used for the same type of instruction, including Orton-Gillingham, Multi-sensory, and Explicit Phonics (Malchow, n.d.). This type of instruction is direct, explicit, systematic, structured, and sequential instruction in the structure of English, including phonemic awareness,

phonics skills, and morphology (Archer et al., 2011; Birsh, 2011; IDA, 2018; Orton-Gillingham Academy, 2018; Spear-Swerling, in press; Torgesen, 2004).

Cohen et al. (2017) found that a majority of teachers they studied did not have the code-based knowledge required to teach struggling readers effectively. Binks-Cantrell et al. (2012), Moats (2009), and Piasta et al. (2009) reported that pre-service and in-service teachers lacked basic language knowledge required to teach reading to beginning and struggling readers. Washburn et al. (2010) found that pre-service teachers lacked important knowledge of language required to teach students who were struggling. Fielding-Barnsley and Purdie (2005) found that general education teachers had a positive attitude about learning language structure but little knowledge of metalinguistics for teaching struggling readers. Mather (2001) found that pre-service teachers scored 50% and general education teachers scored 68% on a survey of word and sound levels of English. The topic of knowledge required by reading teachers was addressed in a special issue of the *Annals of Dyslexia* (Joshi & Wijekuma, 2019).

After analyzing current teacher knowledge and skills with the structure of language and reading research, the current study will suggest changes to teacher education programs and point out a need for professional development. As Dickman (2020) stated, “if college and university professors do not teach current research, they do not imbue future teachers with the ability to provide their students with the superpower contained within the ability to read”.

## **Method**

### **Participants**

The North Dakota Department of Public Instruction provided a random list of email addresses for 400 K-3 teachers, including reading/Title 1 teachers, and 200 special education teachers in North Dakota. Of the 600 participants contacted, 137 responded and filled out the

survey (23% response rate). Thirty-five respondents did not complete most of the questions, so 101 participant scores were analyzed. This work was approved by an Instructional Review Board.

### **Instrument**

The Survey of Language Constructs Related to Literacy Acquisition developed by Washburn et al. (2014) was used as the basis for the survey with permission from the developers. The researchers added five additional questions about knowledge of prominent research and researchers in reading instruction. The level two constructs of the survey included prominent reading research and researchers (five items), phonological (nine items), phonics (ten items), and morphological (four items) knowledge and skills. The original survey had 46 questions and had been used previously (Joshi et al., 2009; Washburn et al., 2011, 2016). The researchers removed nine questions to reduce the length of the survey. Questions removed were either repeated topics or those that addressed skills beyond decoding skills usually required by students with dyslexia (Gough & Tunmer, 1986). The researchers added five questions on topics about reading researchers: Scarborough's Reading Rope (Scarborough, 2001; Kilpatrick, 2015), Gough and Tunmer's Simple View of Reading (Catts et al., 2006; Garcia & Cain, 2014; Gough & Tunmer, 1986), Stanovich's Matthew Effect (Cunningham & Chen, 2014; Stanovich, 1986), Seidenberg's Triangle Framework (Seidenberg, 2017), and Scarborough's theory of accurate reading (Scarborough, 2001).

The survey had multiple-choice questions with four to five possible answers and one correct answer. The correct answer was coded as 1, and the incorrect answers were coded as 0. The reliability of the scores on the original survey was .90 (Cronbach's alpha). The

survey also included a rating of ability to teach phonemic awareness, phonics, fluency, vocabulary, comprehension, children's literature, literacy to English Language Learners, and using assessment to inform reading instruction. Participants chose minimal (1), moderate (2), very good, (3) or expert (4).

### **Analysis/Design**

The hypothesis for research question 1 was that K-3 teachers have accurate knowledge of language constructs and reading research/researchers. The rationale for this hypothesis is based on research that shows that teachers need accurate knowledge of language constructs (Binks-Cantrell et al., 2012; International Reading Association, 2003; Moats, 2009; National Reading Panel, 2000; Spear-Swerling, 2004) and research on reading instruction over the last five decades (National Reading Panel, 2000; Shaywitz, 2003; Torgesen, 2002) in order for all students to learn how to read.

The second hypothesis was that there was a difference between the knowledge and skills of language constructs and research in reading by K-3 general education teachers, reading/Title 1 teachers, and special education teachers. The rationale for this hypothesis was based on the large amount of research on knowledge required by teachers of reading from the past five decades (IDA, 2018). The researchers assumed that teachers with more training in working with students with reading disabilities would have more of the required knowledge. Reading/Title 1 teachers teach students who are struggling with reading in Tier 2 and Tier 3 of Response to Intervention. One-tailed independent samples *t*-tests were used to determine if there was a significant difference in the means of the number of correct answers to the questions in the survey divided into the four level-two constructs (dependent variables) of knowledge of phonemes, phonology,

morphology and reading research/researchers and the current position in a school (independent variables).

The hypothesis for the third question was that there would be a difference in the amount of knowledge of language constructs and reading research by teachers who graduated from a teacher education program less than five years ago as compared to those who graduated five years or more ago. The rationale for this hypothesis is based on research that shows that teachers need accurate knowledge of language constructs (Binks-Cantrell et al., 2012; International Reading Association, 2003; Moats, 2009; National Reading Panel, 2000; Spear-Swerling, 2004). One-tailed independent samples *t*-tests were used to determine if there was a significant difference in the means of the number of correct answers to the questions in the survey divided into the four level-two constructs (dependent variables) of knowledge and skills in phonemes, phonology, morphology, and reading research/researchers, and when the participant graduated from a teacher education program.

The independent variables addressed in the demographic section of the survey included number of years since graduating from teacher education program (five years or more- coded 1, less than five years- coded 2) and position in the elementary school (general classroom teacher- coded 1, special education-2, reading/Title 1 teacher- 3, other- 4). Other items in the demographic section not addressed in this study included gender, rural or urban district, highest level of education, where instruction on language structure and reading research was received, and additional reading courses taken.

## **Procedures**

An email with a link to an anonymous survey was sent out to a random sample of K-3 general education, reading/Title 1 teachers, and special education teachers in North Dakota. In

order to encourage a higher response rate, participants were offered a chance to have their name put in a draw for a \$50 Amazon gift card through a separate link to ensure confidentiality of the survey responses.

## Results

The first part of the survey included eight questions requiring participants to rate themselves on their ability to teach reading areas. Participants chose between minimal (coded 1), moderate (2), very good (3) and expert (4). The percentages of participants answering very good and expert combined are shown in Table 1.

**Table 1**

*Percentage of participants answering very good and expert for teaching reading areas.*

Reading Area	Percentage of participants answering very good and expert
Phonemic Awareness	59.4
Phonics	58.4
Fluency	61.4
Vocabulary	52.5
Reading Area	Percentage of participants answering very good and expert
Children's Literature	51.5
Literacy Skills to ELLs	18.8
Using Assessment to Inform Reading Instruction	55.0

The percentage of participants who provided correct answers for each question is shown in Table 2.

**Table 2**

*Percentage of Participants Scoring Correct Answers for Questions on Language Constructs and Reading Research/Researchers for entire sample*

Question	% of participants	M	SD
<b>C1. Phonological Knowledge and Skills</b>			
q1 A phoneme refers to a (single speech sound)	88.1	0.9	0.3
q2 If tife is a word, the letter i... (find)	92.1	0.9	0.3
q3 If you say the word, and then reverse the order (funny)	69.3	0.7	0.5
q4 If you say the word, and the reverse the order (sigh)	74.3	0.7	0.4
q7 How many speech sounds in "grass" (4)	50.5	0.5	0.5
q8 How many speech sounds in "eight" (2)	5.9	0.1	0.2
q11 What type of task...? (deletion)	73.3	0.7	0.5
q18 Phonological awareness is (the understanding of how spoken language is broken down and manipulated)	49.5	0.5	0.5
q19 Phonemic awareness is (the ability to break down and manipulate the individual sounds in spoken language)	44.6	0.5	0.5
<b>C2. Phonics Knowledge and Skills</b>			
q5 Count the number of syllables in the word pies (1)	92.1	0.9	0.3
q6 Count the number of syllables for the word unbelievable (5)	98.0	1.0	0.1
q10 Two combined letters... one single speech sound (consonant blend)	72.3	0.7	0.5
q13 Identify the pair of words that begins with the same sound (chef-shoe)	89.1	0.9	0.3
q14 All of the following have a silent letter, except (phop)	56.4	0.6	0.5
q15 Which of the following has a final stable syllable? (paddle)	31.7	0.3	0.5
q16 Which of the following words has 2 closed syllables? (napkin)	73.3	0.7	0.5
q17 Which of the following words contains an open syllable? (bacon)	53.5	0.5	0.5

**Table 2 continued**

Question	% of participants	M	SD
q22 What is the rule (“c” is used for /k/ in the initial position before a, o, u, or any consonant)	55.4	0.6	0.5
q23 Which answer best describes... (words do not end in v)	5.0	0.1	0.2
<b>C3. Morphology Knowledge and Skills</b>			
q20 Morphemic analysis is (studying the structure...)	51.5	0.5	0.5
q21 Etymology is: (the study of the history and development of the structures and meaning of words.)	62.4	0.6	0.5
q24 A morpheme refers to (a single unit of meaning)	58.4	0.6	0.5
q25 What is the root in the word audience? (aud)	37.6	0.4	0.5
<b>C4. Reading Research/Research Knowledge</b>			
q26 Scarborough’s reading rope...	59.4	0.6	0.5
q27 According to Gough and Tunmer...	46.5	0.5	0.5
q28 Stanovich’s Matthew Effect...	45.5	0.5	0.5
q29 According to Mark Seidenberg’s triangle model...	35.6	0.4	0.5
q30 According to Scarborough...	64.4	0.6	0.5

The average percentage of participants who chose the correct answer for construct 1, phonological knowledge, was 61%; the percentage for construct 2, phonics knowledge, was 63%; the percentage for construct 3, morphological knowledge, was 57%; and, the percentage for construct 4, reading research/researchers knowledge, was 50%. Participants had to choose the correct answer from four possibilities.

The reliability of the survey including all questions had a Cronbach’s Alpha of .823 for 37 items. The individual items within the four constructs were averaged. The reliability and correlations for each of the constructs are shown in Table 3. The correlation between

phonological knowledge and phonics knowledge was  $r = .45$ . The correlation between phonological knowledge and morphological knowledge was  $r = .28$ . The correlation between phonological knowledge and reading research/researchers knowledge was  $r = .13$ .

**Table 3**

*Correlation of Subscale Constructs and Measures of Internal Consistency for Survey Data*

Construct Number	Subscale Constructs	Question Numbers	C1.	C2	C3	$\alpha$
C1.	Phonological Knowledge and Skills	q1, q2, q3, q4, q7, q8, q11, q18, q19				.473
C2.	Phonics Knowledge and Skills	q5, q6, q10, q13, q14, q15, q16, q17, q22, q23	.45*			.576
C3.	Morphology Knowledge and Skills	q20, q21, q24, q25	.28*	.42*		.508
C4.	Reading Research/Researcher Knowledge	q26, q27, q28, q29, q30	.13	.31*	.48*	.672

*Correlation is significant at the .05 level\**

The second purpose of this study was to assess if there was an association between knowledge and skills about language constructs and reading research/researchers, and number of years since graduating from a teacher education program. To assess these two associations, independent  $t$  tests were used. The mean number of total correct responses for the teachers who graduated five years or more ago (coded 1) was 59%. For teachers who graduated less than five years ago (coded 2) the mean number of correct answers 52%. The difference was not statistically significant,  $t(99) = .165$ ,  $p > .05$ .

The third purpose of this study was to assess if there was an association between knowledge and skills about language constructs and reading research/researchers and the position in a school- general education, reading/Title 1 teachers, and special education teachers.

To assess these two associations, independent  $t$  tests were used. For knowledge and skills about phonology, phonics, morphology, and reading research/researchers combined, the percentage of correct responses for general education teachers was 56% and for special education teachers was 62%. The difference between the two scores was not statistically significant,  $t(83) = -1.397, p > .05$ . For reading/Title 1 teachers, the mean number of correct responses was 59%. The difference between general education and Reading/Title 1 teachers was not statistically significant,  $t(60) = -.444, p > .05$ .

**Table 4**

*t test scores for significant differences between groups*

Comparison	Complete test
Training received less than 5 years vs. 5 years or more	$t(99) = .165, p > .05$
K-3 general classroom vs. special education teachers	$t(83) = -1.397, p > .05$
K-3 general classroom to reading/Title 1 teachers	$t(60) = -.444, p > .05$

## Discussion

The results of this survey confirm previous research about a need for increased knowledge and skills with language constructs for all teachers (Binks-Cantrell et al., 2012; Cohen et al., 2017; Fielding-Barnsley & Purdie, 2005; Moats, 2009; Piasta et al., 2009; Washburn et al., 2010; Joshi et al., 2019). The results also show that contrary to what might be expected, reading/Title 1 teachers and special education teachers did not have a significantly greater amount of knowledge in this area. In addition, there was no evidence that teachers who graduated more recently from a teacher education program had greater knowledge of language constructs.

The results of the self-rating questions on ability to teach areas of reading were concerning. According to the theory of self-efficacy (Bandura, 1977; De la Torre Cruz & Arias, 2007), confidence in one's abilities has an effect on behavior. Less than 60% of teachers surveyed stated that they were very good or experts at teaching the basic, foundational skills for reading, including phonemic awareness and phonics. Fifty-two percent scored themselves as very good or expert for vocabulary, and very good or expert scores for comprehension were the highest at 66%. Only 55% chose very good or expert for using assessment to guide instruction. These self-rating scores clearly signal a need for continuing professional development to ensure that teachers who have the responsibility to teach children how to read are highly qualified and confident. These results are reflected in the reading scores of students from the National Assessment of Educational Progress where only 34% of fourth graders in the U.S. read at or above a basic level (NAEP, 2019).

## **Conclusions**

Learning to read is a basic human right (Greene, 2011). Yet many students in the U.S. struggle to attain even a basic level of reading (NAEP, 2019). A high percentage of these students who struggle learning to read have dyslexia (Washburn et al., 2011). Research clearly outlines the knowledge and skills that teachers require in order to teach all of their students to be successful readers, including those with dyslexia (Binks-Cantrell et al., 2012; Brady, 2011; Ehri et al., 2014; Moats, 1999, 2009; Shanahan & Lonigan, 2010; National Reading Panel, 2000; Shaywitz, 2003). In fact, researchers have proposed for over 20 years that most children who struggle to learn to read can be taught if teachers use evidence-based instruction when they begin school (National Reading Panel, 2000; Shaywitz, 2003; Snowling, 2012; Torgesen et al., 1994, 1998, 2001; Vellutino et al., 2004). Yet teaching to read is not a simple skill (Moats, 2020).

Moats (2009, 2017) and Spear-Swerling (2015) found that general education, reading, and special education teachers are all involved in teaching reading to students with dyslexia in an RTI framework. This current study found that current knowledge required for teaching the foundational skills of phonology and morphology is lacking for all three types of teachers. In addition, all three types of teachers judge their own knowledge as minimal to moderate.

### **Implications for Practice**

The results of this study show a need for the inclusion of additional language constructs and reading research training in teacher education programs. As Dickman (2020) stated, “if college and university professors do not teach current research, they do not imbue future teachers with the ability to provide their students with the superpower contained within the ability to read.” Binks-Cantrell et al. (2012), showed that pre-service teachers who were trained by university faculty members who had undergone professional development in explicit instruction performed better on a language construct survey compared to pre-service teachers who were taught by university faculty who had not gone through such professional development. They also lacked knowledge about how to teach literacy explicitly. The authors referred to the term the “Peter Effect”, which means that you cannot give what you don’t have.

In addition, Feng et al. (2019) found that teachers who completed reading content courses in their teacher education program plus mentoring during their first year had higher levels of self-efficacy. We suggest that there needs to be a two-pronged approach to increasing teacher knowledge of language constructs and reading research. As Darling-Hammond and Bransford (2005) point out, expert teachers are developed over time while teaching. State and district planners must include continuing professional development for teachers in language constructs and reading instruction.

## References

- Archer, A., & Hughes, C. A. (2011). *Explicit instruction: Effective and efficient teaching*. New Guilford Press.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191-215.
- Binks-Cantrell, E., Washburn, E., Joshi, R., & Hougen, M. (2012). Peter effect in the preparation of reading teachers. *Scientific Studies of Reading*, *16*(6), 526-536.
- Birsh, J. (Ed.) (2011). *Multisensory teaching of basic language skills*, 3rd Ed. Brookes Publishing.
- Brady, S. (2011). Efficacy of phonics teaching for reading outcomes: Implications from post-NRP research. In S. A. Brady, D. Braze, & C. Fowler (Eds.), *Explaining individual differences in reading: Theory and evidence* (pp. 69–96). Psychology Press.
- Carlisle, J. F. (2010). An integrative review of the effects of instruction in morphological awareness on literacy achievement. *Reading Research Quarterly*, *45*, 464–487.
- Catts, H. W., Adolf, S. M., & Weismer, S. E. (2006). Language deficits in poor comprehenders: A case for the simple view of reading. *Journal of Speech, Language, and Hearing Research*, *49*(2), 278–293.
- Cohen, R., Mather, N., Schneider, D., & White, J. (2017). A comparison of schools: Teacher knowledge of explicit code-based reading instruction. *Reading and Writing*, *30*(4), 653-690.
- Cunningham, A. E. & Chen, Y. (2014). *Encyclopedia of Language Development*. SAGE Publications.

- Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. Jossey-Bass.
- De la Torre Cruz, M., & Casanova Arias, P. F. (2007). Comparative analysis of expectancies of efficacy in in-service and prospective teachers. *Teaching and Teacher Education, 23*, 641–652.
- Denton, C., Foorman, B. R., & Mathes, G. G. (2003). Schools that beat the odds: Implications for reading instruction. *Remedial and special education, 24*, 258–261.
- Dickman, E. (2020). Why is special education a Failure? *The Examiner, International Dyslexia Association, 9* (1).
- Ehri, L. C. (2014). Orthographic mapping in the acquisition of sight word reading, spelling memory, and vocabulary learning. *Scientific Studies of Reading, 18*(1), 5-21.
- Feng, L., Hodges, T. S., Waxman, H. C., Joshi, R. M. (2019). Discovering the impact of reading coursework and discipline-specific mentorship on first-year teachers' self-efficacy: A latent class analysis.
- Fielding-Barnsley, R., & Purdie, N. (2005). Teachers' attitude to and knowledge of metalinguistics in the process of learning to read. *Asia-Pacific Journal of Teacher Education, 33*, 65–75.
- Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton, C. A., Dimino, J., et al. (2016). *Foundational skills to support reading for understanding in kindergarten through 3rd grade* (NCEE 2016-4008). U.S. Department of Education. Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.
- Foorman, B. R., & Torgesen, J. (2001). Critical elements of classroom and small-group instruction promote reading success in all children. *Learning Disabilities Research & Practice, 16*, 203-212.

- Garcia, J. R. & Cain, K. (2014). Decoding and reading comprehension: A meta-analysis to identify which reader and assessment characteristics influence the strength of the relationship in English. *Review of Educational Research, 84*(1), 74-111.
- Goodwin, A. P. & Ahn, S. (2013). A meta-analysis of morphological interventions in English: Effects on literacy outcomes for school-age children. *Scientific Studies of Reading, 17*, 257–285.
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and special education, 7*, 6-10.
- Grace, K. (2006). *Phonics and spelling through phoneme-grapheme mapping*. Sopris West.
- Greene, S. (2008). Introduction. In S. Greene (Ed.), *Literacy as a civil right: Reclaiming social justice in literacy teaching and learning*. Peter Lang.
- Henry, M. (2010). *Unlocking literacy: Effective decoding and spelling instruction*, 2nd ed. Brookes Publishing.
- International Dyslexia Association [IDA] (2002). *Definition of dyslexia*. Retrieved from <https://dyslexiaida.org/definition-of-dyslexia/>
- International Dyslexia Association [IDA] (2018). *Knowledge and practice standards for teachers of reading*. IDA.
- International Dyslexia Association [IDA] (2018). Scarborough’s Reading Rope. *The Examiner, 7*(2).
- International Dyslexia Association [IDA] (2021). *Senate passes first step act*. <https://dyslexiaida.org/senate-passes-first-step-act/>

- International Reading Association (2003). *Prepared to make a difference: An executive summary of the National Commission on Excellence in elementary teacher preparation for reading instruction*. International Reading Association.
- Joshi, R., Binks, E., Hougen, Dahlgren, M., Dean, E., & Smith, D. (2009). Why elementary teachers might be inadequately prepared to teach reading. *Journal of Learning Disabilities, 42*, 392-402.
- Joshi, R. M. & Wijekumar, K. (2019). Introduction: Teacher perception, self-efficacy and teacher knowledge relating to literacy. *Annals of Dyslexia, 69*, 1-4.
- Kilpatrick, D. A. (2015). *Essentials of assessing, preventing, and overcoming reading difficulties*. John Wiley & Sons.
- Malchow, H. (n.d. ) *Structured literacy: A new term to unify us all and sell what we do*. International Dyslexia Association. <https://dyslexiaida.org/structured-literacy/#:~:text=The%20term%20%E2%80%9CStructured%20Literacy%E2%80%9D%20is,in%20essentially%20the%20same%20way.&text=We%20need%20one%20name%20that,reading%20in%20the%20same%20way>
- Mather, N., Bos, C., & Babur, N. (2001). Perceptions and knowledge of pre-service and in-service teachers about early literacy instruction. *Journal of Learning Disabilities, 34*, 472-482.
- McCardle, P. & Chhabra, V. (Eds.) (2004). *The voice of evidence in reading research*. Brookes Publishing.
- McCutchen, D., Green, L., Abbott, R. D., & Sanders, E. A. (2009). Further evidence for teacher knowledge: Supporting struggling readers in grades three through five. *Reading and Writing: An Interdisciplinary Journal, 22*, 401-423.

- Moats, L. (1999). *Basic facts about dyslexia part II: What every professional ought to know*. International Dyslexia Association.
- Moats, L. (2009). Knowledge foundations for teaching reading and spelling. *Reading and Writing: An Interdisciplinary Journal*, 22, 379–399.
- Moats, L. (2017). Can prevailing approaches to reading instruction accomplish the goals of RTI? *Perspectives on Language and Literacy*, 43, 15–22.
- Moats, L. (2020). Teaching Reading is Rocket Science. *American Educator*, American Federation of Teachers.
- Moats, L. C., Dakin, K., & Joshi, M. (Eds.) (2012). *Expert perspectives on interventions for reading*. International Dyslexia Association.
- National Association of Educational Progress [NAEP] (2019). *The nation's report card: Reading*. National Center for Educational Statistics.  
<https://www.nationsreportcard.gov/reading/nation/scores/?grade=4> .
- National Reading Panel (2000). *Report of the National Reading Panel--Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. National Institute of Child Health and Human Development.
- Orton-Gillingham Academy (2018). *OG approach principles*. Academy of Orton-Gillingham Practitioners and Educators. <https://www.ortonacademy.org/resources/og-approach-principles/>
- Piasta, S., Connor-McDonald, C., Fishman, B., & Morrison, F. (2009). Teacher's knowledge of literacy concepts, classroom practices, and student reading growth. *Scientific Studies of Reading*, 13, 224-248.

- Scarborough, H. (2001). *Handbook of Early Literacy*. Guilford Press.
- Seidenberg, M. (2017). *Language at the speed of sight: How we read, why so many can't, and what can be done about it*. Basic Books.
- Shanahan, T. & Lonigan, C. J. (2010). The National Early Literacy Panel: A summary of the process and the report. *Educational Researcher*.
- Shaywitz, S. E. (2003). *Overcoming dyslexia: a new and complete science-based program for reading problems at any level*. Knopf.
- Snow, C. E., Burns, M.S., & Griffin, P. (1998). *Preventing Reading Difficulties in Young Children*. National Academy of Sciences National Research Council.  
<https://files.eric.ed.gov/fulltext/ED416465.pdf>
- Snowling, M. (2012). Early identification and interventions for dyslexia: A contemporary view. *Journal of Research in special education Needs*, 13(1), 7-14.
- Spear-Swerling, L., & Brucker, P. (2004). Preparing novice teachers to develop basic reading and spelling skills in children. *Annals of Dyslexia*, 54, 332.
- Spear-Swerling, L. (in press). Structured literacy and typical literacy practices: Understanding differences to create instructional opportunities. *Teaching Exceptional Children*.
- Spear-Swerling, L. (2015). *The power of RTI and reading profiles: A blueprint for solving reading problems*. Baltimore, MD: Brookes Publishing.
- Spear-Swerling, L., & Cheesman, E. (2012). Teachers' knowledge base for implementing response-to-intervention models in reading. *Reading & Writing: An Interdisciplinary Journal*, 25, 1691–1723.
- Stanovich, K. E. (1986). Matthew Effects in Reading: Some Consequences of Individual Differences in the Acquisition of Literacy. *Reading Research Quarterly*, 21(4), 360-407.

- Torgesen, J. K. (2004). Lessons learned from research on interventions for students who have difficulty learning to read. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 355–381). Brookes Publishing.
- Torgesen, J. (1998). Catch them before they fall: Identification and assessment to prevent reading failure in young children. *American Educator*, 22, 32-39.
- Torgesen, J. (2002). The prevention of reading difficulties. *Journal of School Psychology*, 40(1), 7–26.
- Torgesen, J., Wagner, R., & Rashotte, C. (1994). Longitudinal Studies of Phonological Processing and Reading. *Journal of Educational Psychology*, 2, 276-86.
- Torgesen, J., Alexander, A. W., Wagner, R., Rashotte, C. A., Voeller, K., Conway, T., et al. (2001). Intensive remedial instruction for children with severe reading disabilities: Immediate and long-term outcomes from two instructional approaches. *Journal of Learning Disabilities*, 34, 33–58.
- Vellutino, F., Fletcher, J., Snowling, M., & Scanlon, D. (2004). Specific reading disability (dyslexia): What have we learned in the past four decades? *Journal of Child Psychology and Psychiatry*, 45(1), 2-40.
- Washburn, E., Joshi, R., & Binks-Cantrell, E., (2010), Are preservice teachers prepared to teach struggling readers? *Annals of Dyslexia*, 61, 21–43.
- Washburn, E., Joshi, R., & Binks-Cantrell, E., (2011). Teacher knowledge of basic language concepts and dyslexia. *Dyslexia*, 17(2), 165-183.
- Washburn, E., Joshi, R.M., & Binks, E. (2014). What do preservice teachers from the US and UK know about dyslexia? *Dyslexia*, 20, 1-18.

Washburn, E. K., Binks-Cantrell, E. S., Joshi, R. M., Martin-Chang, S., Arrow, A.

(2016). Preservice teacher knowledge of basic language constructs in Canada, England, New Zealand, and the USA. *Annals of Dyslexia* 66, 7–26.

Winn, M. T. & Behizadeh, N. (2011). The right to be literate: Literacy, education, and the school-to-prison pipeline. *Review of Research in Education*, 35, 147-173.

## CONCLUSIONS

Equity in education means that students have equal access to quality instruction that leads to their academic and life success (Brookover & Lezotte, 1981). This includes equal access to learning to read which has a major impact on success in academics and life (Ritchie & Bates, 2013). In the past twenty years equity in education has moved into the realm of human rights and social justice. It has been theorized that the ability to read is a basic human right, not a privilege, in the United States (Greene, 2008; Lunsford et al., 1990). If learning to read is considered a civil right, then it stands to reason that the high rates of students graduating from high school who have not acquired proficient reading skills is a social and civil issue (NAEP, 2019). The overall theoretical framework that laid the foundation for this research was the belief in equity in education and ultimately in the belief that learning to read is a right for all children.

Research has shown that teacher knowledge and qualifications are highly correlated to student success (Rice, 2003; Rivkin et al., 2000; Wright et al., 1997), including in reading (Ferguson, 1991a). The results of the three studies discussed in this paper bring to light a continuing lack of complete knowledge of dyslexia, foundational skills in reading, and reading research required to teach students with dyslexia by K-3 teachers in North Dakota (Washburn et al., 2017; Worthy et al., 2016). In addition, administrators were found to have a similar lack of knowledge. K-3 general education, reading/Title 1, special education teachers, and administrators all had a high percentage of agreement of some form of truth to the myth that seeing letters backwards is a characteristic of dyslexia. There was also a high percentage of agreement that vision techniques, such as eye tracking exercises, colored overlays, and lenses would help students with dyslexia. This type of confusion could lead to schools spending time

and money on remediation techniques that do not work (Denton & Meindl, 2016; Vellutino et al., 2004).

Another important finding was that when asked where teachers and administrators received their knowledge of dyslexia, the highest response rate was for “my own research and reading”, then “professional development”, and only 17% of teachers and 11% of administrators said from “a teacher education program.” These responses clearly show that teachers are not receiving enough of the required knowledge for helping students with the most common reading disability, dyslexia from teacher education programs or professional development (Handler & Fierson, 2011).

Although most children with dyslexia are taught to read by general classroom teachers (Moats, 1999), in a Response to Intervention (RtI) model used in most schools in North Dakota, Reading/Title 1 teachers and special education teachers are also involved in reading remediation at the second level of RtI, and special education teachers would be responsible for reading remediation at level 3 of RtI. Previous research has shown what type of reading remediation works for students with dyslexia (IDA, 2018; Moats, 1998; Snow et al., 2015). This type of instruction is currently called Structured Literacy and includes explicit, direct, systematic instruction in language constructs. The results from this current research show that K-3 general education, elementary reading/Title 1, and special education teachers in North Dakota all lack strong skills in the structure of language and knowledge of reading research. In addition, when asked if general education teachers and special education teachers receive instruction about dyslexia, a majority of teachers and administrators indicated that they do not.

This research suggests that teacher education programs in North Dakota need to analyze their curriculum to be sure that they are providing K-3 general education, elementary

reading/Title 1, and special education teachers with a strong foundation in reading instruction needed by struggling readers. The International Reading Association (2003) found that recent graduates from programs that had a strong emphasis on reading instruction had students who showed greater growth in reading comprehension on standardized tests. The teachers taught like experienced teachers.

Although this research suggests changes to teacher education programs, it is important to remember that teachers do not learn everything they need to know in their undergraduate training program in order to be expert reading teachers. As Darling-Hammond & Bransford (2005) point out, teachers continue to learn and grow into expert teachers while teaching. Teachers also require continuous Professional Development on dyslexia and reading instruction in order to become expert teachers of reading, which has been called “rocket science” (Moats, 2020). This research showed a high degree of support from administrators for professional development on dyslexia. Districts and state level programs will need to be developed in order to ensure the success of students with dyslexia which is their right (Plaut, 2009).

## REFERENCES

- 108<sup>th</sup> Congress, (2004). *Public Law 108-446 [IDEA]*. <https://idea.ed.gov/part-c/downloads/IDEA-Statute.html>
- Allington, R. (2013). What really matters when working with struggling readers. *Reading Teacher, 66*(7), 520-530.
- Binks-Cantrell, E., Washburn, E., Joshi, R. & Hougen, M. (2012). Peter effect in the preparation of reading teachers. *Scientific Studies of Reading, 16*(6), 526-536.
- Brookover, W. B., Lezotte, L. (1981). Educational equity: A democratic principle at a Crossroads. *Urban Rev, 13*, 65–71.
- Every Student Succeeds Act [ESSA] (2015). <https://www.ed.gov/essa?src=rn>
- Ferguson, R. F. (1991a). Paying for public education: New evidence on how and why money matters. *Harvard Journal on Legislation, 28*(2), 465-498.
- Glasman, N. S. (1984). Student achievement and the school principal. *Educational Evaluation and Policy Analysis, 6*, 283-296.
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and special education, 7*, 6-10.
- Greene, S. (2008). Introduction. In S. Greene (Ed.), *Literacy as a civil right: Reclaiming social justice in literacy teaching and learning*. Peter Lang.
- Handler, S. M. & Fierson, W. M. (2020). Joint technical report: Learning disabilities, dyslexia, and vision. *Pediatrics, 127*(3), e819-e856.
- Horowitz-Kraus, T., Schmitz, R., Hutton, J. S., & Schumacher, J. (2017) How to create a successful reader? Milestones in reading development from birth to adolescence. *ACTA Paediatrica, 106*(4), 534-544.

Hussar, B. (2020). *The condition of education*. National Center for Education Statistics, U.S. Department of Education.

International Dyslexia Association (IDA) (2018). *Knowledge and practice standards for teachers of reading*. IDA.

International Reading Association (2003). *Prepared to make a difference: Research evidence on how some of America's best college programs prepare teachers of reading*. International Reading Association.

Keillor, Garrison (2005). Garrison Keillor on education, ideology and learning to read. *Be the Best You Can Be*. <https://bestyoucanbe.blogspot.com/2008/01/garrison-keillor-on-education-ideology.html>

Kilpatrick, D. A. (2015). *Essentials of assessing, preventing and overcoming reading difficulties*. Hoboken, NJ: John Wiley & Sons.

Lunsford, A., Moglen, H., & Slevin, J. (Eds.) (1990). *The right to literacy*. Modern Language Association of America.

Lyon, G. R. (1998). Learning to read: A call from research to action. *Center for Development and Learning*. [http://www.cdl.org/resource-library/articles/learning\\_to\\_read5.php?type=author&id=19](http://www.cdl.org/resource-library/articles/learning_to_read5.php?type=author&id=19)

Moats, L. (1999). *Basic facts about dyslexia part II: What every professional ought to know*. Baltimore: International Dyslexia Association.

Moats, L. (2009). Knowledge foundations for teaching reading and spelling. *Reading and Writing: An Interdisciplinary Journal*, 22, 379–399.

Moats, L. (2020). Teaching Reading is Rocket Science. *American Educator*, American Federation of Teachers.

National Association of Educational Progress [NAEP] (2019). The nation's report card: Reading.

<https://www.nationsreportcard.gov/reading/nation/scores/?grade=4>

National Reading Panel (2000). *Report of the National Reading Panel—Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. National Institute of Child Health and Development.

North Dakota 66<sup>th</sup> Legislative Assembly (2019). House Bill 1461.

<https://legiscan.com/ND/text/1461/id/2001753>

North Dakota 67<sup>th</sup> Legislative Assembly (2021). House Bill 1131. Retrieved from:

<https://www.legis.nd.gov/assembly/67-2021/documents/21-0051-01000.pdf>

Orton-Gillingham Academy (2018). *What is the Orton-Gillingham Approach?* Academy of Orton-Gillingham Practitioners and Educators.

<https://www.ortonacademy.org/resources/what-is-the-orton-gillingham-approach/>

Pennington, B. F., McGrath, L. M. & Peterson, R. L. (2019). *Diagnosing Learning Disorders: From Science to Practice*, 3<sup>rd</sup> edition. Guilford Press.

Piasta, S., Connor-McDonald, C., Fishman, B., & Morrison, F. (2009). Teacher's knowledge of literacy concepts, classroom practices, and student reading growth. *Scientific Studies of Reading*, 13, 224-248.

Plaut, S. (Ed.). (2009). *The right to literacy in secondary schools: Creating a culture of thinking*. Teachers College Press.

Rehabilitation Act, Section 504 (1973). <https://www2.ed.gov/about/offices/list/ocr/504faq.html>

Rice, J. (2003). *Teacher quality: Understanding the effects of teacher attributes*. Economic Policy Institute.

- Ritchie, S. J., & Bates, T. C. (2013). Enduring links from childhood mathematics and reading achievement to adult socioeconomic status. *Psychological Science, 24*(7), 1301-1308.
- Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2000). *Teachers, schools and academic achievement*. Working Paper. [www.utdallas.edu/research/greenctr/Papers](http://www.utdallas.edu/research/greenctr/Papers)
- Rossmiller, R. A. (1987). Achieving equity and effectiveness in schooling. *Journal of Education Finance, 12*(4), 561-577.
- Snow, C. E., Griffin, P., & Burns, M. S. (2015). *Knowledge to support the teaching of reading: Preparing teachers for a changing world*. Jossey Bass.
- Snyder, T. D. & Dillow, S. A. (2015). *Digest of education statistics*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Spear-Swerling, L. (2015). *The power of RTI and reading profiles: A blueprint for solving reading problems*. Baltimore, MD: Brookes Publishing.
- Torgesen, J. K. (1998). Catch them before they fall: Identification and assessment to prevent reading failure in young children. *American Educator, 22*, 32-39.
- Torgesen, J., Wagner, R., & Rashotte, C. (1994). Longitudinal Studies of Phonological Processing and Reading. *Journal of Educational Psychology, 2*, 276-86.
- Vellutino, F., Fletcher, J., Snowling, M. and Scanlon, D. (2004). Specific reading disability (dyslexia): What have we learned in the past four decades? *Journal of Child Psychology and Psychiatry, 45*(1), 2-40.
- Wadlington, E., & Wadlington, P., (2005). What educators really believe about dyslexia. *Reading Improvement, 42*(1), 16-33.
- Washburn, E., Joshi, R., & Binks-Cantrell, E., (2010), Are preservice teachers prepared to teach struggling readers? *Annals of Dyslexia, 61*, 21–43.

- Washburn, E., Joshi, R., & Binks-Cantrell, E., (2011). Teacher knowledge of basic language concepts and dyslexia. *Dyslexia, 17*(2), 165-183.
- Washburn, E., Binks-Cantrell, E. & Joshi, R. (2014) What do preservice teachers from the US and UK know about dyslexia? *Dyslexia, 20*, 1-18.
- Washburn, E., Mulcahy, C. & Musante, G. (2017). Novice teacher's knowledge of reading-related disabilities and dyslexia. *Learning Disabilities: A Contemporary Journal, 15*(2), 169-171.
- Worthy, J., DeJulio, S., Svrcek, N., Villarreal, D, Derbyshire, C., LeeKeenan, K., Wiebe, M. Lammert, C. Rubin, J., & Salmer, C. (2016). Teachers' understandings, perspectives, and experiences of dyslexia. *Literacy Research: Theory, Method and Practice, 65*(1), 436-453.
- Wright, S. P., Horn, S. P., & Sanders W. L. (1997) Teacher and classroom context effects on student achievement: Implications for teacher evaluation. *Journal of Personnel Evaluation in Education, 11*(1), 57-67.