

**ASSESSING TEACHERS' KNOWLEDGE AND CONFIDENCE OF SPELLING
INSTRUCTION**

by

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B.A. (Leadership), Trinity Western University, 2013

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

in

THE FACULTY OF GRADUATE AND POSTDOCTORAL STUDIES
(Special Education)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

April 2019

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Assessing Teachers' Knowledge and Confidence of Spelling Instruction

submitted by Penny Hill in partial fulfillment of the requirements for

the degree of Master of Arts

in Special Education

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Abstract

Nearly one out of five children in the classroom may need special help to attain satisfactory levels of literacy. Research findings indicate that teachers are not sufficiently trained to support students who struggle with reading and reading-related disorders such as dyslexia. From a sample of British Columbia teachers (n = 63) this study sought to measure teachers' knowledge of basic language concepts, teachers' knowledge and understanding of the nature of reading difficulties and teachers' confidence in their ability to remediate reading-related difficulties. The results indicate that teachers' understanding of reading-related difficulties such as dyslexia, and their knowledge and skill of basic language concepts such as phonology, orthography and morphology is limited and highly variable. Teachers' knowledge of basic language concepts were similar to previous research whereby teachers performed better on items in which implicit knowledge could be applied to correctly identify a multiple choice answer. Over half (52%) of the teachers believe that the English spelling system is unpredictable. The mean score for spelling tasks which required demonstration of explicit knowledge of the spelling rule when adding a suffix to a word with a silent e; recognizing a word's origin; when ck is used; what letters signal a soft c; all of the ways to spell "long o"; and the ways to spell the consonant "f" was 1 with a range of 0 - 4 out of 6. Only 14% of educators stated that they felt prepared to teach children with learning disabilities. Correlation analyses (Pearson) were computed to assess the relationship between perceived ability and skill. 71% of teachers' self-report of confidence to analyze students' spelling errors to inform instruction was minimal to moderate. 86% of teachers' self-report of confidence to use assessment to inform instruction was minimal to moderate. Overall, findings suggest that teachers lack the confidence and skills for teacher directed instruction necessary to give at-risk students the foundation they need to learn to read.

Lay Summary

The goals of this research are: 1) to understand how teachers may be better prepared to meet the learning needs of children who experience difficulty learning to read, and 2) to contribute a Canadian perspective to the research on reading and writing. Nearly one out of five children in the classroom may need special help to attain satisfactory levels of literacy, therefore knowledge of the factors that promote and impede reading acquisition is essential for teachers. Research provides evidence that by making changes in instructional methodologies reading and spelling performance of students at risk for literacy difficulties can improve and in fact accelerate the reading growth of all students (e.g., Berninger & Swanson, 2013; Joshi, Treiman, Carreker, Moats, 2009b; Weiser & Mathes, 2011). I argue that explicit and systematic spelling instruction is the missing link in many reading initiatives.

Preface

This thesis is written to understand the role of the teacher in students' literacy acquisition. I have been emboldened to write it because I notice that I am not the only teacher licensed to teach without learning anything meaningful about the struggle that some children have reaching basic literacy. In addition, research tells us that one out of five children will struggle to read and to write. In a typical classroom of twenty to twenty-five students four to five students will struggle with learning to read. As a primary teacher, this was indeed my experience. In my beginning years of teaching the question of why some of my students had difficulty with language, despite strengths in other cognitive domains, was a mystery and the realization that I did not know how to help these students troubled me deeply. I will never forget the look on seven-year-old Brent's face when I admonished the class for loudly correcting his backward letters. "Mrs. Shepherd-Hill, Mrs. Shepherd-Hill" shouted my students. "Brent wrote his b backward." "I see that boys and girls," I replied. "We need to be gracious. Brent *sees* his letters backward," I stated. My ignorance haunts me to this day. As long as such myths prevail, they reinforce misunderstandings that can have devastating effect.

Although individual journeys for people with language based learning disorders, such as dyslexia, are always incredibly different, experiences from education always have deep and long-lasting impacts. As the principal now of a small independent school designated by the BC Ministry of Education as a *Special Education School*, I listen, too frequently, to stories of what I call school based trauma. Students with dyslexia and others with language based learning disorders are often misunderstood, participate in failed interventions and experience undue and agonizing failure. Slowly but surely their self-worth erodes. The lucky ones receive social-

emotional support and instructional approaches and educational programs designed to address their areas of weakness. Many do not.

In as much as this thesis is written for those that experience school based trauma it is written for my colleagues who thirst for the knowledge and evidence-based methodologies in order to differentiate instruction for all of their students. It is my hope that my contribution to the robust research on reading and writing will help people restructure their views of reality to see beyond the superficial conditions and events into the underlying causes of the problems — and therefore see new possibilities for shaping the future. Toward this end, sixty-three teachers from the lower Fraser valley completed a questionnaire and survey, which included items from existing measures as well as newly added items. Teachers were asked to rate their own ability across 11 teaching areas related to basic language constructs, reading and literacy, including developing phonemic awareness, phonological awareness, word recognition and spelling as well as their ability to teach children with diverse learning profiles. This self-assessment required respondents to rate their ability as either, *minimal, moderate, good, very good or expert*. Similarly teachers were asked to respond, using a Likert-type scale indicating whether they *strongly agree, agree, were undecided, disagree or strongly disagree*, to twelve statements regarding their views and beliefs about reading and reading-related disorders. Statements included *The English spelling system is unpredictable*, and *Exercises that rehearse coordination of perceptual-motor skills can improve literacy skills*. The results of this study replicate findings of earlier studies (e.g., Stark et al., 2015). For example, there was near consensus amongst the sample regarding teacher preparation, with 95% of respondents disagreeing or strongly disagreeing with the statement *Most teachers receive intensive training to work with children with reading difficulties*. The remaining 5% were undecided. The results of this study provide

additional insight with regard to teachers' confidence and preparation, which are both factors worthy of consideration if the dignity of both teacher and student is to be honoured.

This thesis is an original intellectual product of the author, P. Hill. The fieldwork reported in Chapters 2 – 4 was covered by UBC BREB Number: H16-00879.

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List of Abbreviations

APA American Psychiatric Association

DSM V Diagnostic and Statistical Manual of Mental Disorders V

ERIC Educational Resource Information Center

IDA International Dyslexia Association

NCLD National Center for Learning Disabilities

NICHHD National Institute of Child and Human Development

PST Preservice Teachers

RTI Response to Intervention

SLD Specific Learning Disorder

SVR Simple View of Reading

SWI Structured Word Inquiry

Glossary

alphabetic principle – the insight that there is a direct connection between sounds of spoken language and the letters in the written words

basic language concepts – includes phonemic awareness, phonological awareness, alphabetic principle/phonics, orthography, and morphology

decoding – the ability to translate a word from print to speech

digraph – two letters that come together to make one sound

diphthong – the vowels that glide together and feel as though they have two parts (e.g., the <ou> in house)

encoding – the ability to translate speech to print

graphemes – a letter or letter combination that spells a single phoneme

irregular words – words that do not display the regular or consistent phonic patterns and would not be pronounced correctly using a traditional letter-sound conversion process (e.g., *what, some, put*)

morpheme – the smallest unit of meaning in a word (e.g., cats has two morphemes: cat = meaning small domesticated animal; s = more than one).

morphological awareness – the knowledge of and ability to use the structure of words in the process of both decoding and encoding. **Metamorphological awareness** is the ability to talk about one's morphological awareness (e.g., ability to explain base word, word root, prefix, suffix and syllable).

multilinguistic spelling – the inclusion of multiple domains of linguistic knowledge to correctly spell words (e.g., phonological knowledge, orthographical knowledge, morphological knowledge, and semantic knowledge).

orthography – the patterns and principles by which spoken language is correctly represented in writing.

phoneme – a speech sound that combines with others in a language system to make words.

phonemic awareness – the conscious awareness that words are made up of segments of speech and the ability to hear and manipulate sounds/phonemes in words.

phonics – the instructional practice of teaching how written letters map to sounds or phonemes and systematic rules about connecting letters to sounds.

phonological awareness – the ability to think about spoken words, and the ability to think and talk about the syllables, rhymes, individual speech sounds and syllabic stress of words in spoken language.

struggling reader – readers who experience unexpected reading difficulty resulting primarily in inaccurate and/or slow word reading

Acknowledgements

My dream is for every teacher to have the knowledge and necessary skills to help all of their students reach their full potential, including those that struggle to read and write due to dyslexia. I am not alone. I stand on the shoulders of fearless advocates for those that are marginalized in the classroom and in society. In particular, I am deeply grateful and honored to work along side Dr. Linda Siegel. Linda, I would not be where I am today fighting for change and advocating for “our” kids, if you hadn’t first encouraged me—*thank you*.

I would be remiss not to express my gratitude to Dr. Louisa Cook Moats for granting me permission to use her *Comprehensive Survey of Language Knowledge* for this study. Thank you, Dr. Moats.

I am grateful to Dr. Nikki Sheerer for her time discussing the results of the research. Thank you, Nikki for your guidance. A special thank you to Dr. Barbara Weber and Dr. Sterett Mercer who graciously agreed to assume responsibility for the examining committee.

I am indebted to the myriad teachers that shared personal stories of their struggle to unlock the alphabetic code for their struggling readers and enlarged my vision. To the teachers who took the time to complete the questionnaire I offer enduring gratitude for your participation.

I thank my heavenly father for His guidance and provision. When I look back on my life and think about where I am and what I am doing I am so very thankful for His light upon my path. My courage comes from knowing I am not alone. It is my God that makes my crooked paths

straight. It is the joy in serving my God that propels me forward. The great Bengali poet Tagore (as cited by Lamott, 2012) describes this joy best, 'I slept and dreamt that life was joy./ I awoke and saw that life was service./ I acted and behold, service was joy' (p. 23).

Last but not least I thank my family for their tireless encouragement. And I thank my dear husband, Andrew Hill, who has cooked more than his share of dinners, washed more than his share of dishes and provided immeasurable support.

Dedication

To all of the kiddos who struggle with language and their dear teachers with insufficient professional training to support them effectively, this thesis is written for you.

Chapter 1: Introduction

There are myriad factors related to literacy outcomes. The ability to identify words (i.e., to recognize words instantaneously and automatically) and the ability to spell (i.e., to map spoken language to written words properly) are critical skills for students to master. These skills are essential for school and for life success. Although most students learn to identify words and to spell well enough to be successful in school, some students with comparable cognitive ability never attain functional mastery of these skills. In spite of the fact that many kinds of knowledge are required for capable reading instruction, the focus of this investigation is on why some children struggle with learning to read and teachers' capacities to identify students at risk of reading failure and their ability to differentiate instruction for the dyslexic learner.

Given that specific learning disorder (SLD) affects 5% - 15% of school-age children (APA, 2013), research in this area is important to assist in the process of diagnosis, remediation, and prevention. Although it is important to acknowledge that students struggle in learning to read for many reasons, including lack of motivation and interest, home environment, weak English language skills, or low general intellectual ability, these factors as well as family and socio-cultural conditions associated with poverty that contribute to a broader array of reading difficulties in school-age children, are not the focus of this thesis. Rather, the focus of this thesis is on language-based reading difficulties that stem from neurodevelopmental disorders and the role of the teacher in ameliorating the effects of reading related problems.

My spiral of inquiry began with reflection on why, every year, a handful of my students struggled to read and write while others did not. Most troubling was my own ineffectiveness.

Mrs. Shepherd-Hill: I am one of the world's largest birds and weigh as much as a small woman. I cannot fly. Instead, my strong legs and feet make me a speedy runner. Each of my feet has three toes. The two inside toes are tipped with long claws that I can use as weapons. Who am I?

Jaylee: *Sausage*
(Pseudonym)

This vignette is taken from my own teaching experience. To one teacher Jaylee's answer may be dismissed as simply odd. To another teacher Jaylee's answer may become meaningful diagnostic information or classroom based assessment. This type of information may be data of vital importance. The difference between the knowledge these teachers possess of specific learning disorders may be of critical importance for Jaylee. She has dyslexia. She didn't mean *sausage*. She meant ostrich. Correctly identifying her answer as a symptom of dyslexia rather than simply an odd answer may be pivotal to her academic success. Students, like Jaylee, clearly at risk of academic failure because of reading and language processing weaknesses, unless those weaknesses are recognized early and treated skillfully, not only require but also deserve the competence and expertise of teachers provided with training that emphasizes the study of reading development, language, and individual differences. However, researchers have found that preservice teachers and in-service teachers generally have neither the knowledge to identify the key problems encountered by students with dyslexia nor the skills to provide research-based remediation (Al Otaiba, Lake, Scarborough, Allor & Carreker, 2016; Gillis, M. B. & McCombes-Tolis, J., 2016; Hubbell V, 2012; Morrison & Hessler, 2016b; Washburn, Mulcahy, Joshi, & Binks-Cantrell, 2016; Shaywitz, 2003).

Training that includes opportunities for teachers to develop capacities to understand the key problems faced by struggling readers and spellers equips teachers to skillfully prevent most reading problems. According to Lesaux & Siegel (2003) many reading difficulties are preventable. Indeed, Moats (2010) asserts that most reading problems can be greatly ameliorated through appropriate instruction. However, learning to spell and read words is not a rote process of memorizing letter strings of increasing length. It is a process that requires phonemic awareness, phonological awareness, orthographic awareness and morphological awareness. Typically, children who read and spell poorly find learning to associate letters and sounds to be very difficult. Thus, effective intervention for students at risk of reading failure demands teachers have knowledge of both reading-related disorders as well as considerable expertise in reading and spelling instruction. The development of spelling is inextricably linked to reading development. Nevertheless, it is the hypothesis of the author that teachers are licensed with little understanding of dyslexia or the breadth of knowledge required to ameliorate its effects. Thus, the primary question in this study is: Are teachers licensed with insufficient professional training to effectively support students who struggle with reading-related disorders, such as dyslexia? The goal of this thesis is to obtain and elucidate research about the teacher's critical role in relation to students' reading development. In general terms it is primarily concerned with developing a greater understanding of the barriers that suppress the development of children at risk of reading difficulties.

This thesis incorporates measures that not only provide an extension to the research on teachers' ability and confidence to meet the needs of students who are at risk for reading failure but also answers the call to consider the benefits of linking encoding instruction with decoding instruction (Weiser & Mathes, 2011). Outside of the United States, the United Kingdom, and

Australia, much less research has been conducted in this area. Chapter 1 contains an introduction. Chapter 2 presents the rationale and guiding questions, the purpose of the study, definitions of terms, and a review of relevant research related to this study. Chapter 3 provides reflections and discussion of the literature review. Chapter 4 describes the research including procedures used in the data collection process, and the assumptions and rationale for the design. Chapter 5 details the analysis of the results. Chapter 6 provides a discussion of results and the conclusion is found in Chapter 7, which includes educational implications and recommendations for further research.

Chapter 2: Literature Review

2.1 Rationale and Guiding Questions

Most students learn to read and spell with relative ease. Others persistently struggle. Why? It might easily be assumed that reading disorders are intrinsic to the child because the majority of students respond to current educational practices and seem to learn with apparent ease; that is, a student's struggle may not be the result of instruction but rather be neurological in nature.

Despite its origin, research provides evidence to show that by making changes in instructional methodologies reading and spelling performance of students at risk for literacy difficulties can improve and in fact accelerate the reading growth of all students (e.g., Berninger & Swanson, 2013; Weiser & Mathes, 2011).

There is little doubt that teachers play an essential role in helping children to acquire the reading and writing skills needed to succeed in school and in life. Because much of the focus of primary education is on the acquisition of literacy, competency in literacy instruction should be imperative for teachers, especially for primary teachers. In the words of Joshi and Quatroche (2008), "teaching, particularly teaching of literacy skills to children, requires a high level of expertise that comes from professional training" (p. ix). School districts are fully aware of the impact reading has on students. Millions of dollars are spent every year on general educational and special educational reading remediation. In fact, in 2012 the BC Ministry of Education dedicated \$10.7 million in increased funding to support early reading in every district. However, as we can see in the Ministry's discussion paper, *A New Focus on Reading*, the cost of assuming teachers have the ability to teach literacy skillfully without explicit professional training is too high; "The 2012 Foundational Skills Assessment data tells us that provincially only 70 per cent of Grade 4 students and 64 per cent of Grade 7 students are meeting or exceeding expectations in

reading” (Ministry of Education, 2013). Toward this end, the questions that guide this literature review are: (1) What are the key problems encountered by students who have difficulty reading and spelling? (2) If methodology matters, then what methodologies are needed to improve literacy skills and differentiate instruction for those students at risk of a reading disorder? (3) Are teachers prepared to assess and evaluate children’s progress in reading acquisition and differentiate instruction for those students at risk of a reading disorder? And, (4) What are the central theories that have been used to describe the gap across dyslexia research and teacher preparation?

Through much collaboration it is clear that there is a gap in the professional development programs and teachers are not receiving adequate training to meet the needs of students with reading difficulties. My perception of teachers is that they are extraordinarily skilled at managing the learning process, and effective for most learners, yet less effective, through no fault of their own, teaching those students who struggle with a language-based learning disorder. Many children with dyslexia are not being provided adequate diagnostic and instructional services at school, and their parents are turning to the private sector for such services (e.g., Berninger, 2001). The goal of this review is not to place blame but rather to examine the gap between the research and current practices of teaching reading and spelling. To bridge this gap it is helpful to first define dyslexia as it is conceptualized in this study, then look at the theoretical underpinnings of approaches to reading and spelling. Thirdly, it is not only helpful to examine which practices are more strongly supported by research than others but also to investigate teachers’ capacity to alleviate or reduce the severity and consequences of reading failure (Berninger et al., 2004; Moats, 2009b).

2.2 Data Collection

The purpose of this literature review is to investigate the claim that the role of the teacher in relation to students' successful reading acquisition is critical to the goal of helping to advance the knowledge and skills required to meet the educational needs of children who struggle to read and spell. The data collection process for this review began with an initial electronic search using the Educational Resource Information Center (ERIC) and the key word "dyslexia" which yielded 3,085 items, clearly too large a set to screen. The process was refined by combining the key word "dyslexia" AND "spelling" AND "special education," funneling it down to 217 items. Titles were skimmed and then abstracts were read if they pertained to the nature of reading and spelling disability and/or direct, explicit encoding instruction for reading remediation. Similarly, full text articles that did not offer direct evidence of the importance for teachers to know and understand how to differentiate instruction in basic reading skill were culled. This search was followed by a similar search of the database PsycINFO, the Internet, and the online listserv, "SpellTalk" (<https://buildingrti.utexas.org/links-websites/spelltalk-online-listserv>). A hand search was also conducted in which the reference lists were reviewed in relevant articles and research. Additionally, articles recommended by my supervisor were examined. A pivotal set of relevant articles was obtained by the following inclusion criteria: (a) item was published in a peer reviewed journal, (b) item contained information about essential knowledge teachers need in order to differentiate instruction in basic reading skill, (c) item reported information on empirical evidence of effective instructional methodologies for dyslexic learners, and (d) item reported information on theoretical links underpinning particular approaches to teach reading and spelling.

2.3 Dyslexia Defined

Discovered over a century ago, dyslexia is neither a new problem nor a new concern. For many years, dyslexia was conceptualized as a specific reading difficulty affecting children for whom reading achievement was below that expected on the basis of a child's age and intelligence quotient (IQ) (e.g., Berninger, 2001; Snowling, 2013). This 'yardstick for potential' was questioned by experts in the field and prompted researchers and educators to search for alternative diagnostic methods (e.g., Berninger, 2001; Siegel, 1989). Many studies confirm the irrelevancy of IQ to the definition of learning disabilities (e.g., Berninger, 2001; Siegel, 1989; Shaywitz, Morris & Shaywitz, 2008; Torgesen, 2000). For example, Torgesen (2000) concludes from his review of intervention studies that weaknesses in phonological processing skills characterize children with a variety of IQ levels. Moreover, Shaywitz et al., (2008) argue, "It is not valid to assume that discrepant children require instructional strategies that differ from those for low-achieving readers. It also is not valid to deny the education services available for disabled or at risk readers to low-achieving, nondiscrepant children" (p. 454). Accordingly, the 'discrepancy definition' of dyslexia has fallen from use (e.g., Berninger, 2001; Moats, 2017; Siegel, 1989; Snowling 2013). Researchers throughout the world in the fields of medicine, neuroscience, psychology, and education have made significant contributions to our understanding of the nature of dyslexia. For example, modern neuroscience, through advancements such as functional magnetic resonance imaging (fMRI), is providing an increasingly clearer picture of the contribution of phonological, orthographical, and morphological mappings to reading and its disorders (e.g., Finn, Shen, Holahan, Scheinost, Lacadie, Papademetris, Shaywitz, Shaywitz & Constable, 2014). It is through fMRIs that we have the neural signature that characterizes dyslexia: a 'disruption' or weakness, not a break in

the language circuitry (e.g., Berninger, 2001; Richards, Aylward, Berninger, Field, Grimme, Richards & Nagy 2006; Shaywitz & Shaywitz, 2013).

Although definitions of dyslexia continue to be debated, “the core concept of dyslexia as an unexpected difficulty in reading has remained invariant over the century since its first description and is found in all languages including both alphabetic and logographic scripts” (Shaywitz et al., 2008). In the United States, United Kingdom and Australia, dyslexia is the term that is increasingly used by governments, policy makers, schools and parents to describe individuals with severe reading problems (e.g., Moats, 2009b; Rose 2009; Serry & Hammond, 2015; Torgesen, 2000). Therefore an understanding of what is currently understood by this label is critical. Indeed, students whose persistent struggle with learning to read and spell that cannot otherwise be explained, in that other aspects of development seem to be fine, often meet the criteria of SLD. A Specific Learning Disorder (SLD) is “a biologically based neurodevelopmental disorder that affects a person’s ability to take in, process and/or communicate information” (*Diagnostic and Statistical Manual of Mental Disorders*, Specific Learning Disorder, 2013). An estimated 5 to 15 percent of school based children experience specific learning disorders. Reading disorder (dyslexia) is the most common. An estimated 70 to 80 per cent of those with learning disabilities have a reading disorder (American Psychiatric Association, 2018). Although no longer a diagnostic code in the most recent version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM V), dyslexia is described under the umbrella *Specific Learning Disorder* (Serry & Hammond, 2013). *Dyslexia* is an alternate term, or subtype, used to refer to a pattern of learning difficulties characterized by problems with accurate or fluent word recognition, poor decoding and poor spelling abilities (DSM V).

For purposes of this thesis the definition considered is the professional definition born out of the Definition Consensus Project led by the International Dyslexia Association (IDA) in partnership with the American-based National Center for Learning Disabilities (NCLD), and the National Institute of Child and Human Development (NICHD) (IDA, 2016):

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.

Recent changes in legislation in many countries provide evidence that the term dyslexia is increasingly being used and gaining awareness (e.g., Rose 2009; Serry & Hammond, 2015; Torgesen, 2000). In the US, for example, “28 states have dyslexia laws, related to, among other areas, provision of interventions and accommodations, pilot programs for screening and interventions, and rights for individuals with dyslexia” (p. 50, Youman & Mather, 2015, as cited in Hessler & Morrison, 2016). Similarly, Rose (2009) and Serry and Hammond (2015) have written about the increased dyslexia awareness that has generated positive change in Britain and Australia respectively. I use the term dyslexia as a way of joining a cross-disciplinary conversation.

Serry and Hammond (2015) conducted a study to examine the knowledge about, and the use of, the term dyslexia. Professionals in Australia who were qualified members of one or more

key state or national professional and special interest groups associated with learning difficulty—the nation’s reading experts—were asked to participate in an online survey based on a current definition of, and evidence about, dyslexia. A total of 176 participants participated in the study. Participants’ experiences and views about dyslexia emphasize “the importance of an agreed conceptualization and a shared language about reading difficulties, and in particular dyslexia” (p. 157). For example, although participants stated that the term *dyslexia* was used *a lot* (66%) or *a little* (21%), close to 75% of participants’ preferred an alternative term, such as *learning difficulty* or *language processing* being included alongside *learning difficulty* as opposed to options such as *disorder*, *deficit* or *impairment*. Most commonly, participants made reference to issues with *learning*.

Parents and teachers hunger for practical counsel about how to help their children and students. The term dyslexia connotes a condition requiring specialized instruction. When children and parents are trying to cope with symptoms of dyslexia, discovering there is a name for these problems, that they are not alone, and that a great deal is known about the condition can bring tremendous relief and hope for the future. Although dyslexia is a life-long proposition and does not go away (e.g., Shaywitz et al., 2007), it responds well to appropriate teaching. What is more important is that it is recognized early.

Early identification is critical. Earlier identification should allow interventions to be implemented before a downward spiral of underachievement, lowered self-esteem, and poor motivation sets in (e.g., Berninger, Vaughan, Abbott, Brooks, Abbott, Rogan, Reed, & Graham, 1998; Lesaux, Vukovic, Hertzman & Siegel, 2008; Snowling, 2013). Moreover, evidence suggests that the risk of reading and writing difficulties are apparent early in development (Snowling, 2013), and while there are screening tools that have potential to identify children who

go on to have literacy difficulties, Snowling cautions, “no screening tool is perfect” (p. 8). In fact, no single data source is sufficient for diagnosis of a learning disability (e.g., Berninger 2015; Snowling, 2013). Thus, teachers play a key role in comprehensive assessment and intervention, as well as prevention (Rose, 2009).

A more dynamic assessment approach is ‘response to intervention’ (RTI), which is an administrative framework for organizing the resources of a school to provide appropriate instruction to all students. When RTI is implemented with high fidelity it is possible to reduce the incidence of reading failure (Mellard, 2017); however, the framework alone does not ensure that evidence-based methods – consistent with current reading science –are used by all teachers (Moats, 2017). Further, Torgesen (2000) astutely notes, “to the extent that we allow children to fall seriously behind at any point during early elementary school, we are moving to a “remedial” rather than a “preventive” model of intervention”(p. 58). Herein lies the urgency to ensure teachers possess a thorough knowledge of the foundations of literacy and reading acquisition, have mastery over the application of this knowledge in instruction, and be competent in assessing and evaluating children’s progress in literacy acquisition (Moats, 2003; Moats, 2009a; Moats, 2009b; Siegel, 2016; Washburn et al., 2011; Washburn, 2016). As teachers are well positioned to identify early a child who is progressing more slowly than his or her peers, classroom based assessments can be vital contributions toward identifying students’ specific weaknesses. However, assessment, intervention, and prevention require an understanding of not only a sound theory of the causes of a particular form of learning difficulty, but also an understanding of how a given skill is learned by typically developing children (Snowling & Hulme 2012). Yet, research indicates many teachers have misconceptions about the nature of dyslexia (Serry & Hammond 2015; Washburn, Joshi & Binks-Cantrell, 2011) and lack essential

knowledge needed to teach struggling readers, particularly children with dyslexia (Moats & Foorman, 2003; Moats, 2009a; Serry & Hammond, 2015; Spear-Swerling & Brucker, 2005; Washburn, Binks-Cantrell, Joshi, Martin-Chang, Arrow, 2015; Washburn, Joshi, Binks-Cantrell, 2011). The results from the Serry and Hammond (2015) study indicated, a total of 54% of participants said that they had not been taught about dyslexia during their training *at all* (35%) or *not much* (19%). Similarly, Moats (2009b) extends these findings and asserts that teachers, by self-report, rarely have had sufficient coursework on language structure, the principles of reading development, and pedagogy to differentiate instruction for diverse learners.

Nevertheless, no single method successfully helps all students (e.g., Shaywitz et al., 2008; Torgesen, 2000). Because children are unique beings with individual ability and capability, and because dyslexia exists on a continuum with varying degrees of severity (mild to moderate to severe), there is variation in children's response to treatment. In fact, there is a percentage that does not respond to treatments that are shown to be effective in their peers (e.g., Shaywitz et al., 2008; Torgesen, 2000). Such children are defined as nonresponders or treatment resisters. Torgesen (2000) reviewed a number of prevention studies and concludes – if explicit instruction and practise in acquiring phonological awareness and phonemic decoding skills is applied broadly – then the proportion of the population who can be identified as resistant to the best current methods would leave anywhere from 2% to 6% of children with inadequate word reading skills in grades 1 and 2. Worthy of note is that Torgesen defines treatment resisters as those that are below the 30th percentile. Equally important is that this estimate is immeasurably better than the 30%-36% failure rate reported in the aforementioned B.C. Ministry's discussion paper (Ministry of Education, 2013).

2.4 Theories of Reading and Reading Disability

There is general consensus that the purpose of reading is to understand what one reads, and the Simple View of Reading (SVR) acknowledges that while reading is a complex activity reading comprehension is the product of two inter-dependent processes: word recognition processes and language comprehension processes: $\text{Word recognition} \times \text{Language comprehension} = \text{Reading comprehension}$ (Kilpatrick, 2015). Accordingly, and for pedagogical purposes, the SVR provides a framework to understand the relative contributions of both word recognition/decoding (WR) and language comprehension (LC) for reading comprehension RC. That is, $1 \times 1 = 1$ ($\text{WR} \times \text{LC} = \text{RC}$); $1 \times 0 = 0$ ($\text{WR} \times 0 = 0$); $0 \times 1 = 0$ ($0 \times \text{LC} = 0$). Clear differentiation between these dimensions may therefore provide a conceptual framework to guide reading instruction and/or determine the course of intervention. In other words, understanding that children can experience various degrees of ease or difficulty in either word recognition or language comprehension or both is helpful for pinpointing the sources of reading difficulties and providing targeted intervention and/or effective instruction. It is also important to distinguish the difference between the SVR theory and theories of skilled reading that describe the “fluent reading of familiar words as proceeding directly from print to meaning, and without the requirement for alphabetic decoding” (Castles, Rastle & Nation, 2018). Nevertheless, reducing the proportion of the population at risk for literacy learning requires close examination of the theories that support the various approaches to teach reading. The Reading Wars refers to an ongoing philosophical debate that has gone on for decades about the best approach for teaching reading. Even though there is a strong scientific consensus on the crucial and unique role of phonological awareness in reading development and reading disorders (e.g., Castles et al., 2018; Ehri, 2005; Moats, 2009a, 2009b; Siegel et al., 2013; Snowling, 2013; Torgesen, 2000) debate and resistance to using

methods based on scientific evidence persists (Moats, 2009a; for reviews see Rose, 2006; Weiser et al., 2011).

One school of thought advocates for the meaning-based approach under the names of the “look-say” or whole-word, and whole language methods. Research indicates that embedded in whole language philosophy and methodology to teach reading is the belief that children should learn to read as naturally as they learn to speak (e.g., Aaron et al., 2008; McLaughlin, Weber & Mark Derby, 2013; Moats, 2000; Siegel et al., 2013). Accordingly, the decomposition of words into sounds and mapping sounds to letters is pointless. In fact, Smith, one whole language apologist asserted, “that letter-sound correspondences were “jabberwocky” to be avoided; and that skill development was largely boring, repetitive, nonsensical, and unrelated to developing *real* readers” (Moats, 2000, p. 12). By employing this approach, students are expected to learn how to spell words correctly through exposure to written text. Spelling, like reading, is meant to happen naturally without any formal instruction (Moats, 2000). And although some students readily abstract rules and categories of language, many other children learn hopelessness, passiveness, and avoidance and consider, and at times complete, suicide (Livingston, Siegel & Ribary, 2018; McBride & Siegel 1997). “Some people there are who, being grown, forget the horrible task of learning to read. It is perhaps the greatest effort that the human undertakes and he must do it as a child” (Steinback, 1976). As opposed to spoken language, written language is acquired and must be directly taught.

The code-focused approach to reading emphasizes the sounds of language. Children are taught to transform letters into sounds and then blend (synthesize) the sounds together to form a pronounceable word. The focus is on the structure and form of language. Children work on

words, and words are systematically analyzed or pulled apart. In the words of Aaron et al., (2008),

During America's Colonial days, schools considered spelling an integral part of reading and therefore gave much attention to spelling. During the 20th century, an attitude of indifference came to prevail and spelling instruction was neglected...Recently however, there has been a resurgence of interest in the cognitive processes that underlie spelling and their development. (p. 130)

This resurgence of interest in the cognitive processes that underlie spelling has stimulated much research with evidence that demonstrates the efficacy of explicit and systematic instruction. In fact, The National Reading Panel (2000) found that children who are taught phonics systematically and explicitly make greater progress in reading than those taught without systematic and explicit instruction.

Learning to read and learning to spell are two sides of the same coin (Ehri, 2005). Encoding (going from sound to letter) strongly reinforces decoding (going from letter to sound), and replicated data shows that, explicit and systematic instruction in spelling helps children break the reading code (Lesaux et al., 2008; Moats, 2010; Shaywitz, 2003). However, you cannot teach what you do not know. In fact, in the classroom, spelling is the most tested subject yet least taught. Adoniou, Senior Lecturer in Language at the University of Canberra, posits, "if spelling words are simply strings of letters to be learnt by heart with no meaning attached and no investigation of how those words are constructed, then we are simply assigning our children a task equivalent to learning ten random seven digit PINs each week" (Adoniou, 2013). Again, contrary to the view of spelling as a rote memorization skill, spelling is a complex act that requires active consideration of the sounds, patterns, and meaning of written language

(Masterson & Apel, 2000; Moats, 2000). Still, there is much debate on how best to teach spelling, and possibly, the benefits of explicit and systematic instruction in spelling are undervalued.

Pullen and Lane (2014) conducted a study to empirically examine the effect of manipulative letter use on decoding skills of grade one students struggling in learning to read. Teachers who worked regularly with the students were instructed to provide a four-step lesson that included alphabetic word work with manipulative letters, with the students in small groups of three students for 7 to 10 weeks. In Step 1 the teacher introduced a book with the focus on the pictures, not on the text. During Step 2 the students read the book together. During Step 3 students used manipulative letters to form focus words using magnetic letters and then manipulated the letters to form new words (e.g., changing pig to dig and wig; changing web to wed; changing fun to fan and fin). In Step 4 students applied their skills in a rereading of the text. Comparatively, students in the comparison group did not receive the decontextualized decoding practise. Rather, teachers provided embedded practise decoding words as needed during book reading. The control condition served as a ‘business-as-usual’ and received no supplemental instruction. Pullen and Lane found the treatment group performed at a significantly higher level than students in the control and comparison groups on the decoding measure at posttest. For example, effect sizes for nonword decoding in the Treatment vs. Control was $d = 0.70$; in the Treatment vs. Comparison, $d = 0.65$; and in the Comparison vs. Control, $d = 0.08$. The authors provide evidence that, “the manipulation of letters serves as a way to make the abstract concepts of blending and segmentation of sounds more concrete”(p. 14), and validate manipulative letter use as an effective strategy for developing word reading skills for struggling readers in grade 1.

In a study designed to improve the spelling and word reading of Hebrew speaking kindergartners with specific language impairment, Schiff, Ben-Shushan & Ben-Artzi (2015) proposed remediation based on adding metacognitive strategies to metalinguistic teaching – phonological awareness, alphabet knowledge, and letter-sound matching – of spelling. The metacognitive strategies included defining and planning the course of action and monitoring and evaluating the process as well as the product. The results of the study showed significant gains from pretest to posttest not only of kindergartners' letter naming, letter sounding, and spelling, but also in word reading.

Berninger et al., (1998) evaluated the most effective way to create connections between spoken and written words in an instructional intervention with poor spellers in Grade 2. The 128 children in the sample received 24 20-minute instructional sessions. Treatment groups received explicit training in explicit phonological-orthographic connections whereas the control treatment trained phonological and orthographic awareness without explicit training in making connections between sounds and letters. The authors found significant gains across time, but only for taught words. However, one treatment – explicit training in the alphabet principle, followed by explicit training in whole word and onset-rime connections – led to greater transfer of the alphabet principle to untrained monosyllabic words. From those results, Berninger et al., conclude that explicit training for codes does as well as explicit training for connections. That is, Berninger et al., deem that training in both explicit phonological and orthographic awareness and explicit phonological-orthographic connections should be taught to achieve transfer to untrained words. The results indicate that spelling achievement was raised about one third of a standard deviation by 24 20-minute sessions. Thus, the authors suggest that stronger gains may result from longer and more intensive intervention. Noteworthy is that training in spelling resulted in improved

length of compositions. Berninger et al., conclude that teaching writing well to beginning writers should include explicit instruction in spelling, as a tool, for written expression of higher order thinking and for making meaning.

Conrad (2008) also reported that repeated practice spelling of words with shared orthographic rime units led to greater transfer of the alphabetic principle to spelling and reading unfamiliar words. However, transfer from spelling to reading was greater than transfer from reading to spelling. Conrad examined the reciprocal benefits between reading and spelling in a group of typically developing Grade 2 readers. Although transfer was found both from reading to spelling and from spelling to reading, the amount of transfer was not equal. “At the end of the practice phase, spellers were equally able to read or spell the practice words illustrating complete transfer from spelling to reading. However, the same was not found after reading practice”(p. 875). That is, practice reading a word did not necessarily ensure that word could be spelled correctly. Whereas generalization of word-specific transfer from spelling to reading was significant, $p < .001$. The results of Conrad’s study provide strong support for transfer between reading and spelling and suggest that spelling practice may be particularly valuable in setting up orthographic representations that promote reading fluency.

Blachman, Tangel, Ball, Black & McGraw (1999) also tested the effectiveness of early intervention to heighten phonological awareness. Observing that one of the fundamental tasks facing the beginning reader is understanding that speech can be segmented and that these segmented units can be represented by printed forms, Blachman and colleagues aimed to learn the effects of a phoneme awareness program in kindergarten followed by a reading program in grade one – that emphasized explicit, systematic instruction in the alphabetic code – on the reading development of low-income inner city children. The children, as a group, were in the low

average range in receptive vocabulary and had limited knowledge of the alphabet prior to beginning the intervention. Eighty-five percent of the children received free or reduced lunch. Results of the two-year longitudinal study provide clear evidence of transfer from training in phonological awareness and alphabetic coding to measures of word recognition. For example, from February to May of kindergarten, treatment children participated in 41, 15 to 20 minute phonological lessons and demonstrated superior performance to the control children in terms of phonological awareness, $p < 0.0001$, letter name, $p < 0.0201$, and letter sound knowledge, $p < 0.0001$, reading phonetically regular words, $p < 0.0001$ and pseudowords, $p < 0.0001$, and developmental spelling, $p < 0.0001$.

The reading program in grade one for the treatment children began with review of the phoneme awareness and letter sound activities presented in kindergarten and then consisted of a daily, 30 minute, 5-step reading program that emphasized explicit, systematic instruction in the alphabetic code. The control children followed the traditional Scott Foresman basal reading program used by the district. Both treatment and control children participated in whole class, phonetically based spelling instruction using *Spelling: Words and Skills* by Scott Foresman (1986) as mandated by the school district. Results indicate that the treatment group performed significantly better than the control group on measures of phoneme segmentation, letter names and sounds, and spelling. Although the posttest difference between the groups on word identification was only marginally significant, $p = 0.056$, the treatment children read significantly more nonwords than the control group on a measure requiring the children to read both monosyllabic and polysyllabic phonetically regular words and monosyllabic nonwords ($p < 0.00001$). Standardized testing of spelling at the end of grade 2 revealed no significant difference between the treatment and control children; however, when a modified scoring system was used

and partial credit for phonetically accurate responses was considered, there was a significant difference between the treatment and control children in the lowest quartile of spellers, $p = 0.0140$. Of interest, the treatment children who had the benefit of phonological awareness training in kindergarten and a phonetic approach for both reading and spelling remained significantly ahead of the control children in reading words and nonwords at the end of grade two.

Weiser and Mathes (2011) purport that explicit spelling (encoding) instruction is the missing link for students struggling with reading and spelling. Research findings from the Weiser and Mathes best-evidence synthesis provide a convergence of evidence highlighting the importance of integrating encoding and decoding when working with struggling readers. The experimental or control studies that met stringent inclusion standards for best-evidence standards were divided into three groups: (1) studies that included encoding instruction with reading interventions, (2) studies including specific encoding interventions, and (3) studies that included encoding strategies with phonemic awareness instruction. Treatment groups, that received the guided practice of manipulating phonemes within words and direct encoding instruction of encoding words with these phoneme-grapheme combinations, outperformed contrast groups in which all phonemic activities were done orally, without encoding instruction. Robust Cohen's d effect sizes favoring the treatment groups in the studies were found in areas of phonemic awareness, spelling, decoding, fluency, comprehension, and writing. For example, the most convincing evidence for this type of instruction is the strong practical effect researchers in the latter group found when encoding strategies were linked to phonemic awareness instruction: "Average transfer effects from the integrated phonemic awareness and encoding instruction to improved reading and spelling measures was $d = 0.87$ " (p. 191). From these results, Weiser and

Mathes conclude that struggling readers and spellers receiving encoding instruction integrated with decoding instruction not only improves students' understanding of the alphabetic principle but also assists in developing phonemic awareness, reading and spelling skills.

A growing body of research supports the influence of three kinds of linguistic awareness—phonological, orthographic, and morphological—in learning to read and spell words. In a study designed to improve the reading and spelling skills of students with severe reading and writing problems in grades 4 and 5 (dyslexics) Arnbak and Elbro (2000) proposed remediation based on developing dyslexic students' awareness of morphemes through spoken language exercises. Although the authors found only small differences between the gains of the experimental group compared with the control group in awareness of all types of morphemes, the experimental group progressed significantly more than the control group in reading comprehension and in spelling of morphologically complex words. Based on these results, Arnbak and Elbro concluded that it is possible to develop morphological awareness in students with dyslexia, and in doing so children develop techniques to improve their reading and spelling. Further, one study by Casalis and Colé (2009) found that morphological awareness could be successfully trained in kindergarten. In addition, Casalis and Colé determined that effects of morphological training in kindergarten led to an increased sensitivity to phonemes.

In a more recent study, Good, Lance, and Rainey (2015) examined the effects of morphological awareness training on reading, spelling, and vocabulary skills on children in grade three diagnosed with language impairment (defined by a Spoken Language Quotient of < 85 on the *Test of Language Development–Intermediate: Fourth Edition* TOLD-I: 4; Newcomer & Hammill, 2008 and in conjunction with average nonverbal intelligence and no history of sensory or neurological concerns). To do this, the treatment group received linguistically explicit

instruction in morphological awareness whereas no attention was given to morphological analysis for the control group. Participants in the treatment group demonstrated significant skill growth and outperformed those in the control group on both vocabulary and spelling experimental measures; however, significant group differences were observed only for the vocabulary measure. Of most importance, “although not statistically significant, qualitative analysis suggests that the participants in the [treatment] group did achieve insight into the morphological composition of words and were able to generalize this knowledge to untaught words”(p. 149). Because the duration of the intervention was over 10 weeks with twice weekly sessions of 30 minutes each, the authors contend it is possible that more intense treatment over a longer duration would result in even more robust gains for the participants. In sum, as children (especially children with language impairment) proceed through school, morphological awareness becomes even more critical for reading and spelling success.

2.5 Teacher Knowledge

There is a large volume of research that not only shows reading and spelling performance does improve with proper instruction but also supports the teaching of multiple domains of orthography, which considers the interrelation of multiple linguistic processes (phonology, orthography, morphology and etymology), as an integral part of language arts curriculum (e.g., Berninger et al., 1998, 2009; Bowers et al., 2017; Conrad, 2008; Hammond, 2015; Lesaux et al., 2008; Masterson & Apel, 2000; McLaughlin et al., 2013; Moats, 2009b; Schiff et al., 2015; Weiser & Mathes, 2011). Bowers et al., (2017) astutely argue that English orthography is a morphophonemic system in which spellings have evolved to represent sound (phonemes), meaning (morphemes), and history (etymology) in an orderly way and the authors therefore propose a “form of instruction—what P. N. Bowers and Kirby (2010) called Structured Word

Inquiry (SWI)—that teaches word-level literacy knowledge much like other scientific disciplines” whereby students generate and test hypotheses about how the system works. Bowers et al., (2017) assert, “the goal is to get children to understand why words are spelled the way they are in order to improve literacy, measured in terms of reading words aloud, spelling words, improving vocabulary, and improving reading comprehension”(p. 125). However, many teachers do not recognize that spelling instruction, when done properly, improves reading performance and in some cases is more effective than decoding instruction for improving reading performance (Adoniou, 2013; Apel, Masterson & Hart, 2004; Conrad, 2008; Moats, 1994; Moats & Foorman 2003; Spear-Swerling & Brucker, 2005; Washburn et al., 2011; Washburn et al., 2015; Weiser & Mathes, 2011). Moreover, despite the significance of empirical evidence that supports explicit and systematic instruction in letter sounds, syllables, and words, accompanied by explicit instruction in spelling, the gulf between research and practice remains. Why? Are teachers receiving adequate training on how reading acquisition develops in typically developing children and the process of remediation for students with reading and related difficulties?

Washburn, Joshi, & Binks Cantrell (2011) surveyed preservice teachers (PST) in the Southwest USA about their knowledge of basic language constructs and perceptions and knowledge about dyslexia, and found that preservice teachers, on average, are able to demonstrate implicit skills (i.e., syllable counting) but fail to demonstrate explicit knowledge of basic language constructs such as phonics principles. For example, 23% indicated “2 syllables” in the word ‘*frogs*’. The mean percent correct for all alphabetic principle/phonics knowledge and skill items was 45%. Further, various aspects of morphology proved challenging. In particular, counting morphemes was problematic for the participants – the mean percent correct was 25.43% – even though the majority of PSTs felt more prepared to teach vocabulary than any

other area of instruction (50% indicated “moderate” ability and 44% indicated “very good” ability and one PST indicated “expert” ability). The authors contend that these findings replicate previous studies that suggest, “such a mismatch between perceptions and actual knowledge may cause problems later on—in the classroom—with regard to teachers seeking additional education for and/or assistance in teaching struggling readers”(p. 39). Indeed, though teachers may be literate, and undoubtedly possess some knowledge of English phonology and orthography, they still may lack essential knowledge of basic language constructs and structure that is needed to explicitly teach beginning readers as well as effectively assess and remediate struggling readers (McCutchen, Green, Abbott, & Sanders, 2009; Washburn et al., 2011; Washburn & Mulcahy, 2014).

“It is easy to underestimate the depth of linguistic knowledge that is necessary for teachers to be truly effective in helping struggling readers,” assert McCutchen et al., (2009). McCutchen and her colleagues sought to understand the effects of teacher knowledge on the achievement of struggling readers. Participants were teachers ($n = 30$) of grades three, four, and five. The authors provided intervention teachers a 10-day summer institute to deepen their knowledge of relationships between phonology, orthography, and morphology; knowledge of developmental sequences in children’s metalinguistic skills; and knowledge of explicit strategy instruction in comprehension and in writing. Additionally, teachers had practise in error analysis. “It was through analysis of children’s reading miscues and misspellings that teachers came to see the purpose of deepening their own understanding of the structural features of English”(p. 406). Intervention teachers’ pre- and post-institute scores on alternate forms of the Informal Survey of Linguistic Knowledge developed by Moats (1994); Moats & Lyon, 1996) indicated that teachers significantly increased their linguistic knowledge after their experiences in the summer institute,

$p < .01$ (pre-institute $M = 54.6\%$; post-institute $M = 61.8\%$; Cohen's $d = .50$). What is more, the findings of McCutchen and colleagues demonstrate that intervention focused on increasing teachers' own linguistic knowledge was effective in improving student outcomes not only for lower-performing students but also on student outcomes overall. In other words, teachers' knowledge is directly related to improved student performance (e.g., McCutchen et al., 2009; Washburn et al., 2010; Hammond, 2015).

Purvis, McNeill & Everatt (2016) findings corroborate the arguments by colleagues that university coursework for PSTs (e.g., Al Otaiba, Lake, Scarborough, Allor & Carreker, 2016; McCutchen et al., 2009; Washburn et al., 2010) and professional development for inservice teachers (Al Otaiba & Lake, 2007; Spear-Swerling, 2009) can significantly increase teacher knowledge and boost student reading achievement and provides further support for the viewpoint that teacher education needs to be more explicit in teaching knowledge of language structure. Purvis et al., examined the effect of 7 hours over 8 weeks of direct, explicit teaching of metalinguistic concepts on the phoneme, morpheme and orthographic knowledge of pre-service elementary teachers. Although pre-intervention scores indicate that PSTs entered higher education with relatively low levels of explicit language structure knowledge, post-intervention scores indicated participants demonstrated significant gains in phoneme knowledge, $p < .001$; morpheme knowledge, $p < .001$; and orthographic knowledge, $p < .001$. Thus, the authors conclude that "pre-service teachers lack explicit knowledge of language structure constructs and, therefore, are not adequately equipped to teach reading"(p. 68). These authors' findings replicate those of earlier studies and support the recommendation that preservice teacher education should include explicit professional training in the structure of the English language (e.g., Joshi, Binks,

Hougen, Dahlgren, Ocker-Dean & Smith, 2009; McCutchen et al., 2009; Moats, 2009b; Spear-Swerling & Brucker, 2004; Washburn & Mulcahy, 2014).

Although teaching students that struggle in learning to read is not as simple as knowing basic language concepts, without this knowledge of scientifically based reading instruction, ‘no teacher should be expected to significantly improve reading’ (Lyon & Weiser, 2009 as cited by Hammond, 2015). In Western Australia, where teachers are increasingly expected to teach and assess mastery of phonics in the early years, Hammond (2015) examined early childhood educators’ knowledge, beliefs and practices about teaching phonological awareness and phonics. The results indicate that although early years’ teachers believe they should understand literacy precursor skills and how to teach them, many currently lack the necessary knowledge of beginning reading skills. The authors also found the early years’ teachers “[overestimated] what they know, creating a false sense of security about the efficacy of their classroom practice.” These findings parallel the mismatch between perceptions and actual knowledge in the Washburn et al., (2011) study. Collectively, these studies demonstrate that you cannot teach what you do not know.

The cost of assuming teachers have the requisite knowledge to develop basic reading and spelling skills in children is too high. Many dyslexic individuals and others living with specific learning disorders struggle with a poor self-worth, poor social relationships, and a host of other negative consequences. In a comprehensive review of journal articles investigating the emotional consequences of developmental dyslexia, Livingston, Siegel & Ribary (2018) look beyond the primary consequences—achievement, differences being noticed by family, peers, and teachers and the ‘stigma’ of being different (real or imagined)—and draw our attention to what the authors recognize as the ‘secondary consequences’ experienced by individuals with dyslexia. Livingston

et al., assert, “emotional functioning is a particularly important target as it influences nearly all other aspects of the individual that are affected by dyslexia” (p. 22). Indeed, the experience of shame, triggered by failure to read, is a powerful disabler—cognitively and emotionally. No one can think clearly in a moment of shame. Children will go to great lengths to avoid the embarrassment of not being able to read. Thus, it is critical to identify learning disorders as early as possible and before a child experiences failure. Moreover, the lifelong benefits of early intervention for children with developmental disorders are well documented.

Chapter 3: Literature Review Reflections

3.1 The 'D' Word

One of the most important goals of teachers, particularly primary teachers, is to help children learn to read and write. Most students will learn to read and write easily; however, studies show that up to 20 per cent cannot learn to read or spell without explicit systematic instruction.

Dyslexia awareness is growing and fear and disdain of the 'D' word is diminishing (e.g., Berninger, 2001; Moats 2009b; Rose, 2009; Serry et al., 2015; Torgesen, 2000). However, results of the Serry et al., (2015) study suggest the need for shared language about dyslexia. The neutrality of terms like *language processing* being included alongside *learning difficulty* offer limited direction for individualizing instruction and may delay targeted intervention.

Furthermore, how can we refer to a child at 6 or 7 years of age who comes to school understanding the rules of lacrosse, perhaps knowing how to play violin, and even knows the names of dinosaurs with *learning difficulty*? Equally noteworthy are the results for two of the items in the Serry et al., (2015) study in which participants selected *I don't know* in relation to questions about controversial therapies. The items were *Incorporating music therapy into an intervention program for dyslexia is helpful* (31%); *Dyslexia can be helped by using coloured lenses and/or coloured overlays* (11%). Needless to say, the field of dyslexia is plagued with supposed 'cures' that have no proper evidence base (e.g., Snowling, 2015). Moreover, parents deserve informed counsel about how best to help their children, and teachers want guidance on how best to develop literacy acquisition in their students (Blachman et al., 1999).

According to Snowling (2012), "a good starting point for developing an intervention is a causal theory"(p. 10). If Snowling's hypothesis is indeed correct, and I argue that it is, then teachers need to understand the neurological signature that characterizes dyslexia. All students

whether emerging readers or struggling readers, benefit from evidence-based reading and spelling instruction that focuses on explicit, systematic instruction in word structure including: phonemic awareness, phonics, morphology, and orthography (e.g., Moats, 2009b; Pullen & Lane, 2014; Schiff et al., 2015). Therefore, teachers need to understand the underlying structures and how a breakdown in a specific structure can impact a child's ability to read a word and ultimately to attain automaticity and fluency. For example, if a child displays effortful and inaccurate letter recognition, mispronounces multi-syllable words (e.g., "aminal" for "animal") or if a child reads "bird" for "burned" or responds with "sausage" when s/he meant "ostrich," that confusion provides valuable diagnostic information. Successful intervention for language-based deficits depends on accurate assessment of a child's profile. You cannot fix the problem if you do not understand where and why the breakdown is occurring (e.g., Siegel, 2016). Needless to say, effective classroom based assessment must accurately identify students' specific weaknesses, and requires the analytical thinking of a teacher who understands how and why her students are responding to instruction (Moats, 2009b, p. 383; Siegel, 2016; Snowling & Hulme, 2011). Accurate comprehensive assessment involves the use of both formal and informal assessment measures (e.g., Beirne-Smith & Riley, 2009; Snowling & Hulme, 2011).

Although the results of empirical studies shows that early intervention enhances the probability that students with language-based deficits will develop adequate reading skills some students will continue to need instructional support, sometimes for the remainder of their school years (Abbott & Berninger, 1999). For a small percentage of students, reading difficulties persist despite intensive intervention. More research is needed on how treatment resistors can best be helped. Although no single method successfully helps all students, by applying explicit instruction and practise in acquiring phonemic awareness, phonological awareness, building

phonics and decoding skills more broadly can significantly reduce the proportion of the population who can be identified as resistant to the best current methods (Torgesen, 2000). The English language is logical, and students, especially dyslexic students, need to learn that there are reasons for the structure of our language and discover that they can use that reasoning to build mastery.

3.2 Theories of Reading and Reading Disability

The Simple View of Reading provides a formula to understand that reading comprehension is the product of the interdependent processes of both word recognition (decoding) and language comprehension. Clearly, if either one of these processes is weak, reading comprehension, as a whole will be impacted. Because the hallmark of dyslexia is difficulties with accurate and/or fluent word recognition (Siegel, 2004; Shaywitz, 2008; Washburn et al., 2011) it is critical to understand the importance of word recognition (decoding) and *how* the processes of developing fluent reading and language skills can be considered independent of each other. However, this may require suspension of deeply held philosophies.

Theoretical analyses and empirical findings have led to the widespread view that reading instruction should emphasize developing phonological awareness and phonics skills. However, effective instruction for students with dyslexia and other struggling readers is shrouded in a cloud of controversy. Clearly, children who struggle to read and their teachers have been the collateral damage of the wars of ideology, and “supplemental and intensive interventions cannot be used to mitigate ineffective quality core instruction”(Frey & Fisher, 2017, p. 31). The divide created in the reading wars becomes a liability in the rights of the children to receive access to an adequate education. In the words of Hessler & Morrison (2016),

If the oft-repeated statement “history is written by the victors” is accurate, then we can surmise that neither side won the Reading Wars; however, the casualty list is long and the metaphorical battleground is littered with the achievement and self-esteem of countless children and teachers caught in the cross-fire. (p. 46)

Children with dyslexia will not learn to read simply by being exposed to books or by trying to read books. In the words of Carolyn Merritt, Vice Chair, Code Read Dyslexia Network, “If you surround a child with water, do they ‘magically’ learn to swim without explicit instruction? No – they drown – much like our dyslexics in a sea of words”(Merritt, 2018). Findings in the empirical studies support the hypothesis of Joshi et al., (2009) that explicit instruction in language structure, and especially sound structure, is essential to learning to read and spell. Joshi et al. contend spelling instruction underpins reading success by creating an awareness of the sounds that make up words and the letters that spell those sounds. In fact, explicit spelling instruction is an integral part of learning the language—“helpful for all, harmful for none and crucial for some”(Snow & Juel, 2005, p. 518). And effective teachers know exactly what a child needs through precise testing and progress monitoring, regardless of the program. In fact, I would argue that the teacher *is* the program.

Although the debate regarding methods of phonics instruction concerning whether a “synthetic” approach is preferable to an “analytic” one is beyond the scope of this thesis it is worthy to note that the key ingredient of a successful phonics program is that it is systematic. Instruction addressing phonological awareness and building phonics skills in the early elementary grades may prove sufficient to allow students to meet the demands of the classroom; however, beginning in grade three, phonological awareness and phonics skills are no longer sufficient to meet the increasingly complex text demands (Good, et al., 2015). Indeed, a growing

body of research provides evidence for the influence of three kinds of linguistic awareness—phonological, orthographic, and morphological—in learning to read and spell words (e.g., Arnbak & Elbro, 2000; Bowers & Bowers, 2017; Casalis & Cole, 2009; Good et al., 2015; Snowling, 2012). Students with dyslexia appear to benefit from morphological awareness intervention (e.g., Berninger & Swanson, 2013; Bowers et al., 2017; Siegel, 2008). Further, research supports the increasing importance of morphological awareness as children proceed through school (Bowers et al., 2017; Good et al., 2015). Developing students’ metalinguistic skills – the ability to talk about and explain the use of phonological, orthographical, and morphological skills – is also effective in developing children’s reading and spelling abilities (Bowers et al., 2017; Schiff et al., 2015). In sum, methodology does matter, and teachers’ expertise is a significant factor in a child’s literacy learning.

3.3 Teacher Knowledge

Professional standards have outlined relevant disciplinary knowledge at a general level. Yet general education needs to align with special education for education to truly be inclusive. Explicit teaching requires explicit understanding, and teachers deserve learning opportunities during their professional training to develop their knowledge of basic language constructs and their connection to instruction for beginning and struggling readers. Equally important is the provision of opportunities to practise and apply this knowledge in a meaningful and purposeful way. In so doing, teachers will be better equipped to provide equitable access to education for *all* of their students, including those with dyslexia. McCutchen et al., (2009) demonstrated that a 10-day summer institute produced gains in teachers and corresponding gains in their students, across a range of outcome measures. It bears emphasizing that it is important for teachers (and I would

argue, all stakeholders) to understand the range of challenges faced by individuals with dyslexia, including—and perhaps most importantly—the emotional impact and consequences.

Social emotional and behavioural functioning may significantly impact a student's academic performance and overall school experience (e.g., Livingston et al., 2018). An important consideration is the degree to which behaviour stems directly from academic frustration. In other words, is it "*I can't...*" or "*I won't...*"? Behavioural assessments can offer valuable information that can be used to help students thrive in their school and home environments. Once teachers are able to recognize cues of low self-esteem that stem from academic difficulties, such as defensiveness, anger, aggression, withdrawal, anxiety, or low attendance, they make a kangaroo leap toward relational teaching and greater capacity to make a positive difference in a child's education. Effective teachers seek opportunities to build students' confidence and try to ensure that their students are cognizant of their intellectual capacities. And at times, this may include defining dyslexia.

Definitions of dyslexia will continue to evolve and be debated; however, there is a shift across multidisciplinary fields to building professional expertise in identifying dyslexia and developing effective ways to help learners overcome its effects that is promising. Literacy for all children, including those with dyslexia, requires that all educators understand the complexities of dyslexia. The research findings suggest that effective reading programs are explicit and systematic programs in which children are taught not only how to decode print to speech but also how to encode speech to print. The research reviewed elucidates the need for educators to examine beliefs about reading and spelling and to look at reading difficulties through a scientific lens. Further, the findings from the studies reviewed are promising and highlight the need for teachers to have knowledge of basic language constructs. The breadth of empirical research on

how people learn, how the mind and brain develop, how interests form and how people differ in all these is not only expanding but also shaping development in literacy education around the world. One step toward generating a map of the current reality within the education system in the province of British Columbia is assessing teachers' knowledge and/or confidence and attitudes toward dyslexia and their capacity to ameliorate its effects. Towards this end, efforts of this study are focused on creating a map with an accurate picture of reality within the education system with the goal of better quality and equity outcomes for young people in BC.

Chapter 4: The Research

In the present research study the variables that shape a teacher's effectiveness in literacy instruction were explored. The data discussed in this chapter were collected as part of a survey examining teachers' content knowledge in basic language concepts and perception of spelling instruction for both reading acquisition and remediation of reading problems as well as teachers' knowledge and understanding of the nature of reading difficulties, in particular dyslexia. In addition, information on sociodemographic data (age, gender, teaching areas, years of study, professional preparation, years of experience) were collected for all participants.

Building on the literature, this study addressed four research questions: (1) What are teachers' views and beliefs about reading and reading-related disorders, in particular dyslexia? (2) What is teachers' knowledge about the structure of the English language required for explicit reading and spelling instruction? (3) What are teachers' perceptions and confidence in their ability to explicitly teach the structure of language at the sub-lexical level? (4) What are teachers' perceptions and confidence in their ability to teach children with learning disabilities?

4.1 Procedure and Participants

Long before the recruitment procedure began a proposal was first submitted to the UBC Behavioural Research Ethics Board (BREB). The application for ethical review included submitting the following: 1) Consent Forms; 2) Questionnaire; 3) Questionnaire - Cover Letter; 4) Questionnaire - Survey; 5) Letter of Initial Contact – Survey and 6) an Introductory Letter for Site Permission. Once ethics approval was obtained each site was provided a letter outlining why it was selected, what would be done at the site (time and resources required by participants), my presence on site, and the format for reporting results. Each participant was informed about the reasons why they were selected, the nature of the study, protection of confidentiality, procedures

used in data collection, and the need for their involvement and the expected benefits. Written consent was obtained for each participant. Participants were from two different schools in the same school district.

Teachers were invited to participate electronically in the survey on Survey Monkey hosted by the University of British Columbia, by either personal invitation or electronic email. 68.25% of participants responded through a social or professional connection or recommendation. They were instructed that responses would remain anonymous, and no form of identification was obtained. Participation was voluntary and respondents could decline to answer any question or withdraw their participation at any time by not submitting their responses.

In total, 63 educators from the lower mainland in British Columbia participated in this study. The sample was predominantly female (82.54%) and participants, with the exception of two, were currently employed within the education system in the province of British Columbia. One participant was retired and one was unemployed. Fifty-seven of the participants were professionally qualified teachers; three were principals and another three were support teachers. One participant was a special education teacher. Two participants were educational assistants, two were students, and two were early education educators. 36.49% of the participants had between 0-10 years teaching experience, 34.91% had between 11-20 years teaching experience and 28.57% had 21 years or more teaching experience. Figure 4.1 describes the teaching experience of the sample. 74.60% of participants documented having completed one or more university course related to literacy education, and 15.87% had completed a college or university course related to explicit, systematic word study or spelling instruction. Figure 4.2 describes the professional training of the sample.

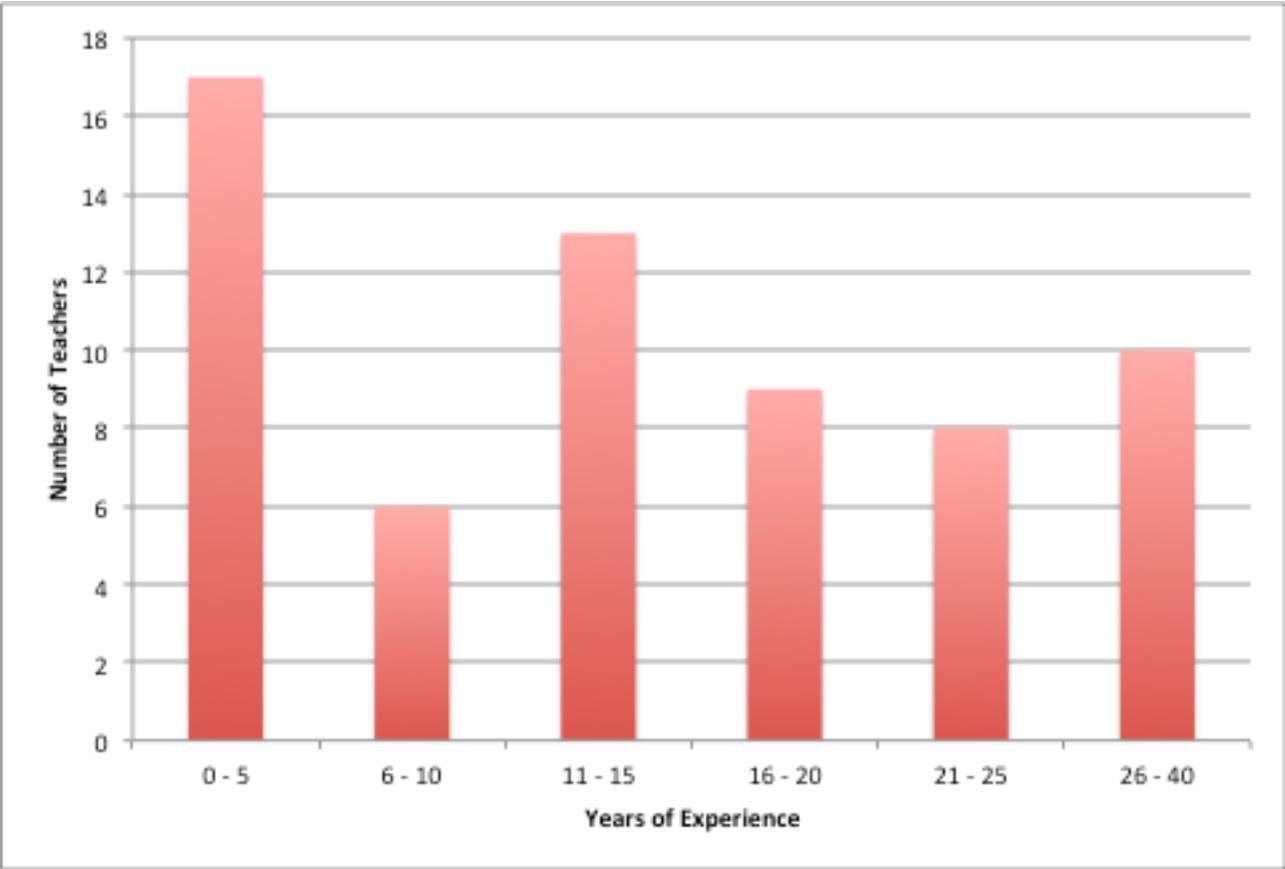


Figure 4.1 Participant details

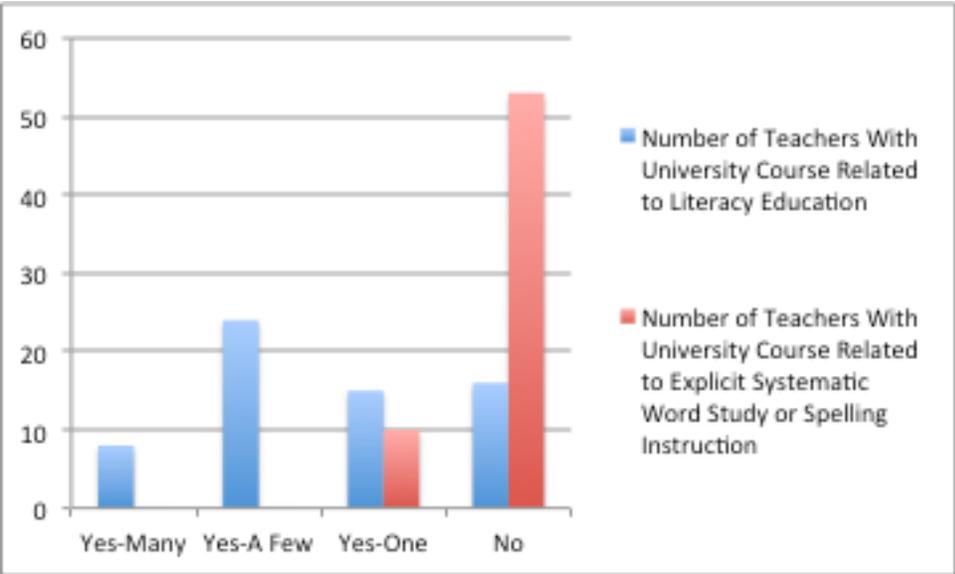


Figure 4.2 Professional Training

4.2 Instrument

This study developed an online survey instrument, hosted by Survey Monkey, which was based on surveys and questionnaires used by other researchers in the field (Moats, 1994; Siegel, 2008; Stark et al., 2015). The full survey can be found in Appendix A. In the questionnaires administered by previous researchers, the items referred mainly to knowledge of basic language concepts, pedagogy and reading-related disorders. In contrast, for this survey I also included items to examine teachers' self-perception and confidence in that knowledge. I created the survey in four parts: 1) background; 2) confidence; 3) views and beliefs about reading and reading-related disorders; and 4) language knowledge and skill. The background questionnaire in Section One included items to attain demographic information such as educational background, years of experience, specific course work in the area of spelling and weekly minutes spent teaching spelling. Section Two asked teachers to rate their own ability, as either *minimal*, *moderate*, *very good*, or *expert*, across 11 teaching areas related to developing children's reading acquisition, including teaching phonemic awareness, phonics, fluency, comprehension, spelling—such as analyzing students' spelling errors to inform instruction, and using assessment to inform instruction—as well as teaching students with learning difficulties. Section Three was adapted from a measurement designed by Siegel (2008) to measure teachers' views and beliefs associated with a reading disorder. Teachers were asked to respond to a series of 11 statements by indicating whether they *strongly agree*, *agree*, *disagree*, *strongly disagree*, or were *undecided*. To determine participants' level of linguistic knowledge relevant for teaching reading the last section included the Comprehensive Survey of Language Knowledge—Form A developed by Moats (2010). This section included proportionately more items that required participants to apply their knowledge to allow for knowledge to be measured across contexts (for

example, phonemic awareness was measured by determining the number of speech sounds in a word). Items measuring language knowledge and skill were multiple choice and short answer. The participant's score was the total number of items correct with a possible maximum of 69.

Chapter 5: Research Results

5.1 Background

Despite 74.60% of participants documenting having completed one or more university course related to literacy education only 24% of teachers rated their confidence to teach phonemic awareness beyond *moderate* ability. More teachers felt confident in their ability to teach phonics and spelling, and yet ironically, less felt confident in their abilities to use assessment to inform reading instruction or to analyze spelling errors to inform instruction. Although 15.87% of teachers had one university course related to explicit, systematic word study or spelling instruction the mean percent on tasks to measure teachers' spelling skill was 16.66%.

Additionally, the majority of teachers had more than 10 years teaching experience, with 43% in the field fifteen years or longer. This suggests that regardless of experience and/or training teachers lack the depth of understanding necessary for teaching children with reading difficulties, especially dyslexic children.

5.2 Confidence

Table 5.1 displays teachers' confidence across 11 teaching areas related to developing children's reading acquisition. Although *Good* was not chosen as a descriptor by any of the participants and therefore omitted from the table, the participants' mean self-ratings for teaching vocabulary, comprehension and children's literature indicate *good* confidence. Comparatively, the means consistently showed moderate confidence across the remaining areas. Correlation analyses (Pearson) were computed to assess the relationships between perceived ability and skill. There were moderate positive correlations between: a) teachers' confidence teaching phonemic awareness and their ability to segment sounds, $r = .266$, $n = 63$, $p = .035$; b) teachers' confidence to teach phonics and their capacity to identify consonant blends, $r = .492$, $n = 63$, $p < .001$; c)

teachers' confidence to teach spelling and their knowledge of consonant blends, $r = .446$, $n = 63$, $p = <.001$; d) teachers' confidence to teach spelling and their knowledge of open and closed syllables $r = .419$, $n = 63$, $p = .001$; e) teachers' confidence to teach spelling and their total phonics knowledge, $r = .364$, $n = 63$, $p = .003$; f) teachers' confidence to analyze spelling errors to inform instruction and their knowledge of consonant blends, $r = .377$, $n = 63$, $p = .002$. Overall there was a moderate positive correlation between confidence and skills in the areas of phonemic awareness, phonics, and spelling. However, marginal confidence was unfortunately correlated with marginal skill. Teachers' lack of confidence in their ability to teach children with learning disabilities was reflected in 85.72% self-rating their ability as either *minimal* or *moderate*.

Teach	Minimal	Moderate	Very Good	Expert	Mean
Phonemic awareness	26 (41)	22 (35)	13 (21)	2 (3)	2
Phonics	17 (27)	25 (40)	19 (30)	2 (3)	2
Fluency	11 (17)	39 (62)	12 (19)	1 (2)	2
Vocabulary	2 (3)	36 (57)	23 (37)	2 (3)	3
Comprehension	2 (3)	27 (43)	31 (49)	3 (5)	3
Spelling	11 (17)	34 (54)	17 (27)	1 (2)	2
Children's literature	10 (16)	19 (30)	32 (51)	2 (3)	3
Literacy skills to English language learners	27 (43)	26 (41)	9 (14)	1 (2)	2
Children with learning disabilities	24 (38)	30 (48)	7 (11)	2 (3)	2
Use assessment to inform reading instruction	7 (11)	38 (60)	16 (25)	2 (3)	2
Analyze spelling errors to inform instruction	30 (48)	24 (38)	8 (13)	1 (2)	2

Table 5.1 Confidence across teaching areas; n (%)

Key: 1 = minimal, 2 = moderate, 3 = good, 4 = very good, 5 = expert

5.3 Views and Beliefs About Reading and Reading-related Difficulties

Teachers' views and beliefs about reading and reading-related difficulties were determined by teachers responding to a series of 11 statements by indicating whether they *strongly agree*, *agree*, *disagree*, *strongly disagree*, or were *undecided* and are reported in Table 2.2. Forty-one percent of teachers indicated either *agree* or *strongly agree* to 'Seeing letters backwards is a common sign of dyslexia', and 27% of teachers were *undecided*. This finding reaffirms the most common misconception concerning dyslexia described in earlier research (Shaywitz, (2003); Washburn, 2011, 2013) and may have grave consequences for those dyslexic students that do not exhibit reversal errors. Another troubling misconception was evident by the majority of teachers (71%) indicating either *agree* or *strongly agree* to the statement, 'Exercises that rehearse coordination of perceptual-motor skills can improve literacy skills'; 25% were *undecided*. Just over half (52%) of the teachers believe that the English spelling system is unpredictable. Yet, the English language is more regular and predictable than commonly believed (Bowers et al., 2017; Joshi et al. (2009b); Moats, 2006). Examples of more accurate understanding were found when the majority of teachers answered *agree* or *strongly agree* to the statements 'Children with reading difficulties have problems in decoding and spelling but not in listening comprehension' and answered *disagree* or *strongly disagree* to 'Children with learning difficulties have lower IQs than typical learners'. Despite these accurate views and beliefs, 95% responded either *disagree* or *strongly disagree* to the statement, 'Most teachers receive intensive training to work with children with reading difficulties', which support persuasive evidence from earlier studies that suggest teachers are ill-prepared to explicitly teach the particulars of language structure and remediate reading difficulties (Hammond, 2015; Moats, 1994; Spear-Swerling et al., 2005;

Washburn, 2011). Overall, these findings support what Binks-Cantrell et al. (2012) coined the “Peter principle” – which states that one cannot give to others what one does not have oneself.

Item	Agree	Disagree	Undecided
The English spelling system is unpredictable	52%	44%	3%
A common sign of dyslexia is seeing letters backwards	41%	32%	27%
Children with reading difficulties have problems in decoding and spelling but not in listening comprehension	59%	36%	6%
Children with learning difficulties have lower IQs than typical learners	0%	98%	2%
Most teachers receive intensive training to work with children with reading difficulties.	0%	95%	5%
Children with reading difficulties need a particular type of remedial instruction which is different from that given to typically developing readers	81%	9.5%	9.5%
Children with reading difficulties are naturally compensated for their difficulties by particular strengths in artistic/visuospatial domains	27%	43%	30%
Children with reading difficulties often have associated difficulties such as clumsiness, poor short-term memory and concentration problems	41%	35%	24%
Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinesthetic)	92%	3%	5%
Mental capacity is hereditary and cannot be changed by the environment or experience	2%	92%	6%
Exercises that rehearse coordination of perceptual-motor skills can improve literacy skills	71%	3%	25%

Table 5.2 Teachers’ views and beliefs

5.4 Language Knowledge and Skill

The mean score for the *Language Knowledge Survey* was 33.66 with a range of 21 – 55 out of 69. A total of 31 participants scored below the mean with only three scoring 51 or better. Figure 5.3 shows the range of scores.

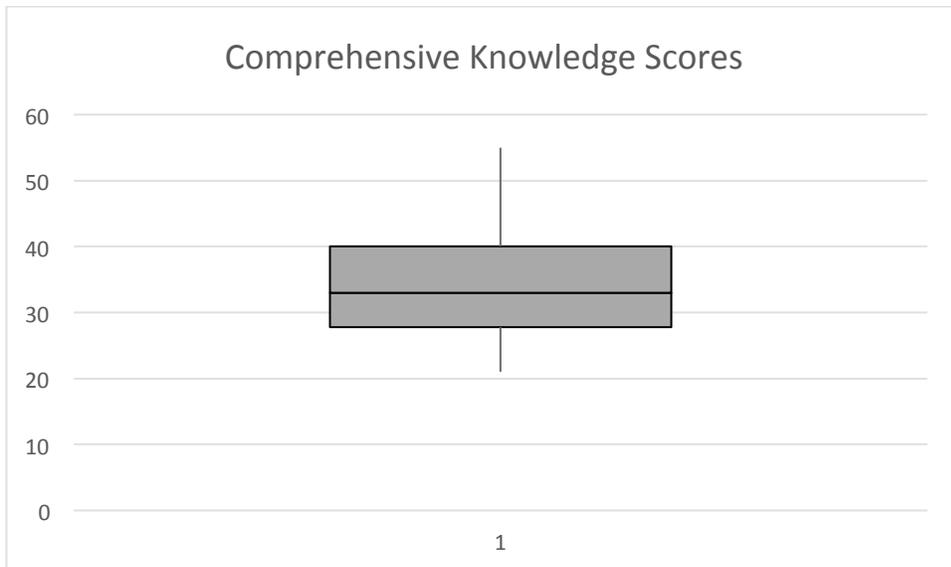


Fig. 5.3 Comprehensive Knowledge Scores

The sample group was divided into two groups to compare the relationship between teachers who taught primary grades—kindergarten, grade 1, grade 2, grade 3—and teachers who taught grades beyond grade 3 (\geq grade 4). An independent samples t-test was conducted to determine whether a statistically significant difference existed between the knowledge of primary teachers and knowledge of intermediate and/or high school teachers in the 11 teaching areas. Although there was a small correlation between teachers’ total phonics score and the grade taught, $r = .330$, $n = 63$, $p = .008$, there was a significant difference in the primary teachers’ scores on items that asked them to identify words with consonant blends ($n = 37$, $M = 2.08$, $SD = 1.498$) and intermediate/high school teachers ($n = 26$, $M = .92$, $SD .628$); $t(51.598) = -4.207$, $p < .001$. Identifying the consonant blend in the word *squished* is an example of a phonics-based item, and only 9.52% of participants correctly identified the consonant blend: **squished**. Another specific phonics task required teachers to determine the number of syllables in a list of eight words. On the whole, respondents were able to identify and count syllables accurately (91.27%, $SD = 1.08$), although *believed* proved challenging for most. Comparable to the findings from Moats (1994)

and Stark et al. (2015), only 3.17% of participants correctly identified the number of phonemes in the word *mix*. There was a correlation between teachers' syllabification skills and the grade taught; however, it was negligible: $r = .287$, $n = 63$, $p = .023$. There was no significant difference between the grade taught and teachers' skill to recognize when a vowel is reduced to the ubiquitous schwa sound. A schwa is when the vowel is neither long nor short and is reduced to the /uh/ sound. Similarly, there was no significant difference between the grade taught and teachers' knowledge of a digraph.

There was a positive correlation between teachers' total phonemic awareness score and the grade taught, $r = .367$, $n = 63$, $p = .003$, and a significant difference in the scores on phonemic awareness for primary teachers ($n = 37$, $M = 7.92$, $SD = 2.919$) and intermediate/high school teachers ($n = 26$, $M = 5.73$, $SD = 2.554$); $t(58.012) = -3.154$, $p < .003$. Although teachers' overall phonological awareness was weak, they performed better on the task of counting phonemes than discrimination of sounds. For example, identifying the third speech sound in the word *tinker* was correctly identified by only two teachers, as was the third speech sound in the word *square*. The words *rouge* and *shower* proved challenging also with only 5 teachers correctly identifying the /zh/ and 11 teachers correctly identifying the /w/ respectively. Similarly, though the overall morphology score was low, there were areas of strength which include 94% of teachers were able to correctly select which one of four alternative pseudowords was the correct item that was missing in the sentence. Locating examples of an inflected verb, compound noun, bound root, derivational suffix and Greek combining form was also somewhat of a strength with 64% demonstrating this morphological knowledge. Unsurprisingly, total morphology scores show a correlation between morphological knowledge and the grade taught, $r = -.344$, $n = 63$, $p = .006$. A significant difference showed between primary teachers' morphology ($n = 37$, $M =$

9.19, SD 3.298) and intermediate and/or high school teachers' morphology, ($n = 26$, $M = 11.35$, $SD 2.348$); $t(60.978) = 3.032$, $p = .004$.

Performance on spelling skill items was variable. The mean score for the spelling tasks was 1 with a range of 0 – 4 out of 6. When asked which letters signal that a 'c' is soft (pronounced /s/ as in city) 24% answered correctly. Slightly more than half of teachers (52%) correctly identified when 'ck' is used in spelling. Few teachers recognize features of English orthography by words' language of origin. That is, only 7 teachers correctly answered question 18: How can you recognize an English word that came from Greek? That is, *it might have a ph for f, ch for k, or y for I; it is likely to be constructed from 2 or more combining forms; and it is likely to be a mythological, scientific or mathematical term*. Spelling knowledge was also measured by asking respondents to list all of the ways to spell "long o". This proved to be difficult with only 5 of the 63 teachers correctly listing o-oa-ow-oe-o consonant e-ough. Equally challenging was the task of listing all of the ways to spell the consonant 'f' with only 6 teachers able to list f-ph-ff-ugh. These results extend efforts to document teachers' inadequate knowledge about the elements of language required for the demanding task of teaching reading and spelling explicitly.

Chapter 6: Results Discussion

The purpose of this study was to examine teachers' knowledge of some of the factors that promote and impede reading acquisition. In particular, causative factors—that educators can control—in relation to reading difficulties were investigated. From a sample of British Columbia teachers this study sought to measure teachers' knowledge of basic language concepts, teachers' knowledge and understanding of the nature of reading difficulties and teachers' confidence in their ability to remediate reading-related difficulties. The results indicate that teachers' understanding of reading-related difficulties such as dyslexia, and their knowledge and skill of basic language concepts such as phonology, orthography, morphology and etymology is limited and highly variable. Critics argue that such knowledge is not needed to teach reading. However, it is essential for teachers to have some knowledge of English phonology and the structure of language in order to provide meaningful feedback and draw children's attention to the types of errors seen in their spelling and reading. The results of this study replicate research findings about teachers' limited grasp of both the nature of reading difficulties as well as the language essentials that teachers need to have in order to explicitly teach reading and spelling to struggling readers (e.g., Hammond, (2015); McCutchen et al., (2009); Moats (2009); Stark et al., (2015); Washburn et al., (2015). At the same time, this study sheds light on teachers' self-perception and lack of confidence to teach spelling explicitly and remediate reading difficulties.

Nearly three-quarters (71%) of the teachers agreed that exercises that rehearse coordination of perceptual-motor skills could improve literacy skills, which is worrisome. Finding the right sized lid for your soft drink is a perceptual-motor skill. There are many brain-gym type programs designed to development perceptual-motor skill; however, the activities in these programs such as walking on a balance beam do not improve literacy. Perceptual-motor

skill development is the process of improving the smoothness and accuracy of movements and ought not to be confused with kinesthetic cues used to draw children's attention to how sounds are motorically produced by the mouth. Some children benefit from kinesthetic cues and indeed rely on associations by a secondary link to develop more precise discrimination for recognition of words both seen and heard. That is, when sounds are too difficult to hear apart, students can be taught to discriminate sounds by how those sounds are motorically produced by their mouths. Nevertheless, besides special methods, including explicit teaching of how speech sounds are produced motorically, there are a number of other important factors in remedial work that require deep understanding of a child's difficulties. Many struggling readers will need teachers who can provide explicit phonics instruction; however, the majority of teachers (52.3%) believe that the English spelling system is unpredictable. This reflects a misunderstanding. In fact, Moats (2006) provides a strong argument that the English spelling system is highly regular, and points to the research of Hanna, Hanna, Hodges, and Rudorf (1966) who estimate that only four percent of English words are truly irregular once phonology, word meaning and word origin are considered. On the other hand, Bowers et al., (2017) argue that *every* word has a story that can explain its spelling. The authors claim there are no irregularities when orthographic phonology, morphology and etymology are considered.

A simple comparison of a child's listening comprehension to his or her reading comprehension provides teachers with meaningful information. A discrepancy between the two is often a good indication that a student may be having difficulties with fluent word recognition and yet only slightly over half (58.73%) of the teachers understand that children with reading difficulties have problems with decoding but not listening comprehension. Further, it is disconcerting that there was near consensus amongst the sample regarding teacher preparation,

with 95.24% of teachers indicating that most teachers do not receive intensive training to work with children with reading difficulties. It is therefore understandable and regrettable that the utility of quick and easy assessments such as comparisons between listening comprehension and reading comprehension often remains unknown.

Spelling (going from sound to letter) strongly reinforces reading (going from letter to sound). It is essential for teachers therefore to have knowledge of orthographic phonology to be able to “draw children’s attention to the types of errors seen in their spelling and encourage them to spell correctly the words they misspelled when they use those words in their future writings” (Aaron et al, 2005, p. 181). Through its patterns and rules, the explicit, systematic, cumulative, and multisensory approach is not only designed to help those one in five students with dyslexia but it will take the guess work out of spelling for all students. However, 86% of teachers lack confidence to analyze students’ spelling errors to inform their instruction, and 71% lack confidence to use assessment to inform their reading instruction.

All teachers showed a weak grasp of phonological concepts and phonics, even though the performance of primary teachers was somewhat stronger at the levels of phonology than intermediate and high school teachers. However, as Moats (2009) contends, students with severe deficits benefit from explicit, intense systematic instruction in phonology and phonics no matter what their age. It was not surprising that teachers were most successful with items that required implicit knowledge and skill, such as syllable counting. On the other hand, it was surprising that 79.78% of teachers miscounted the number of syllables in *believed*. One explanation for this is that many adults’ concepts of language structure are so grounded in print that detailed awareness of speech is difficult to reactivate. In other words, this result may be attributed to a lack of explicit understanding of the syllable boundaries in speech and print and a lack of explicit

understanding that a syllable is a spoken or written unit that must have a vowel sound (Moats, 2010, p. 50). It is also possible as noted by Spear-Swerling et al., (2004) “that teachers’ knowledge of word spellings and automatic recognition of words may at times create confounds in their understanding of word structure”(p. 333). In consideration of teachers’ moderate confidence in their capacity to teach spelling it was not surprising that 47.62% of teachers lacked explicit knowledge to correctly explain when ‘ck’ is used in spelling. The lack of explicit knowledge— that the spelling of a sound can vary according to its position in a word —was further evident in 76.19% of teachers unable to demonstrate when ‘c’ is followed by *e*, *i*, or *y*, it has its soft sound /s/ (as in *cent*, *city*, and *cycle*). Explicit and complete explanations of patterns in English orthography, take the guess work out of spelling and help students to make sense of the English spelling system. Therefore, to provide effective word-level instruction, teachers themselves need to have an explicit understanding of the structure of the English language (Moats, 2006).

Teachers performed better on the morphological tasks in which implicit knowledge of morphology could help correctly answer the item (e.g., Where do they curfamic-curfamily-curfamate-curfamation the money?). Although it was not surprising that intermediate and/or high school teachers demonstrated greater morphological awareness than the primary teachers, introducing students, regardless of grade, to the common morphemes enhances vocabulary and comprehension. In fact, knowledge of orthography and morphology can help teachers move beyond the basic limitations of phonics instruction.

The results of this study support earlier research evidence that indicate experienced and inexperienced teachers alike felt only somewhat prepared to teach students with reading and reading-related difficulties. Collectively these findings shed some light on the need for university

courses to include explicit instruction on the structure of the English language including concepts of phonological awareness, phonemic awareness, the alphabetic principle and principles of phonics and spelling, and morphological awareness. Regular education needs to align with special education if we expect classroom teachers to have the necessary knowledge to effectively differentiate instruction for all learners. Moreover, because of the high incidence of dyslexia and dyslexia-related reading problems teacher knowledge of dyslexia needs to be explored in conjunction with knowledge of basic language concepts.

In sum, the nature and structure of the English spelling system is complex so it is not surprising that highly literate and educated adults lack the explicit knowledge of basic language concepts required for reading and spelling instruction, especially for remedial instruction in reading. However, children that do not naturally develop phonological awareness need explicit instruction that models and mediates these skills. Teaching dyslexic students to read should be the litmus test of all reading instruction.

Chapter 7: Conclusion

The results presented in this study confirm previous findings that most colleges of education do not teach the science of reading (Aaron et al., 2008; Joshi et al., 2009a; Moats, 1994, 2014; Rose 2006). Whether teachers are trained in the United Kingdom (e.g., Washburn et al., 2013), the United States (e.g., Washburn et al., 2011, 2013, 2014), Australia (e.g., Hammond, 2015; Serry et al., 2015; Stark et al., 2015) or British Columbia, Canada, the reality at this point is that university programs are so focused on general education that teachers are not learning the necessary content knowledge to truly include students who struggle with language, in particular students with dyslexia. That is, a number of studies collectively show that the knowledge base for teaching word-level reading skills seems to be a neglected area in teacher preparation. Moreover, consistent with a number of international studies, these findings show that universities are failing to prepare teachers to identify students at risk of dyslexia and how to ameliorate its effects. General education needs to align more with special education to truly be inclusive. Understanding the laws of the English spelling system is “helpful for all, harmful for none and essential for some” (Snow et al., 2005, p. 518).

Spelling is a knowledge-based skill and when teachers are explicitly taught the language essentials then they have the knowledge to understand how spelling supports reading (Moats, 2010). Teachers deserve opportunities to learn how to integrate decoding and spelling instruction based on orthographic phonology, morphology and etymology. Moreover, if “beauty” as Wolf (2018) contends, “allows us to attend to what is important” (p. 84) then delving into the interplay of orthographic phonology, morphology and etymology guides teachers and students to the beauty of the English spelling system: its “morphophonemic nature” (Bowers et al., 2018, p. 2). In so doing, teachers can then arouse wonder and admiration of the English spelling system

that is in fact very well behaved. After all, in the words of Charlotte Mason (2000), an educational reformer in the early twentieth century, “to arouse wonder and admiration must be one of the teacher’s principal aims”(p. 71). Finally, “if our perception of beauty becomes reduced to skimming like a water strider across the thin surface of words, we will miss the depths below; we will never be led by beauty to learn and understand what lies beneath”(Wolf, 2018, p. 84-85).

7.1 Educational Implications

Collectively, results of this study converge with results of international studies (e.g., Aaron et al., 2008; Hammond, 2015; Joshi et al., 2009a; Moats, 1994, 2014; Rose 2006; Washburn et al., 2013; Serry et al., 2015; Stark et al., 2015) to shed a searchlight beam on the need for colleges of education to educate their preservice teachers on the fundamentals of the structure of the English writing system. It cannot be assumed that literate and highly educated people have the metaphonological awareness, orthographic awareness or morphological awareness necessary to lead their students in structured word inquiry to ultimately discover the beauty of the English spelling system: that the English spelling system is well-behaved and makes perfect sense.

What is more, the collective findings of reading researchers demonstrate that intervention focused on increasing teachers’ own linguistic knowledge has direct correlates in improving student outcomes not only for lower-performing students but also on student outcomes overall. In other words, teachers’ knowledge is directly related to improved student performance (e.g., McCutchen et al., 2009; Washburn et al., 2010; Hammond, 2015). Teachers’ knowledge is a causative factor that either promotes or impedes students’ reading acquisition. Where are teachers expected to acquire the knowledge bases essential for teaching reading and spelling to all students, if not at university? Towards this end, efforts of this study highlight convergent

findings that ought to compel an urgent review of the standards for the education and professional competence of educators in British Columbia. The question must be posed: Is it enough for educators to have a “broad knowledge base” and understand the subject areas they teach (Teachers Regulation Branch, BC)? I have argued that teachers themselves need to have an explicit understanding of the structure of the English language in order to provide effective word-level instruction. I have argued therefore, that it is not enough to have a “broad knowledge base” and be responsible to create inclusive school environments.

The philosophy of inclusion is indisputable. Yet, research findings indicate that teachers are not sufficiently trained to ensure that all students, in particular dyslexic students, have equal access to learning and full participation in schools. “Unfortunately, the dream of having an individually appropriate education is still elusive to most” according to Lupart & Odishaw (2003) “and despite the rhetoric of inclusion of students who are at-risk, the reality is that we still have a long way to go before these students are truly, authentically included in our schools and in our communities”(p. 12). Indeed, Safer Schools Together include in their Violent Threat Risk Assessment training, a case study on Kipland Kinkel and the chronology of events that led up to the horror of May 20, 1998 when he shot both of his parents and May 21, the day of the school shooting at Thurston High School killing 2 and injuring 24. In grade two, at 8 years of age—because he had already repeated grade one—Kip had difficulty spelling his own name. His grade two teacher testified at his hearing “his level of frustration and anxiety was abnormally high.” Sadly Kip’s frustration and anxiety were not fully understood even though he continued to “qualify” for special education services. In grade 4 while continuing to “qualify” for special education services Kip was simultaneously placed in a Talented and Gifted program because of his above average performance in science and math. Kip’s case is obviously extreme but there

are lessons to be learned because there are many like Kip. His story shows us a level of pain society does not see. “For many, the walk through the kindergarten door is the beginning of a recurrent nightmare that is invisible”(Wolf, 2018, p. 151). The Bureau of Prisons in states across America know this well; many of them project the number of prison beds they will need in the future based on third grade reading statistics (Lavoie, 2001).

The results of this study are convergent with compelling evidence that teacher-directed instruction is essential to improving children’s reading. We cannot control where the students are coming from but we can control critical variables of instruction such as the content and instructional knowledge of the teacher. Clearly, teachers, especially those that teach reading, deserve opportunities in their professional training to better understand the nature and structure of the English spelling system. In so doing, not only are teachers honoured but also the students they teach. Equipping teachers with deep understanding of a diagnostic-prescriptive approach to teaching and ensuring they understand how their language works is a kangaroo leap toward empowering teachers and removing barriers for our students struggling with learning to read. All students with special needs should have equitable access to learning opportunities for achievement, and the pursuit of excellence in all aspects of their educational programs.

7.2 Limitations and Directions for Future Research

The present study did have some limitations. The participants surveyed were a small sample of teachers from one school district in the province of British Columbia. Thus it cannot be generalized to British Columbia. However, despite the sample size, many of the findings replicated those of earlier studies (e.g., Hammond, 2015; McCutchen et al., 2009; Moats, 1994; Moats et al., 2003; Rose, 2006; Serry et al., 2015; Spear-Swerling et al., 2005; Washburn et al., 2015; Washburn et al., 2011). The findings of this study may be used to support the hypotheses

that teachers are not learning the necessary content knowledge to ameliorate the effects of dyslexia (Rose, 2006; Moats, 2003).

Although it appears that the new curriculum in British Columbia is directing teachers away from explicit and systematic skill building, structured word inquiry (Kirby & Bowers, 2018) is consistent with the new curriculum. Kirby et al. argue that the effects of deliberate morphological instruction may make a greater contribution to reading and spelling, which may very well be worthy of future investigation. It has been suggested that morphological knowledge may represent an area of advantage for struggling readers (Berninger et al., 2013; Kirby et al., 2018), which is an important question for future research.

In the words of Kevin Cameron, Executive Director, Canadian Centre for Threat Assessment and Trauma Response, “you never waste a crisis.” Although, Kip’s story shows us a level of pain society does not see, the lessons learned—the loss of self-esteem leads to a host of social pathologies—has not yet changed teacher training. Let us not waste the horror of Kip’s story.

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Appendix A

Background Questionnaire

What led you to Let'sTalkLiteracy.com (this website)?

- search engine
- social networking site referral
- a social or professional connection recommended it to me
- a link on a blog or other type of site
- something else

Please elaborate:

Why did you choose to participate in this particular research study?

Please indicate your sex:

- Male
- Female

Are you currently employed as one of the following:

- a)* a teacher,
- b)* an educational administrator
- c)* or are you studying to be a teacher or educational administrator?
- Yes
- No

What is your current occupation?

How long have you been in this occupation? (years)

Which ages are the focus of your teaching or administrative duties (check all that apply)?

- Ages 0-4: Early childhood / Nursery
- Ages 4-5: Pre-K / Junior-K
- Ages 5-6 Kindergarten
- Ages 6-7 Grade 1
- Ages 7-8 Grade 2
- Ages 8-9 Grade 3
- Ages 9-10 Grade 4
- Ages 10-11 Grade 5
- Ages 11-12 Grade 6
- Ages 12-13 Grade 7
- Ages 13-14 Grade 8
- Ages 14-15 Grade 9
- Ages 15-16 Grade 10
- Ages 16-17 Grade 11
- Ages 17-18 Grade 12
- Higher education college / university
- Adult learning
- Other

Have you completed a bachelor's or higher degree? Yes No

Have you ever taken a college/university course related to literacy education?

- Yes, many
- Yes, a few
- Yes, one
- No

Have you ever taken a college/university course related to explicit, systematic word study or spelling instruction?

- Yes, many
- Yes, a few
- Yes, one
- No

How many minutes a week do you spend teaching spelling?

- 30-60 minutes
- 60-90 minutes
- 90-120 minutes
- > 120 minutes

Please rate your agreement with the following statements:

Thinking about your current classroom practices, how would you rate your ability to:

❖ **Teach phonemic awareness**

- minimal
- moderate
- very good
- expert

❖ **Teach phonics**

- minimal
- moderate
- very good
- expert

❖ **Teach fluency**

- minimal
- moderate
- very good
- expert

❖ **Teach vocabulary**

- minimal
- moderate
- very good
- expert

❖ **Teach comprehension**

- minimal
- moderate

- very good
- expert

- ❖ **Teach spelling**
 - minimal
 - moderate
 - very good
 - expert

- ❖ **Teach children's literature**
 - minimal
 - moderate
 - very good
 - expert

- ❖ **Teach literacy skills to English language learners**
 - minimal
 - moderate
 - very good
 - expert

- ❖ **Teach children with reading disabilities**
 - minimal
 - moderate
 - very good
 - expert

- ❖ **Use assessment to inform reading instruction**
 - minimal
 - moderate
 - very good
 - expert

- ❖ **Analyze spelling errors to inform instruction**
 - minimal
 - moderate
 - very good
 - expert

Thinking about your experience, training and practice, please rate your agreement with the following statements:

The English spelling system is unpredictable.

- strongly agree

- agree
- undecided
- disagree
- strongly disagree

A common sign of dyslexia is seeing letters backwards.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Children with reading difficulties have problems in decoding and spelling but not in listening comprehension.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Children with learning difficulties have lower IQs than typical learners.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Most teachers receive intensive training to work with children with reading difficulties.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Children with reading difficulties need a particular type of remedial instruction, which is different from that given to typically developing readers.

- strongly agree
- agree
- undecided
- disagree

- strongly disagree

Children with reading difficulties are naturally compensated for their literacy difficulties by particular strengths in artistic/visuospatial domains.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Children with reading difficulties often have associated difficulties such as clumsiness, poor short-term memory and concentration problems.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Individuals learn better when they receive information in their preferred learning style (e.g. auditory, visual, kinesthetic).

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Mental capacity is hereditary and cannot be changed by the environment or experience.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Exercises that rehearse coordination of perceptual-motor skills can improve literacy skills.

- strongly agree
- agree
- undecided

- disagree
- strongly disagree

Extended rehearsal of some mental processes can change the structure and function of some parts of the brain.

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

Comprehensive Survey of Language Knowledge (Moats, 2010)

1. From the list below, find an example of each of the following (answer will be a word or part of a word):

Inflected verb _____

Compound noun _____

Bound root _____

Derivational suffix _____

Greek combining form _____

peaches incredible slowed although shameful doughnut bicycle

neuropsychology sandpaper vanish

2. For each word on the left, determine the number of syllables and the number of morphemes:

	Syllable	Morphemes
bookworm	_____	_____
unicorn	_____	_____

elephant	_____	_____
believed	_____	_____
incredible	_____	_____
finger	_____	_____
hogs	_____	_____
telegram	_____	_____

Pseudoword task

3. I could feel the
- froodly
 - froodful
 - frooden
 - froodness
4. What a completely _____ idea.
- tribacious
 - tribicism
 - tribacize
 - tribation
5. Where do they _____ the money?
- curfamic
 - curfamity
 - curfamate
 - curfamation

6. Please _____.

- scriptial
- scriptize
- scriptist
- scriptious

7. A closed syllable is one that _____.

An open syllable is one that _____.

8. How many speech sounds are in the following words?

sigh _____ thrown _____ scratch _____

ice _____ sung _____ poison _____

mix _____ shrink _____ know _____

9. What is the third speech sound in each of the following words?

joyful _____ should _____ talk _____

tinker _____ rouge _____ shower _____

square _____ start _____

protect _____ patchwork _____

10. Underline the schwa vowels:

telephone addenda along precious imposition unless

11. Underline the consonant blends:

knight climb wreck napkin squished springy first

12. Underline the consonant digraphs:

spherical church numb shrink thought whether

13. When is *ck* used in spelling?

14. What letters signal that a *c* is pronounced /s/?
15. List all of the ways you know to spell “long o.”
16. List all of the ways you know to spell the consonant sound /f/.
17. When adding a suffix to a word ending with silent e, what is the spelling rule?
18. How can you recognize an English word that came from Greek?