THE PREDICTIVE ABILITY OF EARLY READING INDICATORS AND SPELLING ON ORAL READING FLUENCY

by

Jessie Reed

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

The purpose of this quantitative, predictive correlational study was to explore the predictive ability of beginning of the year scores of Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF), and scores from a Primary Spelling Inventory (PSI) at mid-year ORF scores for second-grade students in a rural school district in central Pennsylvania. Because reading skills are strongly linked to positive academic and life outcomes, the identification of students who may have reading difficulties is a critical task for schools. Alphabetic and orthographic knowledge is central to reading development and essential for educators to understand the reading aptitude of students. This study included a convenience sample of 124 second-grade participants from two elementary schools in rural Pennsylvania. A linear multiple regression analysis was used to determine how accurately can ORF scores can be predicted from a linear combination of scores from the beginning of the year reading and spelling benchmarks. The null hypothesis was tested and rejected at the 95% confidence level, where $F(3, 120) = 327.12$ and $p < .001$. There was a significant relationship between the combination of predictor variables and the criterion variable. Approximately 89% of the variance of the criterion variable can be explained by the linear combination of predictor variables. Only beginning of the year ORF was found to significantly predict mid-year ORF scores ($p < .001$). Limitations, implications, and directions for future research are discussed.

Keywords: alphabetic knowledge, grapheme, lexical quality, oral reading fluency, orthographic knowledge, phoneme

Dedication

This dissertation is dedicated to my loving family. To my husband Bob, thank you for supporting my dreams and having the confidence that this was the right path for us. You gave me the fortitude to make the finish line with no regrets. To my children, Nick, Gabby, Sofia, and Stella, your spirit gives me life. I hope my journey inspires you to work diligently for what you want and to recognize wholeheartedly the value of education. You have been so patient during times of imbalance, and I love and admire you all.

To my Mom, who never turns from kindness nor seeks the easy road, you have been our everything for a long time. We have taken different paths to success, but I carry your voice and example in my heart in all things. Thank you for leading with grace and building me strong enough to give a little extra in everything. You are water.

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I would like to thank Dr. Jessica Talada for her remarkable mentorship through the Final leg of this journey. With her as my chair, I pushed forward without any uncertainty. She leads with light, and it was a pleasure to work with her.

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List of Abbreviations

Curriculum-Based Measure (CBM)

Every Student Succeeds Act (ESSA)

National Early Literacy Panel (NELP)

National Reading Panel (NRP)

No Child Left Behind Act (NCLB)

Nonsense Word Fluency (NWF)

Oral Reading Fluency (ORF)

Primary Spelling Inventory (PSI)

Words Their Way (WTW)

CHAPTER ONE: INTRODUCTION

Overview

The purpose of this quantitative, predictive correlational study was to determine whether a linear combination of early literacy indicators and spelling can predict students' reading fluency ability. Chapter One provides a background for the topics for the foundations of early literacy instruction. Included in the background is an overview of the theoretical framework for this study. The problem statement relates to the scope of recent literature on this topic. The purpose statement is followed by a consideration of the significance of the current study. Finally, the research questions are introduced, and definitions pertinent to this study are provided.

Background

The National Assessment of Educational Performance (NAEP) results show that only 35% of students in the United States are proficient readers or better (NAEP, 2022). These alarming statistics reveal that literacy programs across the country are ineffective. Reading skills are one of the strongest predictors of positive academic and life outcomes; therefore, the identification of students who may have reading difficulties is an essential endeavor in schools (Greiner de Magalhaes et al., 2022; ILA, 2019; Møller et al., 2022; Murphy & Justice, 2019; Van Rijthoven et al., 2021; Zaric et al., 2019). The synchrony of literacy development is the relationship between reading, writing, and spelling (Negrete & Bear, 2019). To become proficient readers, students must learn to automatically recognize words and their meanings without decoding (Castles et al., 2018; Ehri, 2020). Gathering data on reading and spelling is essential for educators to understand the developmental reading profile of students (Negrete & Bear, 2019). The use of curriculum-based measures for reading is widely accepted and supported in the literature, but few scholars have investigated the predictive ability of spelling skills on reading achievement (Murphy & Justice, 2019).

Historical Overview

During the 1980s and 1990s, an emergent literacy paradigm was introduced (Saracho, 2017; Teale et al., 2020). The emergent literacy perspective views literacy as a process that begins early in life and develops into formal reading and writing as students enter primary grades (Teale et al., 2020). Thus, schools must encourage developmentally appropriate practices (DAP) for literacy that build foundational skills for proficient readers. In 1997, Congress approved the formation of a National Reading Panel (NRP) to assess the effectiveness of various approaches to reading instruction, identify areas for additional research, and develop policies on literacy instruction (National Reading Panel, 2000). Findings from the NRP contributed to the Reading First Legislation of the No Child Left Behind Act (NCLB) of 2001 (NCLB, 2001). Reading First promoted scientifically validated instructional practices and mandated schools ensure reading success for all students by third grade. The lasting contribution of the NRP is the identification of the essential components of effective reading instruction: phonemic awareness, phonics, vocabulary development, reading fluency, and reading comprehension (NRP, 2000).

The NRP's (2000) report did not include a focus on early literacy skills in children from birth to age 5 years that build the foundation for later reading achievement (NELP, 2008). Early childhood literacy skills have a strong relationship with school-age literacy skills (Conradi-Smith et al., 2020; Ehri, 2020; NELP, 2008; Teale et al., 2020). School-age literacy skills are the essential components of literacy, such as phonemic awareness, phonics, vocabulary development, reading fluency, reading comprehension, writing, and spelling (NRP, 2000; NELP, 2008). These essential components of literacy are the targets of reading, writing, and spelling instruction in elementary and secondary students; however, the NELP (2008) recognized the importance of foundational literacy skills that can be developed in early childhood that precede the development of conventional literacy skills in school-age children. Thus, the NELP convened

to investigate the conventional reading and writing skills that develop in the years from birth to age 5 years. The NELP (2008) found six early literacy variables correlated with later literacy achievement: alphabet knowledge; phonological awareness; rapid automatic naming of letters or digits; rapid automatic naming of objects or colors; writing or writing name; and phonological memory.

The Reading First Legislation of NCLB has been criticized for intensifying the achievement gap among marginalized students and for over-emphasizing standards-based accountability measures (Adler-Greene, 2019; Teale et al., 2020). School accountability is a critical component of quality education for all children; however, NCLB became known as the "one-size-fits-all" solution to the achievement gap between high- and low-performing children, including students with disabilities, students who come from low-income homes, and students belonging to minority groups (Adler-Greene, 2019; ESSA, 2015). In 2015, the Every Student Succeeds Act (ESSA) replaced NCLB to provide equitable educational experiences while protecting marginalized and high-need students. Although the ESSA maintains annual standardized testing requirements from NCLB, the individual states are responsible to submit an accountability plan to the Education Department. The ESSA also affords local educational agencies to submit local a comprehensive plan that incorporates the most appropriate evidence-based instruction, intervention, and assessment methods that match the needs of their student demographic (ESSA, 2015). Additionally, the ESSA provides funding and grants for programs of evidence-based literacy instruction that can help students succeed.

Recently, science of reading (SOR) has resurfaced as an instructional lens for teaching informed by scientific evidence (Cassidy et al., 2022; Petscher et al., 2020; Shanahan, 2020). SOR encompasses the body of objective investigations about how humans learn to read and how

reading should be taught (Goodwin & Jimenez, 2021; Hudson et al., 2021). SOR includes psychology and cognitive science perspectives and has demonstrated the most effective methods of learning to read, from recognizing spoken language to successfully decoding unfamiliar words (Goodwin & Jimenez, 2021; Hudson et al., 2021). SOR is dynamic and evolves with the emergence of new scientific evidence (Petscher et al., 2020; Shanahan, 2020). This view supports explicit teaching of foundational reading skills of phonemic awareness, phonics, fluency, vocabulary, and comprehension identified by the NRP (2000; Ehri, 2020; Goodwin & Jimenez, 2021; Shanahan, 2020).

The importance of early literacy instruction emerged nearly 4 decades ago with the convergence of the NRP (2000) and the NELP (2008). The results of these two literacy panels established essential components of literacy for preschool and school-age students and influenced legislation that mandates the use of evidence-based literacy instruction. The Reading First Legislation of NCLB (2001) gave the federal government authority over school accountability and implemented sanctions and rewards for adequate progress through standardized tests. This was replaced by the ESSA (2015) to close the achievement gap between high and low performing students including marginalized groups. The ESSA gives states and local education agencies authority over school accountability and continues to provide funding and grants for evidence-based literacy programs in schools. The SOR is a widely used instructional lens for literacy that incorporates research from psychology and cognitive science into reading instruction. The amalgamation of reading research and learning research empowers educators to better understand how students learn to read and to plan instruction that supports vast majority of students to become proficient readers.

Society-at-Large

A critical role of the ESSA (2015) is to promote equity and address achievement gaps for marginalized and vulnerable students. This Act purports that all students have equal access to high-quality curriculum and assessment, multiple measures of success, equitable resources, and proven interventions. Further, in a recent statement by the International Literacy Association (2019), access to excellent and equitable literacy instruction is a basic human right. The issue of how to assess reading proficiency through socially just means remains because reading and standardized reading measurements are greatly formed by culture (Aukerman & Chambers Shuldt, 2021; Peterson et al., 2018).

Reading is shaped by students' social and cultural environments (Aukerman & Chambers Shuldt, 2021; Teale et al., 2020). Knowledge and values embedded in passages and test questions can impact students' performance on a test because the tests may be written with advantage for readers from cultures that share those value orientations (Aukerman & Chambers Shuldt, 2021; Peterson et al., 2018). Emphasis on scores from such tests can lead to teachers' neglect of students' reading strengths and an overrepresentation of minority students in special education (Aukerman & Chambers Shuldt, 2021; Bowden et al., 2020; Peterson et al., 2018). Although efforts have been made to reduce test bias, standardized measure should not be the driving force for planning reading instruction and intervention. Instead, educators should consider the cultural, ethnic, and sociocultural backgrounds of their students and utilize data from multiple types of reading assessments to ensure the best capture of students' abilities.

Poverty, trauma, and mental and physical health impairments impact students' school achievement (Bowden et al., 2020). Reading is one of the strongest predictors of academic outcomes for children, and the foundation for proficient reading grows through empirically based systematic instruction during early elementary school (Conradi-Smith et al., 2020; Teale et al.,

2020). Equitable education can be the force that breaks the cycle of disadvantage by providing marginalized students with knowledge and skills to be competitive in the world (ESSA, 2015). The science of reading posits that implementing multiple measures of assessment and evidence-based practices in reading instruction can result in more equitable outcomes for all students (Aukerman & Chambers Shuldt, 2021; Petscher et al., 2020).

Theoretical Background

Ehri and McCormick's (1998) phase theory of reading development and theory of orthographic mapping served as the theoretical basis for this study. Ehri and McCormick's phases of reading development are characterized by alphabetic knowledge, the root of grapheme-phoneme correspondence. Graphemes are the written representation of phonemes; phonemes are the smallest units of spoken language (Ehri & McCormick, 1998; Kilpatrick et al., 2019). To become fluent readers, students must acquire a level of understanding of grapheme-phoneme correspondence through systematic phonics instruction. Ehri's theory of orthographic mapping involves the formation of letter-sound connections to the pronunciations and meanings of specific words in memory (Ehri, 2014). Building a lexicon of orthographic knowledge helps students read with little effort, freeing cognitive processes for comprehension (Querido et al., 2020; Zaric et al., 2019). Students acquire reading skills through systematic, effective, and cumulative literacy programs that build foundational skills that develop into proficient reading (Castles et al., 2018; Ehri, 2020). Ehri's phase theory of reading development and theory of orthographic mapping have instructional implications for improving student achievement in reading. Additionally, these theories have practical application to help teachers recognize skill deficits and guide appropriate instruction.

Early literacy instruction has been a focus of research because of its importance to later academic and school outcomes (NRP, 2000; NELP; 2008). Learning to read has been considered

a basic human right (ILA, 2019). Research by Ehri and colleagues has provided a framework for curricula for early reading instruction and makes a strong case for systematic instruction to build orthographic knowledge (Ehri, 2014, 2020). Beginning reading instruction must include tasks that teach the alphabetic code and spelling patterns (Ehri, 2020; Roberts et al., 2020). Through explicit and cumulative phonics instruction, students build connections between letters and sounds in pronunciations (Ehri, 2020). Spelling scores can glean insight into a student's developmental reading phase and identify their level of orthographic knowledge (Ehri & McCormick, 1998). Although scholars have supported using curriculum-based measures to collect student data, there is little research using spelling scores to identify students at risk for reading difficulties. (O'Keeffe et al., 2017; Van Den Bosh et al., 2019).

Problem Statement

Data-driven instruction and assessment are at the forefront of teacher requirements to ensure all students are making adequate progress in reading. With only 35% of students in the United States being proficient readers, it is clear that the current identification and screening procedures are not effective (NAEP, 2022). The current body of research supports curriculum-based measures for universal screening and progress monitoring; however, literature has not expanded the study of the relationship between reading fluency and spelling scores. Gaining a better understanding of the predictive ability of spelling could improve the screening and identification procedures for children at risk for reading comprehension difficulties (Murphy & Justice, 2019). While the significant relationship between reading fluency and nonsense word fluency has been established in professional research studies, there is a gap in research examining spelling scores as a predictor of future reading ability (Good et al., 2019; Murphy & Justice, 2019; Van Den Bosh et al., 2019).

Another gap in the literature calls for a more holistic picture of students' reading abilities (Conrad et al., 2019; Diggs & Christ, 2019; Murphy & Justice, 2019; Negrete & Bear, 2019). Seeing students' written representation of the lexical and sublexical orthographic knowledge may provide better diagnostic accuracy of reading difficulties (Diggs & Christ, 2019; Ehri, 2020; Munger & Murray, 2017; Murphy & Justice, 2019; Van Den Bosh et al., 2019). Additionally, gaining knowledge of a student's level of word-specific and general orthographic knowledge could inform immediate intervention (Zaric et al., 2019). The problem is that additional research is needed to determine the predictive ability of spelling scores on later reading ability to understand the utility of spelling as a tool for identifying and screening students at risk for reading difficulties (Gischlar & Vesay, 2018; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019).

Purpose Statement

The purpose of this quantitative, predictive correlational study was to explore the predictive ability of beginning of the year scores of NWF, ORF, and scores from a PSI at the mid-year ORF scores for second-grade students. Because manipulation of variables did not occur, the appropriate research design is nonexperimental (Gall et al., 2007). The predictor variables for this study were scores from the beginning of the year NWF, ORF, and PSI. The predictor variables were measured using *Acadience® Reading* NWF and ORF measures. NWF uses phonetically regular make-believe words that provide a direct measure of a student's knowledge of the alphabetic principle and basic phonics (Good & Kaminski, 2011). ORF is defined as the ability to read written words with accuracy, automaticity, and prosody (Good & Kaminski, 2011; Kuhn & Levy, 2015). The PSI is a list of words that represent a variety of spelling features and assesses students' knowledge of key spelling features that relate to the spelling stages (Bear et al., 2020). The composite score combines the total words spelled correct

with the number of features spelled correct. The criterion variable was scores on mid-year *Acadience® Reading* ORF.

The population was composed of 124 second-grade students from two rural elementary schools in the same district in central Pennsylvania. Student demographic information reported in 2017 are .53% multiracial, .04% Hawaiian/Pacific, .07% American Indian, .42% Asian, 1.4% African American, 8.31% Hispanic, and 89.42% White. Additionally, 45.22% of the student population is economically disadvantaged.

Significance of the Study

Foundational literacy skills are the building blocks to becoming a proficient reader, and early screening is key to identifying at-risk students. Understanding how students learn to read is vitally important for interpreting and using data on early literacy indicators (January & Klingbeil, 2020; Shanahan, 2020). A critical question is how teachers can utilize universal screening and progress monitoring data from curriculum-based measures (CBM) to inform instruction (Good et al., 2019; Oslund et al., 2017). The use of CBM data has been recommended as a tool for universal screening and progress monitoring; however, several researchers have considered the utility of spelling scores (Gischlar & Vesay, 2018; January & Klingbeil, 2020; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; Oslund et al., 2017; Pan et al., 2017). The ability to spell involves multiple skills, ranging from knowledge of spelling patterns to spelling unfamiliar words, and the potential exists to identify skill deficits based on spelling errors (Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; O'Keeffe et al., 2017; Van Den Bosh et al., 2019).

Adding spelling scores to benchmark testing has several benefits. Scores for spelling may provide additional information about reading development because they reveal a student's application of orthographic knowledge (Ehri, 2020; Murphy & Justice, 2019; Negrete & Bear,

2019). This may glean insight into the student's ability to read words beyond standardized reading CBMs (Murphy & Justice, 2019; Oslund et al., 2017). Both spelling and decoding require orthographic knowledge; however, spelling scores provide a glimpse into students' lexical and sublexical skills (Murphy & Justice, 2019). Another benefit of including spelling scores in assessments is the efficiency of use since spelling can be administered in groups, whereas CBMs administration occurs individually (Munger & Murray, 2017; Murphy & Justice, 2019).

The current study contributed to the existing literature by exploring the predictive ability of early literacy curriculum-based measures and spelling scores on later reading achievement. Gaining a better understanding of the predictive ability of spelling could enable more informative identification and screening procedures (Murphy & Justice, 2019). With the addition of spelling scores, teachers may be able to better target students' skills deficits in reading, facilitating the application of more appropriate interventions and instruction. Additionally, this study provides insight for continued research on the benefits of using spelling scores as part of universal screening for early literacy.

Research Question

The following research question guided this study:

RQ1: How accurately can Oral Reading Fluency (ORF) scores be predicted from a linear combination of scores from the beginning of the year curriculum-based measures of nonsense word fluency (NWF), oral reading fluency (ORF) and Words Their Way Primary Spelling Inventory (PSI) for second-grade students?

Definitions

1. *Alphabetic knowledge*: A working knowledge of the alphabetic system (Ehri & McCormick, 1998).

2. *Curriculum-based measure*: An approach to measuring student growth and evaluating the effectiveness of instruction or intervention (Good & Kaminski, 2011).
3. *Grapheme*: A written representation of phonemes (Ehri, 2020; Ehri & McCormick, 1998).
4. *Nonsense Word Fluency*: Phonetically regular make-believe (nonsense or pseudo) words that provide a direct measure of the alphabetic principle and basic phonics (Good & Kaminski, 2011).
5. *Oral Reading Fluency*: The ability to read written words with accuracy, automaticity, and prosody (Good & Kaminski, 2011; Kuhn & Levy, 2015)
6. *Orthographic knowledge*: Orthographic knowledge represents spoken language in a written form stored in memory (Ehri, 2020; Kilpatrick et al., 2019).
7. *Orthographic mapping*: The formation of letter-sound connections to bond the spellings, pronunciations, and meanings of specific words in memory (Ehri, 2014, 2020).
8. *Phoneme*: The smallest unit of sound that make up spoken language (Ehri, 2020; Ehri & McCormick, 1998).
9. *Progress monitoring*: Using ongoing assessment data of identified at-risk students to measure the effectiveness of instruction or intervention (Good & Kaminski, 2011).
10. *Universal screening*: A screening tool that assesses every student within a grade level at specified intervals in a school year to quantify student risk based on established benchmark scores (Good & Kaminski, 2011).

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic review of the literature was conducted to explore the relationship between foundational reading and spelling skills for students in second grade. This chapter includes the findings of this review of the current literature related to the topic of study. First, Ehri's theories of reading development and orthographic mapping will be discussed; next, a synthesis of recent literature on early reading development will be addressed, and a review of research on the science of reading will be reviewed. Lastly, studies of orthographic knowledge in reading and spelling development are reviewed. Finally, a gap in the recent literature is identified, justifying the need for the current study.

Theoretical Framework

Linnea Ehri's theory of the phases of reading development and theory of orthographic mapping focus on students' acquisition of reading skills. The phase theory of reading development identifies five phases characterized by knowledge of the alphabetic system. The phases are prealphabetic, partial alphabetic, full alphabetic, consolidated alphabetic, full alphabetic, and automatic phases (Ehri & McCormick, 1998). As students move through the phases of reading development, they store spelling patterns in memory and recognize words by sight. Learning to read and spell words involves forming connections between the smallest unit of the writing system, graphemes, and a unit of sound, phonemes, and bonding the spellings of words to their pronunciations in memory (Ehri, 2014). This concept is orthographic mapping, and it explains how students learn to read words by sight, to spell words from memory, and to acquire vocabulary words from print (Ehri, 2020; Kilpatrick et al., 2019).

Phase Theory of Reading Development

Ehri and McCormick (1998) described phases of development that all readers progress through from early reading to skilled reading. There are several methods that proficient readers use to recognize words: decoding, analogy, prediction, and sight-reading. Decoding involves identifying sounds of individual letters and blending them into pronunciations that students recognize as actual words (Castles et al., 2018; Ehri & McCormick, 1998). Another method is analogy, in which students recognize how the spelling of an unknown word is like one they already know (Ehri, 2020; Ehri & McCormick, 1998). Prediction is when a student guesses an unknown word using the first letter sounds, words before and after in the text, and any available context clues (Ehri, 2020; Ehri & McCormick, 1998). Finally, reading words by sight activates the memory of words that have been read before and stored (Krasa & Bell, 2021; Negrete & Bear, 2019). Using this method, students can automatically recognize pronunciations and meanings and read with little cognitive effort.

Reading words by sight requires students to develop an understanding of grapheme-phoneme correspondences. Ehri and McCormick (1998) described graphemes as functional letter units that symbolize phonemes, the smallest sound units in a word. Alphabetic knowledge is the root of grapheme-phoneme correspondence; thus, Ehri's phases of reading development characterize foundational reading skills that students must acquire before moving to the next phase (Conrad et al., 2019; Roberts et al., 2020). When students begin to understand and use alphabetic processes, they progress through the phases of reading development successively (Ehri & McCormick, 1998).

The first phase is prealphabetic because students do not use alphabetic knowledge to read words (Ehri & McCormick, 1998). At this phase, students have a limited understanding of how letters correspond to sounds in oral language; therefore, they cannot decode or apply word attack

strategies. Students can identify some words from sight, but they are often words that are commonly encountered in their environment (Ehri & McCormick, 1998). When context clues such as pictures or logos are absent, students have difficulty recognizing to these words. The prealphabetic phase is typical of preschool or early kindergarten students who lack letter knowledge (Roberts et al., 2020). At this phase, students must develop knowledge of both uppercase and lowercase letters and phonemic awareness. Additionally, students begin to develop phonemic awareness skills, an understanding that spoken words consist of separate phonemes or sounds (Kilpatrick, 2020). Once students develop phonemic awareness, they understand grapheme-phoneme correspondences in words and move to the next phase.

Ehri's next phase is partial alphabetic when students begin to read words by sight using some alphabetic cues and guessing strategies (Ehri & McCormick, 1998). Students cannot decode or apply analogy strategy because they cannot segment the word's pronunciation into all its phonemes (Ehri, 2005). This phase typifies students in kindergarten and early first grade when students learn to match letters to their corresponding sounds. Students will know most consonants especially those with a name that makes their sound; however, they lack knowledge of graphemes involving more than one letter to symbolize a phoneme (Ehri & McCormick, 1998). Students in this phase use partial letter knowledge combined with context clues to predict unknown words (Ehri & McCormick, 1998; Roberts et al., 2020; Treiman & Wolter, 2020).

Alphabetic mastery must be achieved before moving to the subsequent phases. In the full alphabetic phase, Ehri and McCormick (1998) described how students "acquire and use orderly relationships for associating sounds to the letters they see in words" (p. 149). In this phase, students acquire the essential foundation for developing proficient reading skills. Students have a working knowledge of grapheme-phoneme correspondences of the alphabet. In addition, they

have phonemic awareness, which allows them to match phonemes in pronunciations to graphemes in conventional spellings (Treiman, 2018; Vazeux et al., 2020). Knowledge of grapheme-phoneme correspondence enables students to apply decoding strategies to identify unfamiliar words and store sight words in memory while also applying analogy to familiar words (Ehri & McCormick, 1998). When students gain this knowledge, there is a significant increase in sight-word vocabulary and reading words as text. Text reading begins slowly because early readers do not have large stores of words in memory (Chambrè et al., 2020; Ehri & McCormick, 1998).

With more reading practice, students can consolidate grapheme-phoneme chunks into larger units. Ehri and McCormick (1998) called this phase the consolidated-alphabetic phase, also referred to as the orthographic phase, because the focus is on spelling patterns. This phase involves learning chunks of letters such as roots, affixes, onsets, rimes, and syllables (Ehri & McCormick, 1998). These word chunks facilitate word decoding accuracy and speed while storing the spelling patterns in memory, building the orthographic lexicon. A large orthographic lexicon contributes to faster and more effective sight word reading because larger chunks require less processing per word (Conrad et al., 2019; Negrete & Bear, 2019).

The final phase is automatic because students have developed the skills to identify unfamiliar and familiar words instantly. Most words encountered in a text are familiar, and students approach unfamiliar words using several word-identification strategies. Ehri and McCormick (1998) purported that having a toolkit of multiple methods to identify unfamiliar words allows students to maintain a high level of reading accuracy. When word reading becomes automatic, fluent, and accurate, students can focus more on text comprehension (Castles et al.,

2018; Ehri, 2014). Comprehension, or gaining meaning from written text, is the goal of literacy instruction (Ehri, 2020; Petscher et al., 2020; Teale et al., 2020).

Theory of Orthographic Mapping

Through the phases of reading development, students form a connection between the spellings of words and their pronunciations in memory. Ehri (2014) introduced this concept as orthographic mapping and defined it as the process of forming grapheme-phoneme connections that bond the spellings, pronunciations, and meanings of words as a single lexical unit in memory (Ehri, 2014; Kilpatrick et al., 2019). Orthographic mapping occurs when readers form connections between written units, either single graphemes or larger spelling patterns, and spoken units, either phonemes, syllables, or morphemes (Ehri, 2014). Orthographic mapping allows students to build a storage system of familiar words and spelling patterns in memory called the orthographic lexicon. Orthographic mapping explains how children learn to read words by sight, spell words from memory, and to acquire vocabulary words from print (Conrad et al., 2019; Negrete & Bear, 2019).

Children are taught to read words by applying strategies to unfamiliar words and by retrieving previously read words that have been stored in memory (Ehri, 2014). Students use their knowledge of the writing system to apply a decoding strategy to an unknown word. The English writing system consists of graphemes that are single letters or digraphs that represent the smallest sounds or phonemes in words (Ehri, 2014; Krasa & Bell, 2021). As students progress through the phases of reading development, larger grapho-syllabic and morphemic spelling-sound units are stored (Ehri, 2014; Kilpatrick, 2020). When decoding, students transform graphemes into a blend of phonemes or spelling patterns into a blend of syllabic units (Ehri, 2020). Students are simultaneously searching the orthographic lexicon for a familiar spoken

word that matches the blend and fits the context of the word (Ehri, 2014). Because the English writing system includes multiple pronunciations and spellings of sounds, as well as irregular spelling patterns, students must expect variability when blending letters to form recognizable words (Ehri, 2020).

Another strategy to apply to an unfamiliar word is analogy. This involves recognition of a similar spelling pattern of a word in memory and adjusting the pronunciation to match letters in the unknown word (Ehri, 2014). Ehri and McCormick (1998) asserted that students must have a large storage of recognized words to read words by analogy. Ehri identified a third strategy for reading unfamiliar words as prediction. When reading with prediction, students use initial letters plus contextual cues or pictures to make a guess about the word (Ehri, 2014, 2020). The students will match the pronunciation to the spelling of the predicted word to verify that the phonemes fit the graphemes. Students make connections between the spellings and pronunciations of words by through application of the reading strategies of decoding, analogy, and prediction. Students must have knowledge of the English writing system and phonological skills to apply a strategy (Kilpatrick, 2020).

As students see a new word and say or hear its pronunciation through a reading strategy, the spelling becomes mapped onto its pronunciation and meaning and stored in memory (Ehri, 2014). Words that have been read before become sight words because seeing the word immediately activates the pronunciation and meaning in memory (Chambrè et al., 2020; Negrete & Bear, 2019). Sight word reading enables accuracy and reading fluency while accuracy and reading fluency increase reading comprehension. Skilled readers read by sight because orthographic mapping builds a sight word bank also known as the orthographic lexicon (Conrad et al., 2019; Zaric et al., 2019). Sight words can be phonetically regular or words with

phonetically irregular parts (Ehri, 2014). Words are considered sight words when students no longer need to decode or apply a reading strategy to identify the word. Students recognize words automatically because they have been orthographically mapped (Kilpatrick et al., 2019). When students read words from memory rather than by decoding, analogy, or prediction, reading fluency improves and students can focus on the meaning of the written words. Students become less dependent on word reading strategies; however, decoding, analogy, and prediction may still be utilized in proficient readers to confirm words identified fit the spelling and the context (Ehri, 2014).

Orthographic knowledge is stored during the phases of reading development. The phases are named to reflect the types of connections that are formed using alphabetic knowledge and stored in memory (Ehri, 2014). In the partial alphabetic phase, students learn letter names and sounds and begin forming partial connections to the more notable letters to sounds in pronunciations (Treiman & Wolter, 2020). In the full alphabetic phase, students begin to develop working knowledge of the major letter sound correspondences and use that knowledge to decode unfamiliar words and read words by analogy (Ehri, 2014; Treiman & Wolter, 2020). Sight word memory is formed which leads to early fluency. During the consolidated alphabetic phase, students develop working knowledge of recurring spelling patterns and commonly occurring suffixes (Conrad et al., 2019; Negrete & Bear, 2019). Sight words are easily stored because students have developed the ability to recognize word parts and common spelling patterns. In addition, during this phase, students have gained knowledge about the more complex sound-symbol correspondences in their orthographic lexicon and reading fluency emerges (Negrete & Bear, 2019). Finally, in the automatic-alphabetic phase students recognizes most words in text

automatically by sight; however, students can draw on the various reading strategies to identify unfamiliar words rapidly (Negrete & Bear, 2019; Zaric et al., 2019).

Orthographic mapping is also important because the spellings of words enter memory and improve vocabulary acquisition (Chambrè et al., 2020). Students who remember words better when the spellings were seen because orthographic mapping bonds the pronunciation and meanings of new vocabulary words in memory. Spelling activities activate grapheme–phoneme connections to create a stronger pronunciations and meanings bond in memory which facilitates vocabulary learning (Ehri, 2020). Alphabetic and orthographic knowledge is necessary to create high-quality lexical representations for fluent, accurate reading (Petscher et al., 2020).

Ehri's research emphasizes the importance of systematic phonics instruction to teach students the foundational skills to become efficient at decoding (Petscher et al., 2020). Ehri's theories explain how students form grapheme-phoneme representations through decoding and store them in memory to build an orthographic lexicon. Additionally, spelling instruction strengthens students decoding ability and stores of spelling patterns in memory (Murphy & Justice, 2019; Zaric et al., 2019). As students gain representations in their lexicon, word-reading fluency improves, allowing more focus on reading comprehension. Reading becomes automatic and frees the cognitive load for comprehension. Ehri's theory of orthographic mapping explains how students read words by sight, spell words from memory, and acquire vocabulary words from print (Ehri, 2014).

Ehri's theory of the phases of reading development and theory of orthographic mapping explain how students develop the skills to become proficient readers and can be used to inform instruction. Skills in each of the phases of development can help teachers determine how to support, scaffold, and guide their students to the next phase (Ehri, 2014). Ehri's phase theory of

reading development and theory of orthographic mapping helps understand the process of learning to read as students move from alphabetic knowledge to proficient reading through orthographic learning. Understanding these theories helps educators understand how to provide explicit and systematic instruction for students to progress through these phases in both typical and struggling readers (Castles et al., 2018; Ehri, 2014; Møller et al., 2022).

Related Literature

Students in the United States have the right to excellent literacy instruction because reading ability has been linked to outcomes later in life (Greiner de Magalhaes et al., 2022; ILA, 2019; Møller et al., 2022; Peterson et al., 2018; Van Rijthoven et al., 2021). The Reading First Legislation of No Child Left Behind (2001) was the first to mandate research-based instructional practice and hold schools accountable for student progress. The National Reading Panel (2000) and The National Early Literacy Panel (2008) identified the essential components of reading and the most effective practice of reading instruction. The Every Student Succeeds Act (2015) replaced NCLB (2001) in effort to make educational experiences more equitable by giving states and local educational agencies more control over school accountability measures that match the needs in their student demographic. Most recently, reading instruction has been viewed through the science of reading lens which incorporates perspectives from various disciplines in psychology and cognitive science into reading instruction. A review of related literature shows the development of literacy skills begins early in childhood and progresses through explicit, systematic reading and spelling instruction in schools (Cassidy et al., 2022; Hoffman et al., 2021; Teale et al., 2020).

Children's Rights to Excellent Literacy Instruction

Reading is considered a gateway to success in school (Castles et al., 2018; Roberts et al., 2020). Through the theoretical lens of Ehri and McCormick (1998), early foundational literacy

skills are essential for later reading development (Hoffman et al., 2021; Petscher et al., 2020; Saracho, 2017; Teale et al., 2020). Literacy begins early in life and develops into formal reading and writing education during the primary grades (Petscher et al., 2020; Roberts et al., 2020; Teale et al., 2020). Developing early literacy skills in early childhood makes it easier for children to progress in formal literacy instruction (Castles et al., 2018; Jeong et al., 2017; National Early Literacy Panel, 2008; Pan et al., 2017; Saracho, 2017; Teale et al., 2020). Before students enter school, they are exposed to print and pick up cues from the environment that enable them to recognize words and imitate reading-like behaviors (Ehri, 2014; Saracho, 2017; Teale et al., 2020). In addition, students who come from literacy-rich home environments often come to school with a strong foundation for alphabetic knowledge (Saracho, 2017).

Early literacy has been a focus of research for decades (NRP, 2000; NELP, 2008; Saracho, 2017; Teale et al., 2020). In 1997, Congress formed the National Reading Panel (2000) to review reading research before and after 1966 to identify "critical skills, environments, and interactions that influence the young children's acquisition of reading abilities" (p. 1). The NRP approached the review of research through scientific methods and identified the most effective reading practices. Those practices consist of explicit, systematic, and cumulative instruction in phonemic awareness, phonics, fluency, vocabulary, and comprehension (NRP, 2000). The NRP's report continues to be influential in determining policy and practice and remains a guideline for many current early literacy programs and initiatives (Castles et al., 2018; Petscher et al., 2020).

The Reading First legislation of NCLB was the first of educational policies to promote instructional practices for literacy that have been validated by scientific research (NCLB, 2001). This legislation explicitly defines scientifically based reading research and outlines the specific activities state, district, and schools are to carry out based upon such research (NCLB, 2001).

Based on the NRP's (2000) report, reading curricula and materials must focus on five essential components of reading instruction: phonemic awareness, phonics, vocabulary, fluency, and comprehension. Additionally, school districts must provide professional learning for teachers on using scientifically based reading practices and how to work with struggling readers (NCLB, 2001). The Reading First legislation also emphasized identifying and preventing early reading difficulties through universal screening, interventions for struggling readers, and monitoring of student progress (NCLB, 2001).

The National Early Literacy Panel convened to review and synthesize previous studies relevant to the early predecessors to conventional literacy instruction (NELP, 2008). The goal of NELP was to gain insight into the early acquisition of literacy and improve the field of literacy in early childhood education to benefit the children's long-term education. The NELP report acknowledged several essential variables that predict young children's literacy proficiency later in school (NELP, 2008; Saracho, 2017). The most robust and reliable foundational skills for later literacy achievement are alphabet knowledge and phonological awareness (NELP, 2008).

Practices under NCLB exposed an achievement gap among marginalized students and therefore, the Every Student Succeeds Act (2015) replaced NCLB as the main federal law for K–12 general education. Under the ESSA (2015), states are accountable for student achievement. The law provides a flexible framework; however, each state sets its own goals for student achievement within the framework (ESSA, 2015). Additionally, states were required to adopt challenging academic standards in reading, math, and science (ESSA, 2015). The National Governor's Association developed the Common Core State Standards (CCSS) to prepare students from kindergarten through senior year of high school for college and careers (Castles et al., 2018). These CCSS standards for foundational literacy in grades kindergarten to 5 are based

on the NRP (2000), and NELP (2008) reports. These standards build students' understanding and working knowledge of concepts of print, the alphabetic principle, and other essential components of the English language and writing system Castles et al., 2018. The foundational skills in CCSS are essential components of effective, systematic literacy instruction that is designed to develop reading proficiency in all students.

The International Literacy Association (2019) published a position statement advocating for students' rights to excellent literacy education. "Excellent literacy instruction builds a strong foundation for learning and, in turn, equips children to develop their potential, growing into adults who participate fully in their communities and society, enjoying the fullness that continuous learning brings to their lives" (ILA, 2019, p. 2). Taken together, ESSA (2015), CCSS, and the science of reading present an opportunity for an equitable education system designed to ensure that historically marginalized students receive an equitable literacy education that prepares them for lives in the dynamic 21st century (Cook et al., 2016; ESSA, 2015; Petscher et al., 2020).

The Science of Reading

The term *science of reading* has increased and decreased in pedagogy over two centuries. It was first used in the 18th century to refer to text reading coinciding with the scientific study of language and the inception of linguistics. The purpose of studying linguistics was to determine proper pronunciations of ancient languages to read the Koran or the Bible (Shanahan, 2020). During the 1830s, science of reading was used in education to discuss teaching students to sound out words properly although early reading research was not limited to decoding (Shanahan, 2020). Efforts to apply research to reading instruction have increased since the 1950s due to growth of reading research, specialized journals of reading research, national funding for reading

research, and mandates that require instructional alignment with reading research (Cassidy et al., 2022). The application of reading research to instruction includes a heavy emphasis on decoding, vocabulary, reading comprehension, metacognition, oral language, and spelling (Cassidy et al., 2022; Shanahan, 2020).

The science of reading (SOR) was identified as an "extremely hot topic" in *What's Hot in Literacy* annual survey in 2021 (Cassidy et al., 2022; Jeong et al., 2017). SOR encompasses the body of objective investigations about how humans learn to read and how reading should be taught (Cassidy et al., 2022; Goodwin & Jimenez, 2021; Hudson et al., 2021; Shanahan, 2020). SOR incorporates perspectives from various disciplines in psychology and cognitive science and has demonstrated the most effective methods of learning to read from the basics of spoken language to successfully decoding unfamiliar words. Based on the simple view of reading, SOR emphasizes the importance of role of decoding, language, and listening comprehension when learning to read (Gough & Turner, 1986). Students struggle with reading comprehension when either decoding or language is underdeveloped (Cervetti et al., 2020; Duke & Cartwright, 2021). This view supports explicit teaching of foundational reading skills of phonemic awareness, phonics, fluency, vocabulary, and comprehension identified by the NRP (Goodwin & Jimenez, 2021).

Humans acquire spoken language first and then must learn how to structure the sounds. Dehaene (2009) purports that by the age of 5 years old, children have expert knowledge of phonology from spoken language; however, they are not aware of this knowledge and must be explicitly taught in early literacy programs. The human brain is hard-wired for processing language, but the neural circuitry necessary for reading is established through instruction (Castles et al., 2018; Dehaene, 2009). Three brain regions associated with reading are the

phonological processor, the orthographic processor, and the phonological assembly region (Dehaene, 2009). The phonological and orthographic processors of the brain humans manage language and visual images and develop as students form connections between phonemes and graphemes (Dehaene, 2009; Ehri, 2020; Kilpatrick, 2020).

Phonemic Awareness

Foundational literacy skills begin with phonemic awareness (Cassidy et al., 2022; Ehri, 2020; Kilpatrick et al., 2019). Phonemes are the smallest detectable sound units in spoken language and allow the human brain to distinguish one syllable or word from another. Writing systems are designed for letters to represent individual phonemes; however, the English language has inconsistencies in letter-phonemes (Kilpatrick, 2020). Students must master the alphabetic code to distinguish between the different phonemes within a spoken pronunciation. Letter-sound representations are stored in long memory and anchor the word's spelling to that pronunciation (Kilpatrick, 2020). Although the NRP (2000) identified awareness of graphemes-phonemes as an awareness, orthographic mapping continues to build letter-sound proficiency throughout reading development (Castles et al., 2018; Ehri, 2020).

Spoken language is hard wired in the human brain, but the brain must be taught to decipher written code (Castles et al., 2018; Dehaene, 2009). The alphabetic code, the idea that words are made of sounds and that letters represent those sounds, is a first step in recognizing sounds from speech correspond to letters in print (Roberts, 2021). Phonemic awareness can be a difficult concept because phonemes have no physical reality (Vazeux et al., 2020). Students must learn the letter-sound correspondences not only to assist in sounding out new words, but also because phonemic awareness is central to remembering words (Kilpatrick, 2020). Phoneme awareness is the ability the most strongly correlated with reading acquisition, and it is learned

most effectively during the alphabetic phases of reading development (Castles et al., 2018; Vazeux et al., 2020).

The ability to segment pronunciations into phonemes underlies the process of connecting graphemes to phonemes; therefore, students must be taught the foundational skill of phonemic awareness. Teachers instruct students to the sounds heard in words and the articulatory gestures produced by the movements of the mouth while in saying words (Ehri, 2014). Articulation exercises configure phonemic representations of words in memory because the letters in the words become more firmly attached to these mouth gestures to support word reading (Ehri, 2014). Phonemic awareness expands students' knowledge of sounds from individual letters to syllables, onsets and rimes, and words. Vazeux et al. (2020) found that by teaching the relations between letters and syllables, children learn the pronunciation of letters depending on their context. Students build phonemic representations as they learn that a spoken syllable corresponds to a sequence of letters.

Systematic Phonics Instruction

One of the critical elements in successful reading instruction identified in reading research is the role of phonics instruction in learning to read (Ehri, 2020). SOR shows that the brain is not hard-wired to read and therefore, alphabetic code must be systematically and explicitly taught (Dehaene, 2009). Systematic and explicit phonics instruction presents knowledge of the regular sound and spelling patterns found in the English language. It teaches students the correspondences between graphemes and phonemes and how to use these to read and spell (Castles et al., 2018; Ehri, 2020). Phonics is the practical application of the alphabetic principle and allows students to decode words they have not encountered before by applying phonemic awareness skills (Ehri, 2020). Through explicit instruction, phonics skills should be

cumulatively taught, so students build automaticity in recognizing grapheme-phoneme correspondence.

Systematic phonics programs begin with alphabetic knowledge, the teaching of the letters' shapes, sounds, and associations (Roberts, 2021). These programs teach students the primary grapheme-phoneme connections in a specified order; students master each phase to achieve proficiency in reading (Castles et al., 2018). Systematic phonics instruction includes phonemic awareness strategies to teach students to blend and segment phonemes and a routine for decoding words that utilize spelling instruction to activate orthographic maps to store spellings (Goodwin & Jimenez, 2021). In addition to decoding, students are taught various strategies for approaching unfamiliar words, such as using words with similar spellings to make analogies to familiar words (Chen et al., 2019). Decodable books provide opportunities to practice the foundational skills in a meaningful way and bond words to spelling and pronunciations in memory (Castles et al., 2018; Ehri, 2020). As students build stores of vocabulary and sight words in their orthographic lexicon, reading becomes effortless and automatic, allowing them to gain meaning from text (Negrete & Bear, 2019; Querido et al., 2020; Zaric et al., 2019).

Learning to read does not occur as a natural development process; therefore, research supports several evidence-based principles for phonics instruction (Castles et al., 2018; Dehaene, 2009; Ehri, 2020). First, systematic phonics instruction is most effective in a comprehensive reading program that includes phonemic awareness, fluency, vocabulary, and comprehension (NRP, 2000). Instruction in foundational literacy skills is most effective in early childhood education (Petscher et al., 2020; Roberts et al., 2020). Finally, reading instruction must be explicit, systematic, and cumulative. Many programs include a scope and sequence from less

complex to most complex that allows students to progress through the phases of reading development while building their orthographic lexicon.

Through phonemic awareness and phonics instruction, students learn to use the alphabetic principle to establish relationships between the letters of written language and the sounds of spoken language (Castles et al., 2018; Ehri, 2014). These skills lead to reading fluency, which is a significant predictor of reading comprehension across all grade levels (Teale et al., 2020). The automatic phase is the final phase in word reading development (Ehri & McCormick, 1998). This phase is characterized by quick and effortless word recognition because most words read have been stored in the orthographic lexicon. Students have developed automatic decoding strategies and possess a variety of word attack strategies to use with little effort (Ehri & McCormick, 1998). Fluency involves automatic word recognition combined with semantic and syntactic knowledge of text (Duke & Cartwright, 2021; Negrete & Bear, 2019). Additionally, fluent reading requires knowledge of how text features such as punctuation signal prosody (Duke & Cartwright, 2021). When students can read fluently, the cognitive focus is entirely on the meaning of the printed text.

Reading and spelling are essential life skills; thus, all students must receive quality literacy instruction (Greiner de Magalhaes et al., 2022; ILA, 2019; Møller et al., 2022; Van Rijthoven et al., 2021; Zaric et al., 2019). To become a successful reader and speller, students must build stores of phonological, orthographic, and semantic representations (Ehri, 2020; Kilpatrick et al., 2019; Negrete & Bear, 2019; Querido et al., 2020; Zaric et al., 2019). Many phonics interventions focus solely on reading and do not combine reading and spelling instruction as one (Van Rijthoven et al., 2021). Recent research has supported a combination of spelling and phonics in one intervention to bolster reading and spelling development (Greiner de

Magalhaes et al., 2022; Møller et al., 2022; Van Rijthoven et al., 2021). Spelling requires students to explore the use of sounds and letters in words; thus, spelling stimulates the development of phonemic awareness and alphabetic knowledge (Møller et al., 2022). Spelling goes beyond phonemic awareness because it forces students to use orthographic codes. Møller et al. (2022) posited that students may use orthographic code for spelling before using it for reading. Children with reading impairments significantly improve their pseudoword reading, word reading, and word spelling following combined phonics through spelling intervention (Møller et al., 2022; Van Rijthoven et al., 2021).

Spelling

The Horn-Ashbaugh Speller, by Ernest Horn and Ernest Ashbaugh (1921), was the first text to present evidence-based spelling instruction (Pan et al., 2017). *The Speller* included grade-level lists and a systematic routine of testing, writing, and word study exercises (Pan et al., 2017). *The Speller* was a popular textbook that introduced effective learning strategies that are still recognized today such as distributed practice and low-stakes practice tests to learn the spelling of words. Both strategies improve students' ability to recall information and apply skills in various contexts (Brown et al., 2014). Cognitive and educational research has established that both distributed practice that low-stakes practice tests promote retrieval and function as a more powerful learning tool than nonretrieval studying (Brown et al., 2014; Pan et al., 2017).

In the early 20th century, spelling skills were highly valued. Despite its popularity, there are components of *The Speller* that make it obsolete in today's classroom. First, English spelling patterns have many irregularities, and it makes some written words difficult to associate with their spoken forms (Daffern & Critten, 2019; Krasa & Bell, 2021). Additionally, *The Speller* did not include phonics-based activities because there was inadequate evidence at the time

supporting the effectiveness of phonics instruction; instead, students were expected to memorize the spellings of words (Pan et al., 2017). Finally, the absence of grade-level benchmarks for spelling lists did not allow for diagnosing individual students' spelling skills in a systematic way (Pan et al., 2017). Spelling ability was reflected by the level of difficulty of the word lists and a tally of errors from an analysis of letters of correspondence that the authors conducted (Pan et al., 2017).

Skepticism over the traditional methods of explicit spelling instruction has grown in recent years. The deemphasis of direct spelling instruction has occurred because incorrect spelling is no longer penalized on many standardized tests, innovations in technology automate the spelling process, and different ways to spell due to digital communication negate the importance of correct spelling. Although spelling is not penalized on standardized tests such as the Scholastic Achievement Test (SAT), the Common Core State Standards still include specific spelling benchmarks starting at third grade (Pan et al., 2017). The innovation of digital communication has had a profound impact on the view of spelling (Pan et al., 2017). Spellcheck and autocorrect software have changed the way writers identify and correct spelling mistakes. Spellcheck software highlights spelling errors in digital text and suggests replacements words, whereas autocorrect software automatically replaces misspellings with correctly spelled words (Pan et al., 2017). Although these innovations in technology can eliminate spelling errors, several types of mistakes are commonly missed and can worsen a person's written communication (Lunsford & Lunsford, 2008; Pan et al., 2017). Additionally, the widespread use of digital communication, including text messaging, email, and social media, has changed the formality of writing and spelling. For example, abbreviations, acronyms, pneumonic devices, and

other words commonly used in digital communication have become commonplace and caused spelling to deteriorate (Pan et al., 2017).

Written communication skills are essential for students to interact with the world successfully. Researchers have shown that spelling is still a valuable skill because errors in spelling errors can negatively impact the perception of people and their writing in settings outside of schools (Jeong et al., 2017; Pan et al., 2017). In a study that examined how a student's grammar and spelling errors affect others' responses to postings in online discussion posts, Jeong et al. (2017) found that arguments posted by high-error students are more likely to be challenged than arguments posted by low-error students. These results are important because spelling errors in a job document, such as a resume, can hinder a person's ability to gain employment or promotion. Resumes briefly scanned are often rejected upon detection of spelling errors. Additionally, spelling errors can be costly to companies and organizations and result in a drop in interest in a company (Pan et al., 2017).

Students learn the foundational skills for successful written communication in early literacy instruction. These include the ability to identify letters by sight and build representations between spellings and pronunciations (Conrad et al., 2019; Roberts et al., 2020). In the early phases of reading development, young students understand that writing represents a message through print symbols; however, they lack the knowledge of meaningful sound connections (O'Keeffe et al., 2017; Ouellette & Senechel, 2017; Vazeux et al., 2020). With alphabetic knowledge and some phonological awareness, students learn to identify the sounds of words in print. Typically, young students recognize the first and last sounds in words before the medial sounds (O'Keeffe et al., 2017; Ouellette & Senechel, 2017). The development of phonological awareness, the ability to detect and manipulate sounds in speech, occurs before and during

reading instruction (Ehri, 2014; Kilpatrick, 2020). Phonological awareness is a cognitive skill measured by various tasks that early readers perform in a specific order: detect a sound, blend sounds, and then elide a sound (Kilpatrick, 2020; Vazeux et al., 2020). These tasks progress from the letter sound, syllable, onset-rime, and phoneme (Ehri, 2014; Vazeux et al., 2020). Mastery of phonemic awareness helps beginning readers understand the alphabetic code needed for reading and spelling and enables students' development of orthographic knowledge (Ehri, 2014; Roberts, 2021; Vazeux et al., 2020).

The link between spelling and reading justifies explicit spelling instruction (Møller et al., 2022; Pan et al., 2017). Ehri (2014) purported that spelling instruction improves reading ability because it builds students' alphabetic knowledge essential to reading. Spelling skills build on similar concepts in reading, such as phonological and orthographic knowledge (Ehri, 2014; Pan et al., 2017). Spelling fosters learning letter-sound correspondence in the context of whole words (Møller et al., 2022). Integrating spelling into early reading instruction promotes a bidirectional practice (Møller et al., 2022; Van Rijthoven et al., 2021). Students associate sounds with letters during spelling, whereas letters are associated with sounds during reading (Møller et al., 2022; Van Rijthoven et al., 2021). Word recognition and decoding require that students recognize printed words, while spelling requires accurate recall of letter patterns and words (Treiman, 2018). This bidirectional relationship may provide more robust links between letter-sound correspondence, strengthening reading and spelling development (Møller et al., 2022; Van Rijthoven et al., 2021). Additionally, correct spelling is essential to reading because misspellings can cause errors and difficulties during comprehension. Knowing conventional spellings of words allows for more proficient reading and the ability to concentrate on comprehension rather than spelling (Pan et al., 2017; Treiman, 2018).

While spelling is a useful measure of reading ability, spelling skills cannot be achieved only through reading for a variety of reasons. First, young students invent their phonological spellings for words and would not learn to correct their errors (Ouellette & Senechel, 2017; Pan et al., 2017; Treiman, 2018). Invented spellings represent what a student hears in speech and provide a window into students developing awareness of the alphabetic principle (O'Keeffe et al., 2017; Ouellette & Senechel, 2017; Treiman & Wolter, 2020). Even when not conventionally correct, phonological spelling is an essential step in developing literacy, but students must advance beyond invented spellings by learning conventional spelling patterns. As students become proficient readers, they begin to focus more on the meaning of the text rather than the spelling of words (Ehri, 2020; Pan et al., 2017). When students have a sizeable orthographic lexicon, they can identify words in reading without processing all the letters; this is called prediction (Negrete & Bear, 2019; Querido et al., 2020; Zaric et al., 2019). Explicit spelling instruction encourages students to pay close attention to all the letters and letter patterns in written words and reinforces how sounds are linked to spelling (Chen et al., 2019; Møller et al., 2022; Pan et al., 2017).

How to teach spelling continues to be a controversial topic in the literature. Because of the growth in understanding of the link between reading and spelling, teachers in the United States have reported that traditional memorization-based approaches that teach spelling yield ineffective results (Møller et al., 2022; Pan et al., 2017; Treiman, 2018). Traditional spelling instruction involves memorizing a list of words for a test (Englert et al., 2020; Treiman, 2018). The words may be selected based on a reading text's theme or content rather than words that follow a particular spelling pattern or phonics lesson (Treiman, 2018). Instructional strategies to help children memorize spelling list words, such as studying and repeated writing of the words,

do little to help students understand how the writing system works (Ehri, 2020; Pan et al., 2017; Treiman, 2018). The definition of spelling is no longer confined to the ability to spell correctly. Understanding of spelling skills has been expanded to include phonological, morphological, orthographic, etymological, and visual knowledge (Kilpatrick, 2020; Pan et al., 2017).

Incorporating spelling activities into early systematic phonics instruction has been shown to be beneficial for students and is associated with significant gains in phoneme analysis, spelling, and word reading (Englert et al., 2020; Møller et al., 2022; Treiman, 2018). Phonics-based spelling instruction teaches students how the alphabetic writing system functions—that each letter has a sound and should be used whenever the sound is heard (Møller et al., 2022; Pan et al., 2017; Treiman, 2018). Spelling activities allow students to analyze words into sound components and match the appropriate letters to each sound (Møller et al., 2022; Treiman, 2018). This stimulates phonemic awareness and letter knowledge, which are prerequisites for reading (Roberts, 2021). Spelling activities advance students reading development beyond phonemic awareness and letter knowledge toward developing orthographic knowledge (Kilpatrick, 2020). The use of orthographic code is stronger in spelling than in reading because spelling requires recall of the appropriate letter sequences of words. In contrast, reading requires recognition of letter sequences or sight words (Møller et al., 2022). Recall and recognition are both ways to retrieve orthographic knowledge from memory; however, recognition has a cue, and recall does not. As a result, recall requires more mental effort and strengthens learning (Brown et al., 2014). Students may begin to use orthographic knowledge in spelling tasks before reading tasks.

Orthographic mapping has also been observed with students who have not yet learned to read (Ehri, 2020; O'Leary & Ehri, 2019). Prereaders who know letter names but are not yet reading used their letter knowledge to show orthographic facilitation through a proper name

(O'Leary & Ehri, 2019; Treiman & Wolter, 2020). When given a proper name–learning task, 4- and 5-year-old students learned the names better when they had seen the spellings (O'Leary & Ehri, 2019). Additionally, prereaders benefit from letter names when they try to spell words (Treiman & Wolter, 2020). The findings of this research revealed that letter knowledge can be spontaneously activated from memory to use the sounds of letters to connect spellings to pronunciations before students have been formally taught to read (Ehri, 2020; O'Leary & Ehri, 2019; Treiman & Wolter, 2020).

Researchers have established that the spelling of words can also enable students to learn new vocabulary words (Chambrè et al., 2020; Ehri, 2020; O'Leary & Ehri, 2019). Vocabulary learning is the acquisition of words, their pronunciations, meanings, and grammatical function (O'Leary & Ehri, 2019). Ehri (2020) found that spelling significantly improved students' memory for pronunciations and meanings of words as compared with words that were taught with no spellings. This shows spelling activates grapheme–phoneme connections and bonds pronunciations and meanings in memory. Because this activates orthographic mapping and creates a stronger memory for vocabulary learning, word-specific spelling has become an essential part of the vocabulary learning process (Chen et al., 2019; Ehri, 2020; O'Leary & Ehri, 2019). In a study of first graders, Chambrè et al. (2020) further found students who were taught to decode spelling words remembered the words better compared to students who were only shown the spellings.

Students more accurately remember words when they see the spelling and decoding produces better spelling recall than only seeing the words (Chambrè et al., 2020; Ehri, 2020; O'Leary & Ehri, 2019). These findings support the notion that exposure to spellings activates grapheme–phoneme connections to better secures spellings to pronunciations along with

meanings in memory (Ehri, 2020). The connections are activated when spellings are simply exposed, but the connections are strengthened when spellings are explicitly decoded (Chambrè et al., 2020; Ehri, 2020; O'Leary & Ehri, 2019). These results substantiate the combination of spelling, phonics, and vocabulary instruction as an explicit and systematic instructional program aligned to age-appropriate reading skills (Castles et al., 2018; Goodwin & Jimenez, 2021).

Phonics-based spelling is most effective when the teacher understands how the writing system works (Daffern & Critten, 2019; Englert et al., 2020; Hudson et al., 2021; Puliatte & Ehri, 2018; Treiman, 2018). Treiman (2018) purported that most adults follow correct spelling patterns but have never considered why. Teachers' linguistic knowledge is significantly associated with student spelling gains (Puliatte & Ehri, 2018). One concern is that teacher preparation programs do not educate preservice teachers on the complexities of the English writing system and its contribution to the development of spelling and reading (Englert et al., 2020; Hudson et al., 2021; Puliatte & Ehri, 2018; Treiman, 2018). Hudson et al. (2021) posited that teachers can deepen their knowledge of reading and spelling skills through in-service training and scaffolded support. Teacher preparation programs can significantly increase teachers' understanding of phonological awareness, phonics, and morphological awareness (Englert et al., 2020; Hudson et al., 2021). This type of knowledge could help teachers make data-informed instructional decisions by increasing the ability to analyze students' errors (Treiman et al., 2019).

Teachers lack knowledge about the various spelling errors students make and how to diagnose those errors (Daffern & Critten, 2019; Treiman, 2018). The types of errors that students make are linked to their understanding of language structures. Because spelling and reading utilize many of the same skills, such as phonemic awareness, phonics, and morphemic

knowledge, deciphering students' spelling errors can reveal much about reading ability (Daffern & Critten, 2019; Englert et al., 2020; Treiman et al., 2019). The results of spelling assessments can drive instruction by helping teachers identify where to provide additional support for students who struggle in specific areas (Treiman, 2018). Specific spelling errors may reveal impediments in phonological skills, orthographic knowledge, or morphemic knowledge (Daffern & Critten, 2019; Englert et al., 2020; Kilpatrick, 2020). Teachers who can understand the root of a spelling error can monitor students' progress and respond to misspellings more effectively (Treiman et al., 2019). Spelling is an efficient assessment method because it can be quickly administered to groups of students; therefore, it can be a practical first step for determining skills deficits and providing additional in-depth reading instruction (Englert et al., 2020; Møller et al., 2022; Treiman et al., 2019).

Orthographic Learning

Castles et al. (2018) termed the transition from novice to skilled reading as orthographic learning. In early literacy education, students develop the phonological skill of phonemic awareness of initial sounds and fundamental grapheme-phoneme relationships (Kilpatrick, 2020). Students learn to blend and segment phonemes in written words in grade one, which develops into decoding skills and orthographic mapping (Chambrè et al., 2020). Some early elementary students begin phoneme deletion and manipulation tasks, and by Grades 2 and 3, students are actively using phonics activities and orthographic mapping to read words (Castles et al., 2018; Chambrè et al., 2020; Ehri, 2014). As students rely less on alphabetic decoding, they learn to recognize familiar words and automatically map their spellings to meanings without decoding (Negrete &

Bear, 2019). In grade two, Ehri's theories predict that students begin to transition from decoding strategies to using word-specific representations to read print (Conrad et al., 2019; Ehri, 2014; Negrete & Bear, 2019). The transition to skilled reading occurs through exposure to printed text, but several variables such as age, frequency, and linguistic nature strengthen orthographic knowledge used in skilled reading (Castles et al., 2018).

Orthographic knowledge contributes significantly to a student's reading and spelling skills (Ehri, 2020; Murphy & Justice, 2019; Negrete & Bear, 2019; Querido et al., 2020; Zaric et al., 2019). Orthographic knowledge encompasses two components: word-specific or lexical orthographic knowledge and general or sublexical orthographic knowledge (Murphy & Justice, 2019; Querido et al., 2020; Zaric et al., 2019). Lexical orthographic knowledge is the ability to recall representations of whole words from memory (Querido et al., 2020; Zaric et al., 2019). Sublexical orthographic knowledge refers to knowing the "regularities within the orthographic system including letter position frequencies, letter pattern redundancies, and positional and contextual rules in the use of letters" (Querido et al., 2020, p. 2460). Fluent reading and spelling are supported by orthographic knowledge because it enables the student to quickly recognize or recall written words automatically (Ehri, 2020).

The subcomponents of orthographic knowledge contribute to reading and spelling in unique ways because they have different functions (Murphy & Justice, 2019; Zaric et al., 2019). Lexical orthographic knowledge allows students to quickly recognize familiar words as a single unit (Murphy & Justice, 2019). This type of orthographic knowledge enhances reading comprehension and spelling because it accesses full word representations in their orthographic lexicon. Sublexical orthographic knowledge contributes to reading skills because it forms a large store of regular spelling patterns and consistencies in different words. Students establish word

representations and store them in memory, allowing larger units to form connections (Zaric et al., 2019). Knowledge about recurring spelling patterns is helpful because students can apply analogy or prediction when approaching unknown words (Ehri, 2014).

Orthographic learning, the storage of orthographic knowledge in memory, occurs during reading and spelling. Orthographic learning functions as a self-teaching device that enables students to independently develop the word-specific orthographic representations necessary for fluent reading (Castles et al., 2018; Conrad et al., 2019; Murphy & Justice, 2019). Orthographic representations are necessary for students to develop automatic, visual word recognition (Ehri, 2014). With reading experience, students bond the semantic, orthographic, and phonological meanings of representations together as a unit (Conrad et al., 2019; Ehri, 2020). The lexical quality of representations is vital in reading and spelling because it allows students to distinguish between similar words with little effort (Andrews et al., 2020). Lexical quality refers to "a critical determinant of the efficiency and effectiveness of the procedures involved in retrieving linguistics codes during reading comprehension" (Andrews et al., 2020, p. 2258). When the lexical quality of orthographic representations is high, a student's cognitive load can be focused on comprehension because words are recognized automatically and efficiently (Castles et al., 2018). The most widely used indicators of lexical quality have been measured with vocabulary and decoding skills; however, spelling tasks have been shown to capture the orthographic accuracy that is crucial to lexical quality (Andrews et al., 2020).

Orthographic learning can be assessed using a variety of spelling tasks. Reading and spelling activities establish word-specific representations with high lexical quality (Conrad et al., 2019; Zaric et al., 2019). Orthographic learning may occur more readily in reading; however, spelling results in higher quality word-specific representations (Conrad et al., 2019). Spelling

may be superior to word recognition as a self-teaching mechanism for orthographic learning (Murphy & Justice, 2019). Few studies have directly compared orthographic learning during reading and spelling and how spelling can be used as an assessment measure for readers who are at risk (Andrews et al., 2020; Conrad et al., 2019; Henbest & Apel, 2021; Murphy & Justice, 2019).

Spelling is assessed using a variety of metrics that vary in spelling accuracy (Henbest & Apel, 2021; Murphy & Justice, 2019; Treiman et al., 2019). For example, spelling accuracy is measured using a binary measure of whole word spelling or a nonbinary measure that gives partial credit for correct word parts based on phonemes, graphemes, and morphemes (Murphy & Justice, 2019; Treiman et al., 2019). A commonly used scoring metric is words spelled correct (WSC), which measures whole word spelling accuracy (Treiman et al., 2019). A commonly used nonbinary measure is correct letter sequence, in which scoring is based on the accuracy of pairs or groups of letters within the word (Henbest & Apel, 2021). When using CLS as a scoring metric, Murphy and Justice (2019) and Treiman et al. (2019) found spelling significantly related to reading comprehension and explained unique variance. These results indicated that the lexical level, which involves the stored mental representations of words, is significantly related to reading comprehension. It could be explained that partial scoring metrics offer some advantage because they are based solely on orthographic accuracy. Partial credit scoring using correct letter sequences may be a better indicator of the relationship between spelling and word recognition (Treiman et al., 2019); however, this has not been fully investigated in the literature (Murphy & Justice, 2019; Treiman et al., 2019).

Spelling activities can strengthen orthographic learning; therefore, the current researcher aimed to determine the predictive ability of spelling scores on later reading achievement. The

results of this study added to the literature in several ways. First, few studies have investigated the direct relationship between spelling and later reading achievement. Additionally, few studies have explored spelling scores to identify students at risk for reading difficulties. Ehri and McCormick's phase theory of reading development (1998) and Ehri's theory of orthographic mapping provided the theoretical framework for how readers move from using alphabetic knowledge to using orthographic knowledge for skilled reading. Researchers have shown a significant relationship between reading and spelling in orthographic knowledge (Bailey et al., 2021; Conrad et al., 2019). Decoding and spelling are skills that require the application of orthographic knowledge and, therefore, spelling ability may provide a visual representation of the lexical quality of orthographic learning. Researchers have shown that spelling contributes to higher quality lexical representations when the spelling is assessed using orthography-only metrics (Henbest & Apel, 2021; Murphy & Justice, 2019; Treiman et al., 2019). Using the WSC and CLS spelling metrics, spelling and vocabulary explained the same or slightly more variance in reading comprehension than word recognition and vocabulary (Murphy & Justice, 2019; Treiman et al., 2019). Assessment lays the groundwork for explicit teaching, and teachers must collect relevant and comprehensive data from various sources (Daffern & Fleet, 2020). Spelling should be a consideration in future research on lexical quality and the inclusion of spelling in universal screening and progress monitoring routines (Daffern & Fleet, 2020; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; Treiman et al., 2019).

Summary

There are detrimental educational, social, and emotional consequences to reading failure, and it is paramount that young students are screened for reading difficulties using the most effective and efficient assessments (Greiner de Magalhaes et al., 2022; Møller et al., 2022; Van Rijthoven et al., 2021). The development of foundational reading skills is paramount to effective

literacy instruction. Ehri and McCormick's (1998) phases of reading development is a well-established theory that is recurring in the research on early literacy. Ehri's phase theory of reading development identifies five phases of knowledge of the alphabetic system that children move through to learn to read. In addition, Ehri identified the concept of orthographic mapping in the acquisition of reading, spelling, and vocabulary. Orthographic mapping involves the formation of letter-sound connections to the pronunciations and meanings of specific words in memory. Orthographic learning describes the transition from novice to skilled reading through Ehri's theories (Conrad et al., 2019; Henbest & Apel, 2021; Murphy & Justice, 2019). Several studies have supported the critical role of spelling on increasing lexical quality during orthographic learning (Daffern & Fleet, 2020; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; Treiman et al., 2019). It is unclear in the literature how spelling assessments can be used to predict later reading ability strengthen the developmental reading profile of students in early elementary grades. Additionally, several studies have shown promise for using a variety of spelling metrics to identify struggling readers (Daffern & Fleet, 2020; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; Treiman et al., 2019). This study aimed to fill a gap in the literature by establishing the predictive power of spelling scores on a linear combination of early literacy indicators.

CHAPTER THREE: METHODS

Overview

The purpose of this quantitative, predictive correlational study was to explore the predictive ability of early reading indicators of NWF, ORF, and spelling scores on later ORF scores. This chapter includes an outline and justification of the selected research design, participants, setting, instruments, and procedures for data collection and analysis.

Design

The researcher selected a quantitative, nonexperimental, predictive correlational design for the current study. According to Creswell and Guetterman (2019), prediction research design is a type of correlational research that investigates whether variables positively predict an outcome. This was an appropriate design because the study investigated the predictive ability of a combination of early reading indicators and spelling scores on a mid-year measure of oral reading fluency. A quantitative study was appropriate because a statistical method was used to analyze the data and generalize findings from the sample to a population (Gall et al., 2007). The study was nonexperimental because no manipulation of variables occurred.

The purpose of this quantitative, predictive correlational study was to explore the predictive ability of beginning of the year scores of NWF, ORF, and scores from a PSI at the mid-year ORF scores for second-grade students. One predictor variable was scores from the beginning of the year curriculum-based measures of NWF, which are phonetically regular make-believe words that provide a direct measure of a student's knowledge of the alphabetic principle and basic phonics (Good & Kaminski, 2011). The next predictor variable was scores from a ORF measure, which is ability to read written words with accuracy, automaticity, and prosody (Good & Kaminski, 2011). The third predictor variable was the composite score from the PSI from the Words Their Way program. The PSI was a list of words that represent a variety of spelling

features and assesses students' knowledge of key spelling features that relate to the spelling stages (Bear et al., 2020). The composite score combines the total words spelled correct with the number of features spelled correct. The criterion variable was mid-year ORF scores measured by *Acadience® Learning*. ORF is defined as the ability to read written words with accuracy, automaticity, and prosody (Good & Kaminski, 2011; Kuhn & Levy, 2015). The scores on each of the assessments are continuous variables because they are numeric and fall on a continuum (Creswell & Guetterman, 2019).

Research Question

RQ1: How accurately can Oral Reading Fluency (ORF) scores be predicted from a linear combination of scores from the beginning of the year curriculum-based measures of nonsense word fluency (NWF), oral reading fluency (ORF) and *Words Their Way Primary* Spelling Inventory (PSI) for second-grade students?

Hypothesis

H_0: There will be no significant predictive relationship between the criterion variable (ORF score) and the linear combination of predictor variables (NWF, ORF, and PSI) for second-grade students.

Participants and Setting

This study included a convenience sample of second-grade participants from two elementary schools in rural Pennsylvania. The number of participants exceeded the minimum requirements for a regression analysis with three predictor variables using the formula $N \geq 50 + 8k$. Data collection occurred in the schools as part of beginning and mid-year benchmark testing.

Population

The participants for the study were drawn from a convenience sample of second-grade school students from two elementary schools during the 2022–2023 school year. The school

district is situated in a rural agricultural area of central Pennsylvania. Student demographic information for the school district were reported in 2017 as .53% multiracial, .04% Hawaiian/Pacific, .07% American Indian, .42% Asian, 1.4% African American, 8.31% Hispanic, and 89.42% White. Additionally, 45.22% of the student population is economically disadvantaged. Total population of students in second grade in the district is 240.

Participants

The number of participants sampled was 124, which exceeded the required minimum when assuming a medium effect size for this study. According to Gall et al. (2007), the sample size for multiple regression is determined using the recommended formula $N \geq 50 + 8k$. The minimum number of students required for multiple regression with three predictive variables is 74 when assuming a medium effect size with a statistical power of .7 at the .05 alpha level (Gall et al., 2007). To exceed the minimum number of participants needed for the study, 124 participants were selected.

The sample came from two different elementary schools in a district. Within each school, there are five self-contained second-grade classrooms. The second-grade participants were chosen at random from the two schools. Sample demographic information included 124 students between the ages of 7–8 in second grade. All identifying information was removed from the sample prior to being sent to the researcher.

A letter of introduction explaining the purpose of the study and requesting permission to access measures and scores were sent to the school district's administration and school building principals. The letter explained participant disclosure, data privacy, security, and collection procedures. Upon receiving approval from the district's administration, the data were collected and coded by the school teams and provided to the researcher with no identifiers for participants.

Setting

The participants for the study were drawn from a convenience sample of second-grade school students from two rural elementary schools during the 2022–2023 school year. Data were collected during the regular benchmark assessment schedule for 2022–2023 school year. Administration of measures was completed in the by the Title I coordinator in their elementary school classrooms. Measures of *Acadience® Reading* occurred individually and measures of Primary Spelling Inventory occurred in groups of 15–20.

Instrumentation

Acadience® Reading was used for measures of NWF and ORF. Participant scores from NWF and ORF were collected in September as part of the beginning of the year benchmark testing. The Words Their Way PSI was the instrument used for obtaining a spelling score. The PSI was administered to students in small groups and scored by the Title I coordinator of the school. *Acadience® Reading* ORF was the instrument for the criterion variable and was administered in December as part of the mid-year benchmark assessment schedule.

Acadience® Reading

The purpose of *Acadience® Reading* is to measures the acquisition of early literacy skills from kindergarten through sixth grade (Good & Kaminski, 2011). Initial development of the *Acadience® Reading* measures was based on procedures from Deno and Fuchs's (1987) Curriculum-Based Measurement and General Outcome Measurement (Good & Kaminski, 2011). The early versions of the measures were authored by Roland Good and Ruth Kaminski under the name DIBELS®. The measures were designed to be economical and efficient indicators of a student's progress toward achieving general outcomes in reading as benchmark assessments and progress monitoring tools (Good & Kaminski, 2011). The current version, *Acadience® Reading* by Good and Kaminski (2011), has improved empirical testing of reading passages, ease of use

for administration and scoring, field-tested student directions, consistency of scores from one form to the next, and lists of common response patterns (Good & Kaminski, 2011). *Acadience® Reading* is comprised of six early literacy subscales that every child must master to become a proficient reader. Reading subscales for second grade include NWF and ORF; both measures were utilized in this study. Several peer reviewed journals were examined that used NWF and ORF to predict future reading performance (Conradi-Smith et al., 2020; Good et al., 2019; January & Klingbeil, 2020; Morris et al., 2017).

Nonsense Word Fluency

The purpose of NWF is to measure a student's understanding of the alphabetic principle and ability to blend sounds into consonant-vowel-consonant (CVC) and vowel-consonant (WV) (Good & Kaminski, 2011). *Acadience® Reading* is a reliable and valid instrument to measure NWF. Test-retest reliability describes the correlation between scores on the same measure at different points for the same participants (Gall et al., 2007). Test-retest reliability estimates for NWF ranged from .75 in second grade to .87 in third grade (University of Oregon, 2018). Validity coefficients for NWF ranging from .62 to .80 were established through several criterion-related studies (University of Oregon, 2018). Predictive and concurrent validity data are reported between .65 and .77 for predictive validity and between .65 and .74 for criterion validity (Dewey et al., 2015).

NWF assessments contain 50 VC and CVC nonsense words in random order (e.g., dif, ik, nop; Good & Kaminski, 2011). Students are scored in by the number of correct letter sounds (CLS) produced and the number of whole words read (WWR) without sounding out (Good & Kaminski, 2011*).* Correct letter sounds (CLS) is the number of letter sounds produced correctly

in 1 minute, and WWR is the number of nonsense words read correctly as a whole word at once without sounding it out.

First, the administrator models the skill using a practice item. Next, the student is provided a scoring sheet with the nonsense word lists. Students are instructed to "read the make-believe words the best they can, reading either the whole word or saying any sounds they know" (Good & Kaminski, 2011, p. 22). If a student reads the whole word without sounding it out, the administrator underlines the whole word. If the student does not read the whole word, the administrator underlines each correct letter sound (Good & Kaminski, 2011). CLS can be produced in isolation or blended and WWR is the total words read without first being sounded out. NWF is a 1-minute timed assessments that is administered to students individually by a trained test administrator. See Appendix C for this instrument.

Oral Reading Fluency

The purpose of ORF is to measure advanced phonics and word attack skills, accurate and fluent reading, and reading comprehension (Good & Kaminski, 2011). The first component of ORF measures reading fluency through words read correctly per minute and the second component measures comprehension through a student's ability to retell what they just read. *Acadience Reading* also a reliable and valid instrument to measure ORF. Test-retest reliability estimates for ORF ranged from .87 in second grade and .94 in third grade (University of Oregon, 2018). Validity coefficients for ORF ranging from .84 to .87 were established through several criterion-related studies (University of Oregon, 2018). The Cronbach's alpha for *Acadience Reading* composite score is .89 at the beginning of the year and .83 at mid-year (Dewey et al., 2015). Cronbach's alpha is a widely accepted method for determining test score reliability (Gall et al., 2007).

For ORF, students are given an unfamiliar, grade-level passage and asked to read for 1 minute (Good & Kaminski, 2011). While the student reads aloud, the administrator marks errors such as substitutions, omissions, and hesitations for more than 3 seconds (Good & Kaminski, 2011). Students read three different grade-level passages for 1 minute each when doing benchmark assessments. The median score from three passages is the best indicator of student performance (Good & Kaminski, 2011). Accuracy is determined by dividing the correct median words by the correct median words plus the median errors and multiplying by 100 (Good & Kaminski, 2011). Scores are recorded as the median number of words correct per minute and the median number of errors per minute (Good & Kaminski, 2011).

The second component, Passage Retell, is measured if a student has read a minimum of 40 correct words per minute. Passage Retell provides a measure of comprehension for the ORF assessment to ensure the student is reading for meaning and not speed-reading with little attention to comprehension (Good & Kaminski, 2011). During Passage Retell, the administrator documents the number of words the student uses in the retelling related to the story. Students are prompted at 3 seconds of hesitation, but if the student hesitates again for 5 seconds or longer, the task is discontinued (Good & Kaminski, 2011). The administrator makes a qualitative rating of the student's response based on how well the student retold the portion of the passage read (Good & Kaminski, 2011). Scores for passage retell are recorded as the median number of correct words in the Retell and the median quality of response for the retell (Good & Kaminski, 2011). Administration time for Passage Retell is a maximum of 1 minute per passage. Total administration time for ORF and Passage Retell is one minute plus 1 minute maximum for passage retell. As the median score is recorded, the total administration time is approximately 6 minutes. See Appendix D and E for these instruments.

Words Their Way Primary Spelling Inventory

Words Their Way (WTW) originated from research on invented and developmental spelling and includes five stages of spelling and orthographic development (Bear et al., 2020). WTW provides research-validated spelling inventories designed to assess students' knowledge of spelling features that align to stages of word knowledge and reading. The PSI is used in kindergarten through third grade (Bear et al., 2020). WTW has been used in several peer-reviewed studies (Munger & Murray, 2017; Puliatte & Ehri, 2018).

The PSI consists of 26 words ordered by difficulty from letter name–alphabetic to within word pattern stages, and the number of words read depends on grade level and how many words are correct. WTW recommends providing enough words, so the administrator has at least five misspelled words to analyze. The PSI was evaluated for internal consistency using Cronbach's alpha. The PSI reliability using Cronbach's alpha indicated overall reliability of .9341 (Sterbinsky, 2007). Test-retest reliability estimates on the PSI for second-grade students ranged from .82 in the fall and .931 in the spring administration, with all coefficients significant at the $p < .001$ level (Sterbinsky, 2007).

The administrator provides students with a sheet of paper with numbered columns. Bear et al. (2020) recommend the following scripted directions:

> I am going to ask you to spell some words. You have not studied these words and will not be graded on them. Some of the words may be easy and others may be difficult. Do the best you can. Your work will help me understand how you are learning to read and write and how I can help you. (p. 31)

Providing this statement informs students of the measure's purpose and encourages them to give the spelling test a reasonable effort. The words are called aloud naturally, without drawing out sounds or separating into syllables. Each word is called twice and used in a sentence for context.

Words can be repeated, and it is appropriate to ask a student to rewrite a word that cannot be read. The test administrator should monitor the testing environment to ensure students are at the correct number, writing legibly, and not copying (Bear et al., 2020).

WTW provides a *Feature Guide* to use as a scoring sheet for each student. The words are scored by how many features are spelled correctly according to the descriptions (Bear et al., 2020). A check goes in the "words spelling correctly" box if the word is spelled correctly. To score, the administrator adds the number of checks under each feature and across each word, adjusting the final ratios depending on how many words were called (Bear et al., 2020). The PSI can be administered as a whole class or in small groups with about 20–30 minutes for administration. See Appendix F for this instrument.

Procedures

Institutional Review Board (IRB) approval was obtained from Liberty University. A letter was submitted to the school district superintendent and two building principals to provide information on the study and request permission to use *Acadience® Reading* data for second-grade students. Additionally, the researcher sent a letter to the Title I program coordinator requesting assistance administering the Primary Spelling Inventory (PSI) to students in both elementary buildings. The researcher had no contact with the students, no personal identifiers were used in reporting, and data collection occurred as part of the school's benchmark assessment schedule; therefore, parent permission was obtained. See Appendix B for the IRB Approval Letter.

The participants were assessed during benchmark testing using *Acadience® Reading* NWF and ORF measures at the beginning of the 2022–2023 school year's benchmark assessment schedule. The Title I coordinator in the district administered the PSI in groups of participants in September 2022. The coordinator scored the PSI and entered the data on a spreadsheet. The

scores for the criterion variable, mid-year ORF, were collected in December 2022 as part of the year assessment schedule. The student scores for the beginning of the year NWF and ORF and mid-year ORF were obtained directly from *Acadience*® Data Management (ADM).

Student scores for all measures were coded and personal identifiers were removed. Coded and deidentified scores were provided to the researcher on an Excel spreadsheet. The original reports of scores were stored in a safe in one of the elementary schools. The key for the coded scores were stored in the other school building. Only the school building principal has access to these locked spaces. The Excel spreadsheet was stored on a personal, password-protected computer and cloud storage that belongs to the researcher. Only the researcher knows the password for this device. When not being utilized, the computer was stored in a locked closet that only the researcher could access. The data will be retained for a period of 5 years after the completion of this research study and then be destroyed.

Data Analysis

A multiple linear regression analysis was conducted to determine the predictive relationship between a criterion variable and a combination of two or more predictor variables (Gall et al., 2007). Multiple linear regression is appropriate because it determines the magnitude and statistical significance between a criterion variable and a combination of two or more predictive variables (Gall et al., 2007). In this study, ORF score from the mid-year benchmark testing was the criterion variable. NWF, ORF, and PSI scores from the beginning of the year benchmark testing were the predictor variables. Scores from the measure of the criterion variable and the measures of the predator variables were continuous and generated from a ratio scale because it was not possible to score below zero (Gall et al., 2007). A multiple linear regression analysis revealed how the predictive strength of each of the early reading indicator variables on a

later ORF score. Additionally, the results determined whether a combination of some or all the early reading indicators were stronger predictors of later oral reading fluency (Gall et al., 2007).

Multiple linear regression analysis necessitates checks for bivariate outliers and assumptions of normality and linearity, homoscedasticity, and multicollinearity (Pallant, 2020). Preliminary data were screened for outliers using a scatterplot of all pairs of predictor variables and all possible combinations of predictor variables and the criterion variable (Gall et al., 2007). Extreme bivariate outliers were checked to ensure that the data were entered correctly. If the scores were entered correctly, each would be removed due to the relatively small size of the sample (Gall et al., 2007). The residuals from scatterplots are the differences between the predicted scores and the observed scores on the criterion variable (Gall et al., 2007; Pallant, 2020). The same residuals were used to satisfy the assumptions of normality, linearity, and homoscedasticity (Pallant, 2020). A scatterplot that shows a normal distribution of scores in a classic "cigar shape," and no strong positive or negative direction would satisfy the assumption of distribution and linearity (Gall et al., 2007). To satisfy the assumption of homoscedasticity, the variance of residuals around the predicted values must be the same for all predicted scores (Pallant, 2020).

Multiple linear regression analysis requires checks for multicollinearity among predictor variables (Gall et al., 2007). Multicollinearity occurs when two or more of the predictor variables are highly correlated (r = .7 or higher; Pallant, 2020). If multicollinearity exists, only some of the predictor variables are entered into the regression analysis even though all of them may have the predictive ability (Gall et al., 2007). Variance inflation factors (VIF) are used to determine whether multicollinearity exists. The VIF indicates collinearity if there is an increase in the

variance of a regression coefficient (Tsagris & Pandis, 2021). If the VIF for a variable is greater than 5 or 10, the multicollinearity of this variable is too high (Tsagris & Pandis, 2021).

The descriptive statistics, mean (*M*), and standard deviation (*SD*) were explored for the predictor variables and the criterion variable. An ordinary least-squares regression analysis was conducted where all predictor variables were entered simultaneously (Gall et al., 2007; Pallant, 2020). This is appropriate because all measures use a continuous scale (Gall et al., 2007). The correlation between each individual predictor variable and the criterion variable were examined in terms of predictive ability above the other predictor variables individually and combined. This determined how much of the variance at the mid-year ORF scores was explained by the beginning of the year NWF, ORF, and PSI individually and together. Correlation coefficient (*r*), multiple correlation coefficient (*R*), coefficient of determination (R^2), and significance level (*p*) were reported (Gall et al., 2007). These results were used to determine whether the null hypothesis should be rejected at the 95% confidence level.

CHAPTER FOUR: FINDINGS

Overview

The purpose of the current quantitative, predictive correlational study was to explore the predictive ability of beginning of the year scores of Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF), and scores from a Primary Spelling Inventory (PSI) at the mid-year Oral Reading Fluency scores for second-grade students. The predictor variables were scores of NWF, ORF, and PSI. The criterion variable was a later measure of ORF scores. A multiple linear regression was used to test the hypothesis. This chapter includes a restatement of the research question and null hypothesis, data screening procedures, descriptive statistics, assumption testing, and results.

Research Question

RQ1: How accurately can Oral Reading Fluency (ORF) scores be predicted from a linear combination of scores from the beginning of the year curriculum-based measures of nonsense word fluency (NWF), oral reading fluency (ORF) and Words Their Way Primary Spelling Inventory (PSI) for second-grade students?

Null Hypothesis

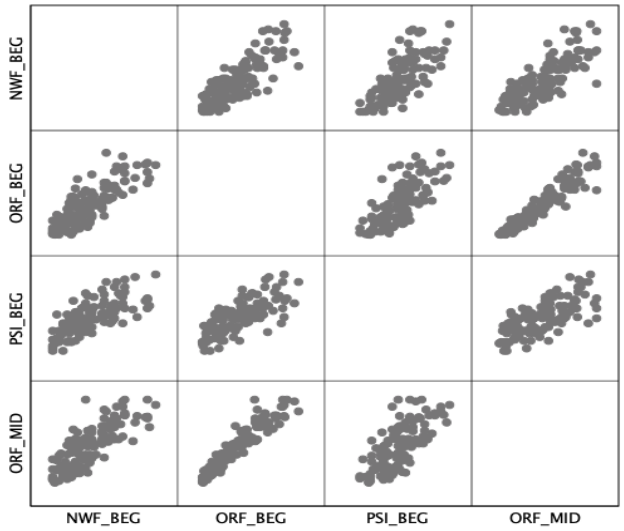
H_0: There will be no significant predictive relationship between the criterion variable (ORF score) and the linear combination of predictor variables (NWF, ORF, and PSI) for second-grade students.

Data Screening

The primary researcher sorted the data and scanned for inconsistencies on each variable. No data errors or inconsistencies were identified. A matrix scatterplot was used to detect bivariate outliers between predictor variables and the criterion variable. No bivariate outliers were identified. See Figure 1 for the matrix scatterplot.

Figure 1

Matrix Scatter Plot



Descriptive Statistics

Descriptive statistics were calculated for each of the variables. The sample consisted of 124 participants. Scores on the exams are nominal. Table 1 provides the descriptive statistics for each variable.

Table 1

Descriptive Statistics

	n	Min.	Max.	*M*	*SD*
Nonsense Word Fluency	124	0	50	17.86	12.131
Oral Reading Fluency	124	4	144	55.98	34.882
Primary Spelling Inventory	124	19	80	45.81	12.986
Oral Reading Fluency (mid)	124	8	150	70.72	37.264
Valid *n* (listwise)	124				

Assumption Testing

Assumption of Linearity

A multiple linear regression requires that the assumption of linearity be met. Linearity was examined using a scatter plot. The assumption of linearity was met. See Figure 1 for the matrix scatter plot.

Assumption of Bivariate Normal Distribution

A multiple linear regression requires that the assumption of bivariate normal distribution be met. The assumption of bivariate normal distribution was examined using a scatter plot. The assumption of bivariate normal distribution was met. See Figure 1 for the matrix scatter plot.

Assumption of Multicollinearity

A Variance Inflation Factor (VIF) test was conducted to ensure the absence of multicollinearity. This test was run because if a predictor variable (x) is highly correlated with another predictor variable (x), they essentially provide the same information about the criterion variable. If the VIF is too high (i.e., greater than 10), then multicollinearity is present. Acceptable values are between 1 and 5. The VIFs were below 5 indication the assumption of the absence of multicollinearity was met between the variables in this study. Table 2 provides the collinearity statistics.

Table 2

Collinearity Statistics

		Collinearity Statistics	
	Model	Tolerance	VIF
1	NWF_BEG	.296	3.377
	ORF_BEG	.290	3.451
	PSI_BEG	.412	2.425

a. Dependent Variable: ORF_MID

Results

To test the hypothesis, a multiple linear regression was conducted to determine whether there is a predictive relationship between early reading indicators scores and spelling scores and a later measure of oral reading fluency scores for second grade students. Multiple regression analysis uses a correlation statistic to predict future scores and to test what impact variables had on an outcome (Creswell & Guetterman, 2019). The predictor variables were scores for Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF), and a Primary Spelling Inventory (PSI). The criterion variable was a later measure of oral reading fluency. The researcher rejected the null hypothesis at the 95% confidence level, where $F(3, 120) = 327.12$ and $p < .001$. These results indicate a significant relationship between the predictor variables (beginning of the year NWF, ORF, PSI scores) and the criterion variable (mid-year ORF). Table 3 provides the regression model results.

Table 3

Regression Model Results

Model		*SS*	*df*	*MS*	*F*	Sig.
1	Regression	152191.265	3	50730.422	327.120	.000[b]
	Residual	18609.856	120	155.082		
	Total	170801.121	123			

a. Dependent Variable: ORF_MID
b. Predictors: (Constant), PSI_BEG, NWF_BEG, ORF_BEG

The model's effect size was extremely large, at $R = .944$. Furthermore, $R^2 = .891$, indicating that approximately 89% of the variance of the criterion variable can be explained by the linear combination of predictor variables. Table 4 provides a summary of the model.

Table 4

Model Summary

Model	*R*	R^2	Adjusted R^2	*SEM*
1	.944[a]	.891	.888	12.453

a. Predictors: (Constant), PSI_BEG, NWF_BEG, ORF_BEG

Because the researcher rejected the null hypothesis, analysis of the coefficients was required. Based on the coefficients, it was found that the beginning of the year ORF was the best predictor of mid-year ORF scores, with a $p < .001$. The coefficients for beginning of the year nonsense word fluency and primary inventory scores indicate there is no significant predictive relationship with mid-year oral reading fluency. Table 5 provides the coefficients.

Table 5

Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		*B*	*SE*	*β*	*t*	Sig.
1	(Constant)	13.502	4.539		2.974	.004
	NWF_BEG	.259	.170	.084	1.521	.131
	ORF_BEG	.930	.060	.871	15.557	.000
	PSI_BEG	.011	.135	.004	.084	.934

a. Dependent Variable: ORF_MID

CHAPTER FIVE: CONCLUSIONS

Overview

A multiple linear regression analysis was conducted using beginning of the year scores on early reading indicators of NWF, ORF, and scores from a PSI and mid-year scores of ORF as the criterion variable. The data were analyzed using the SPSS program in the previous chapter. The results of the analysis are discussed in Chapter Five, including the implications of the findings and the limitations of the study, which informed recommendations for future research.

Discussion

The purpose of this quantitative, predictive correlational study was to explore the predictive ability of beginning of the year scores of NWF, ORF, and scores from a PSI at the mid-year ORF scores for second-grade students. The sample was comprised of 124 second grade students from two schools in one rural school district. The data for the predictor variables of NWF, ORF, and PSI were collected at the beginning of the school during routine benchmark testing. The data for the criterion variable were collected at mid-year routine benchmark testing. NWF and ORF were assessed using *Acadience® Reading* and have high reliability and validity (Good & Kaminski, 2011). The PSI is from Words Their Way and is also found to be a reliable and valid measure of spelling ability (Sterbinsky, 2007). The importance of literacy to student outcomes is robust in the literature; yet school districts across the United States continue to have a large percentage of students who are not meeting benchmarks for reading (Castles et al., 2018; Murphy & Justice, 2019; Roberts et al., 2020). Examining the relationship between measures of foundational literacy skills through early reading indicators and spelling and later reading achievement may provide a more comprehensive literacy profile of students and equip teachers with the skills and knowledge to diagnose and remediate issues with reading development. This study was guided by the following research question:

RQ1: How accurately can Oral Reading Fluency (ORF) scores be predicted from a linear combination of scores from the beginning of the year curriculum-based measures of Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF) and Words Their Way Primary Spelling Inventory (PSI) for second-grade students?

A multiple linear regression analysis was conducted to address this research question. The null hypothesis that there will be no significant predictive relationship between the criterion variable (ORF score) and the linear combination of predictor variables (NWF, ORF, and PSI) for second-grade students was tested and rejected at the 95% confidence level where $F(3, 120) = 327.12$ and $p < .001$. There was a significant relationship between the predictor variables (beginning of the year NWF, ORF, PSI scores) and the criterion variable (mid-year ORF). In addition, the $R^2 = .891$. This indicated that approximately 89% of the variance of the criterion variable can be explained by the linear combination of predictor variables. Because the null hypothesis was rejected, the coefficients were analyzed individually. Beginning of the year ORF was found to be the only variable that significantly predicts of mid-year ORF scores ($p < .001$). The coefficients for beginning of the year NWF and PSI scores indicate there is no significant predictive relationship for either variable with mid-year oral reading fluency.

Literacy incorporates a variety of foundational skills and understandings about written and spoken language as systems of communicating meaning. Evidence from previous longitudinal studies have established the impact of early literacy skills on academic achievement across content areas (NRP, 2000; NELP, 2008). The work of the NRP identified five areas that are necessary for literacy development: phonemic awareness, phonics, fluency, vocabulary, and comprehension. The NELP found letter-word identification, word attack skills, and vocabulary in the early elementary school years were the most important predictors of reading comprehension.

Results indicated that beginning-of-first-grade letter-word identification and word attack skills were the most important predictors of reading comprehension at the end of Grade 1. However, vocabulary was the best predictor of reading comprehension at the end of Grade 3 (NELP, 2008). These results indicate vocabulary scores endured as an important predictor, while the predictive power of early literacy skills diminished over time as students become proficient at site word reading and rely less on word-attack strategies (NELP, 2008).

The results of this study support the practice of data-informed instruction and intervention for early literacy skills through universal screening using a comprehensive system of assessments (Cassidy et al., 2022; ESSA, 2015; Goodwin & Jimenez, 2021; NELP, 2008; Shanahan, 2020). The coefficient of determination assessed the proportion of variance between the linear combination of predictor variable (NWF, ORF, PSI) and the criterion variables (ORF). The results show that approximately 89% of the variance of the criterion variable can be explained by the linear combination of predictor variables ($R^2 = .891$). These robust findings support the use of multiple measures to screen students for early reading difficulties. Universal screening assessments help to identify students who are struggling, and the use of data from multiple measure gleans deeper insight as to why a student is struggling. The addition of spelling to early literacy measures provides another view of students' developing reading profiles. Word reading utilizes recognition and decoding to recognizing printed words, while spelling utilizes accurate recall of letter patterns and words. Thus, spelling may glean deeper insight into a students' level of orthographic knowledge.

Scholars have established that in the beginning of reading development, students' abilities to analyze words into their sound components and to apply the grapheme-to-phoneme and phoneme-to-grapheme mappings are strongly involved in learning to read and to spell

(Querido et al., 2020). In addition, several theories of reading development consider the role of orthographic knowledge as a strong predictor of reading and spelling acquisition (Ehri, 2014; Murphy & Justice, 2019; Querido et al., 2020; Zaric et al., 2019). Ehri's theory of phases of reading development and theory of orthographic mapping established the importance of developing a strong foundation of early reading skills and spelling on later reading development (Hoffman et al., 2021; Petscher et al., 2020; Teale et al., 2020). The theory of the stages of reading development defines phases that young readers progress beginning with the basic units of writing, graphemes, and the correspondence of sound, phonemes (Ehri, 2014). As students develop grapheme-phoneme correspondence, they begin to store these lexical representations in memory and automatically recognize them in print. Through the process of orthographic mapping, students bond larger lexical representations, or spelling patterns, to the meaning of words. These lexical representations in memory enable the development of automatic and accurate oral reading fluency (Ehri, 2020; Negrete & Bear, 2019). During orthographic mapping, students develop a storage of common spelling patterns and sight words. Sight words are recognized automatically, and students no longer needs to apply reading strategies to determine the meaning. The transition to skilled reading occurs as students are repeatedly exposed to printed text; repeated exposure builds students orthographic knowledge.

Orthographic knowledge can be described in two categories which contribute to reading development through different means. Lexical orthographic knowledge, also known as word-specific orthographic knowledge, allows students to quickly recognize familiar words as a single unit (Murphy & Justice, 2019). Sublexical orthographic knowledge is more general and allows students to recognize recurring spelling patterns which can help with decoding of unfamiliar words (Zaric et al., 2019). Sublexical orthographic knowledge has a positive impact on the

development of lexical orthographic knowledge (Querido et al., 2020). Through reading practice, students develop strong grapheme-phoneme associations and extract relevant sequences and patterns (Ehri, 2005; Querido et al., 2020).

Both types of orthographic knowledge are utilized by students during the assessments of the predictor variables and the criterion variable in this study. The predictor variables of NWF, ORF, and PSI scores measure the skills that students acquire in the early stages of reading development that strengthen students' orthographic knowledge. This study found the linear combination of variables to be a strong predictor of later oral reading fluency. There was a significant relationship between the predictor variables (beginning of the year NWF, ORF, PSI scores) and the criterion variable (mid-year ORF) and the null hypothesis was rejected at the 95% confidence level, where $F(3, 120) = 327.12$ and $p < .001$. In addition, approximately 89% ($R^2 = .891$) of the variance of the criterion variable can be explained by the linear combination of predictor variables ($R^2 = .891$). These results are supported by research that determined the predictive power of orthographic knowledge.

Several recent studies have confirmed that orthographic knowledge predicts later reading and spelling ability (Murphy & Justice, 2019; Querido et al., 2020; Zaric et al., 2019). In the study of Querido et al. (2020), lexical level orthographic knowledge was found to have a predictive effect on the later ability to read and spell words in an early phase of literacy instruction. This finding also supports the theoretical view that word-specific orthographic knowledge plays an important role in supporting sight word reading and correct word spelling (Chen et al., 2019; Conrad et al., 2019; Ehri, 2014). Orthographic knowledge predicts reading and spelling over and above general intelligence and phonological awareness (Zaric et al., 2019).

Although both types of orthographic are crucial for reading and spelling, word-specific representations stored in memory play a more important role than general knowledge.

Some recent studies have examined the relationship between both the lexical and sublexical components of orthographic knowledge and spelling (Andrews et al., 2020; Conrad et al., 2019; Murphy & Justice, 2019; Treiman et al., 2019). Further, Murphy and Justice (2019) discovered that lexical orthographic knowledge is a significant predictor of reading comprehension when orthographic accuracy was measured by using correct letter sequence metrics over words spelled correctly (Murphy & Justice, 2019; Treiman et al., 2019). The PSI measure used in this study combines words spelled correct and a partial-credit metric to provide a composite score. The partial spelling credit is metric was the only spelling metric that controlled for word recognition (Murphy & Justice, 2019). Although this study tested the predictive ability of early indicators on reading fluency, the overarching goal of reading instruction is to reduce the mental effort of reading individual words so students can focus on understanding the text. Therefore, the findings of Treiman et al. (2019) are supported by the results of this study because reading fluency skills are a prerequisite for proficient reading comprehension.

Although the combination of predictor variables is a powerful predictor of later reading ability, the results of this study showed less predictive power of each variable individually. Beginning of the year ORF was found to be the only variable that significantly predicts of mid-year ORF scores ($p < .001$). The coefficients for beginning of the year NWF and PSI scores indicate there is no significant predictive relationship for either variable with mid-year ORF.

Nonsense Word Fluency

NWF is a widely used curriculum-based measure for foundational reading skills in young students. This measure is used as a universal screening tool to diagnose struggling readers and

ensure students are making progress on goals. This assessment measures a student's ability to decode individual phonemes and then blend them together to read words (Good & Kaminski, 2011). NWF provides an indication of a student's progress in acquiring phonemic awareness and alphabetic skills. The words are VC and CVC word patterns in made-up, or nonsense, words (Good & Kaminski, 2011). Reading nonsense words requires students to match phonemes accurately and automatically to graphemes and blend the letter-sounds into pseudo words (Martin et al., 2020; Shea et al., 2020). This measures students' knowledge of the most common letter–sound correspondences and their ability to blend the sounds to read unfamiliar words.

In this study, NWF was not a significant predictor of later oral reading fluency ($p = .131$). This was a surprising result, considering that NWF is a is a measure of phonemic awareness and the effectiveness of phonemic awareness instruction is illuminated through Ehri's Phase Theory for Reading Development (Ehri, 2014). According to the theory, the prealphabetic phase is the first stage of reading and characterized by students' reliance on visual cues to remember words Ehri, 2014; Roberts, 2021; Roberts et al., 2020). For students to move from this initial phase to the partial alphabetic phase, phonemic awareness skills and letter knowledge must begin to develop through explicit PA and alphabetic instruction (Castles et al., 2018; Ehri, 2014; Roberts et al., 2020). As students develop both phonemic awareness and alphabetic knowledge, they begin early stage of fluent reading, called the full alphabetic phase. This phase is defined by more accurate decoding or word reading (Ehri, 2014). Students who can accurately and automatically read nonsense words are ready to learn more complex patterns that propel them towards reading fluency and comprehension. In the full alphabetic phase, students begin to develop automatic sight word recognition and to use letter-sound correspondence to of segmenting and blending words with three to four phonemes (Ehri, 2014). NWF measures a

student's knowledge of the alphabetic principal and ability to blend sounds into words building the foundation for ORF.

Prior research has demonstrated the validity of decision-making with nonsense word measures and justifies the use of pseudoword reading measures in reading assessment systems (Fien et al., 2008; Roberts et al., 2020). Word reading proficiency is a prerequisite to reading comprehension, and pseudoword reading regularly accounts for a considerable amount of variance in word reading proficiency (Fien et al., 2008; Martin et al., 2020). Scores from NWF are commonly used to predict future reading performance and identify students who need instructional support (Martin et al., 2020; Murphy & Justice, 2019; Shea et al., 2020). Ehri (2005) found a contribution of lexical orthographic knowledge was observed only to spelling and in an early phase of literacy instruction. These findings, however, did not extend to reading pseudowords. The results of the present study reveal that teachers should not solely use NWF to analyze and diagnose the word reading ability in students. Nonsense words reveal the foundation of alphabetic knowledge but may not be an essential indicator of student's future performance on reading fluency or reading comprehension.

Oral Reading Fluency

ORF is the ability to read connected text quickly, accurately, and with expression (Good & Kaminski, 2011). When reading fluently, students recognize the words automatically from memory using little cognitive effort to decode the words. Because of this, ORF is one of the essential components required for successful reading comprehension. When assessing ORF, students are timed and asked to read a grade-level passage. Students are scored using *words read correct* metric. Additionally, accuracy and comprehension scores are obtained to determine the reading composite score. In the present study, beginning of the year ORF was found to be the

only variable that significantly predicts of mid-year ORF scores ($p < .001$). It is sensible that one measure of ORF would be predictive of a later measure of ORF provided they are measured using the same metric. In this study, both measures of ORF were measured using words read correct score through *Acadience® Reading.*

These results are consistent with a significant body of research that highlights the predictive value of ORF (Bigozzi et al., 2017; Cho et al., 2018; Conradi-Smith et al., 2020; Grace Kim, 2015; Negrete & Bear, 2019). As a universal screening measure, ORF has proven beneficial for predicting how well students will perform on comprehension measures. Conradi-Smith et al. (2020) found that reading rate predicted 88.3% of students who would pass a later high stakes reading assessment and 68.8% of students who would not pass the high stakes reading assessment. Bigozzi et al. (2017) examined the effect of ORF on later academic achievement and determined reading fluency predicted outcomes in all literacy-based subjects, with reading rate being the most important predictor. This is important because it shows the effect of reading fluency does not fade after early elementary school and secondary schools should not underestimate the positive impact of automatic reading fluency has on students' learning (Bigozzi et al., 2017).

Researchers have suggested that ORF is an indicator of overall reading capability (Cho et al., 2018; Grace Kim, 2015). A study by Grace Kim (2015) determined significant relationship between orthographic awareness and text-reading fluency over and above other emergent literacy skills and word-reading fluency. This is important to the results of the present study because as automatic word-reading skills develop, sublexical and lexical processing becomes more efficient, which allows students to allocate more focus to meaning construction (Cho et al., 2018). In the beginning phases of reading development, decoding is the primary focus of reading development

(Ehri, 2014). At a later phase of reading, text-reading fluency becomes a significant predictor of reading comprehension over and above word-reading fluency and listening comprehension (Grace Kim, 2015). When students automatically recognize text, there is an increased cognitive capacity for complex comprehension processes such as synthesizing knowledge or filling knowledge gaps through inference-making (Cho et al., 2018). These studies provided consistent empirical support for the strong relation between ORF and reading comprehension, especially from kindergarten through Grade 3 (Conradi-Smith et al., 2020; Morris et al., 2017). This was relevant to the present study because it stresses the importance of assessing early reading indicators in early elementary for screening and monitoring of instruction and interventions during in early elementary school.

Multitiered frameworks for instruction and assessment are commonly implemented in school settings in the early elementary grades as a means for identifying and mediating students at risk for reading disabilities. The results of this study support the notion that reading speed and decoding accuracy alone is insufficient for predicting later reading ability (Conradi-Smith et al., 2020; Morris et al., 2017). Reading is a complex mental process, and success on a reading assessment is dependent on a variety of skills, strategies, and strengths that cannot be encapsulated by a reading fluency measure (Conradi-Smith et al., 2020). Monitoring student progress is associated with improved student performance; however, it is unclear what method is most appropriate for evaluating response to instruction and intervention (Cho et al., 2018; Daffern & Fleet, 2020; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; Treiman et al., 2019).

Spelling

Through this study, the researcher aimed to add knowledge to the extant literature on reading development that supports the utility of spelling in early identification of reading difficulties in students. Researchers have shown that learning to read and spell depend on much of the same underlying orthographic knowledge and that spelling data can be used to inform instruction and gain a better picture of students' reading abilities (Andrews et al., 2020; Conrad et al., 2019; Morris et al., 2017; Murphy & Justice, 2019; Querido et al., 2020). Contrary to the literature reviewed, the results of the present study did not yield a significant predictive relationship between spelling and later oral reading fluency.

There is empirical support indicating that spelling performance at the end of kindergarten can predict the chance of future success in proficient reading (Morris et al., 2017; O'Keeffe et al., 2017; Ouellette & Senechel, 2017; Treiman et al., 2019). Treiman et al. found spelling to be a significant predictor of word reading ability in later grades beyond measures of phonological awareness, letter-sound knowledge, and other areas prior to Grade 1. Additionally, invented spelling was found to contribute directly to reading along with alphabetic knowledge and phonological awareness (Ouellette & Senechel, 2017). Invented spelling refers to young students' attempts at spelling using the phonetic characteristics of the word. Spelling surpasses what can be learned by testing phonological awareness, letter-sound knowledge, and reading ability at the end of kindergarten (Morris et al., 2017; Ouellette & Senechel, 2017). One reason that the present study results may not have been significant is because of the age of the students at the first benchmark. In this study, students were tested at the beginning of second-grade year and again at the middle of second grade. It is plausible that not enough time has passed between the two data collection periods for students to make noticeable gains in reading ability. Future

researchers could replicate this study but use students spelling scores from kindergarten to explore the predictive power on later reading ability.

In a study by Conrad et al. (2019), spelling tasks resulted in higher quality lexical representations. Lexical quality refers to the efficiency and effectiveness of retrieving orthographic knowledge during reading comprehension (Andrews et al., 2020). As students gain orthographic knowledge, they bond the semantic, orthographic, and phonological meanings of lexical representations as a unit. This makes the retrieval of word-specific orthographic knowledge more efficient to retrieve. Prior researchers have suggested that spelling allows students to remember words more accurately when they see the spelling and decoding produces better spelling recall than only seeing the words (Chambrè et al., 2020; Ehri, 2020; O'Leary & Ehri, 2019).

Spelling tasks activate grapheme–phoneme connections to better secures spellings to pronunciations along with meanings in memory and the connections are strengthened when spellings are explicitly decoded (Chambrè et al., 2020; Ehri, 2020; O'Leary & Ehri, 2019). Querido et al. (2020) found the lexical component of orthographic knowledge has a greater number of contributions particularly for spelling. When lexical representations are still being built in the initial phases of reading development, correct word spelling may depend not only on well-specified stored representations of words, but also on orthographic pattern knowledge (Querido et al., 2020). The results of this study may not have shown a predictive power of spelling because students have not yet achieved a strong storage of lexical orthographic knowledge.

Spelling has not been included in universal screening practices for early literacy; however, multiple sources of data should be used as part of this screening process to determine

whether students are at risk for reading difficulties. The present results suggest that adding a measure of spelling may be a valuable instrument when screening children for literacy difficulties. Although spelling as an individual variable did not show predictive power, the combination of measures of nonsense word fluency, oral reading fluency, and spelling were found to be a powerful predictor of later oral reading fluency. Several studies support the critical role of spelling on increasing lexical quality during orthographic learning (Daffern & Fleet, 2020; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; Treiman et al., 2019). Additionally, several studies have shown promise for using a variety of spelling metrics to identify struggling readers (Daffern & Fleet, 2020; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019; Treiman et al., 2019). To glean more insight into the utility of early spelling measures, future scholars should seek to compare the predictive value of spelling to that of other measures in students who are at risk of reading difficulties (Treiman et al., 2019)

Implications

The National Assessment of Educational Progress (2022) has reported that only 35% of students in the United States are proficient readers. In 2022, fourth and eighth grade reading scores declined for most states compared to 2019. Alarmingly, the average reading score at both fourth grade is lower than all previous assessment years going back to 2005 (NAEP, 2022). Students in the United States have the right to excellent literacy instruction because reading ability has been linked to outcomes later in life (Greiner de Magalhaes et al., 2022; ILA, 2019; Møller et al., 2022; Peterson et al., 2018; Van Rijthoven et al., 2021). The current body of research supports the use of universal screening and progress monitoring to identify students at risk for reading difficulties; however, literature has not expanded the study of the relationship between reading and spelling scores. Through this study, the researcher aimed to fill the gap in the literature that calls for a more holistic picture of students' reading abilities (Conrad et al.,

2019; Diggs & Christ, 2019; Murphy & Justice, 2019; Negrete & Bear, 2019). Gaining a better understanding of the predictive ability of spelling could improve screening and identification procedures for children at risk for reading comprehension difficulties (Murphy & Justice, 2019).

A multiple linear regression analysis was conducted to examine the predictive ability of a linear combination of early reading indicators and spelling on later reading achievement. The null hypothesis was tested and rejected at the 95% confidence level, where $F(3, 120) = 327.12$ and $p < .001$. There was a significant relationship between the predictor variables (beginning of the year NWF, ORF, PSI scores) and the criterion variable (mid-year ORF). In addition, the $R^2 = .891$. This indicated that approximately 89% of the variance of the criterion variable can be explained by the linear combination of predictor variables. Because the null hypothesis was rejected, the coefficients were analyzed individually. Beginning of the year ORF was found to be the only variable that significantly predicts of mid-year ORF scores ($p < .001$). The coefficients for beginning of the year NWF and PSI scores indicate there is no significant predictive relationship for either variable with mid-year oral reading fluency.

The science of reading, the interdisciplinary body of scientifically based research on reading, has accumulated evidentiary support on how proficient reading and writing develop. Additionally, SOR seeks to explain why some students have difficulty learning to read and how teachers can effectively instruct and remediate to improve student outcomes. This includes a heavy emphasis on prevention of and intervention for reading difficulties through assessments. According to the findings of the present study, the combination of variables is a powerful predictor of later reading ability. This use of multiple assessments can help identify why students are having reading difficulty and inform instruction to remediate that difficulty which is well-supported by science of reading. The application of reading research to instruction includes a

heavy emphasis on decoding, vocabulary, reading comprehension, metacognition, oral language, and spelling (Cassidy et al., 2022; Shanahan, 2020).

The coefficients of determination reveal only oral reading fluency was a significant predictor. The primary researcher hypothesized that spelling would be a predictor because research shows that during early reading instruction spelling promotes a bidirectional practice (Møller et al., 2022; Van Rijthoven et al., 2021). Students associate sounds with letters during spelling, and letters are associated with sounds during reading (Møller et al., 2022; Van Rijthoven et al., 2021). This bidirectional relationship provides more robust links between letter-sound correspondence, strengthening reading and spelling development (Møller et al., 2022; Van Rijthoven et al., 2021).

While the present study did not find that spelling scores predict a later measure of oral reading fluency, this study supports that gaining knowledge of a student's level of word-specific and general orthographic knowledge could inform immediate intervention (Zaric et al., 2019). Suggestions for further research is listed at the end of this chapter. While previous research has shown that spelling builds and strengthens orthographic knowledge, few studies have explored the predictive ability of spelling scores on later reading ability to understand the utility of spelling as a tool for identifying and screening students at risk for reading difficulties (Gischlar & Vesay, 2018; Morris et al., 2017; Munger & Murray, 2017; Murphy & Justice, 2019).

In conclusion, the findings of this study can be used by schools to better understand reading development and strengthen instruction and interventions programs. Including spelling in early literacy benchmarks provides a more comprehensive profile of reading development. By using multiple measures in assessment, more specific deficits in literacy can be identified. This is imperative for schools to meet the individual needs of their students and begin to see even gains

in reading, which have been shown to extend into future academic outcomes beyond early elementary school years.

Limitations

Although correlational research can determine a predictive relationship among a combination of variables, it cannot predict causation. While there is abundant correlational research supporting the predictive relationship between a combination of early literacy indicators and later reading fluency, no analysis cannot determine the cause. This is a limitation of all correlational research, but there are several limitations unique to the present study.

First, this study is limited due to the use of a convenience sample from two elementary schools within one rural school district. The primary researcher chose this demographic because of the accessibility of data. Both schools are identified as Title I schools because children from low-income families make up at least 40 percent of enrollment. Title I funding is provided to manage schoolwide programs that serve all children in the school to raise the achievement of the lowest-achieving students. The results of this study should not be used to generalize about public schools that do not have Title I status because the demographics such as socioeconomic status and curricular programs would be different. This study can be replicated and extended to test the null hypothesis with other populations.

Another limitation is that the researcher relied on two different reading intervention teams to administer the assessments and the primary researcher could not test the students. This is a limitation because even though the assessments were given during the same collection period, different teams may have slightly different procedures. In addition, the researcher did not consider factors related to teaching and instruction that may have impacted the students' performance on the benchmark assessments. Some teachers are more proficient at using data able to inform their instruction throughout the year to improve reading fluency scores. Teachers with

less experience may not yet understand how to interpret data to guide instruction that improves students' performance on these types of assessments.

The final limitation is the short period of time between data collection of the predictor variables and the criterion variables. The data for the predictor variables were collected at the beginning of the school year and the data for the criterion variable was collected at the mid-year benchmark testing. The mid-year benchmark is the first experience students have with assessments of formal reading comprehension. Future research in this area would benefit from a longitudinal study that explores performance early reading indicators and spelling on long-term reading outcomes.

Recommendations for Future Research

The findings of this study show a need for further investigation into the relationship of early indicators of spelling and later reading ability. Suggestions for future studies are listed below.

1. Examine the correlation between early reading indicators and later reading ability.
2. Consider the correlation between spelling and later reading ability.
3. Quantify the correlation between reading accuracy and later reading ability.
4. Determine the correlation between English language learners and later reading ability.
5. Evaluate the correlation between teacher-level factors such as years of teaching and certification area and later reading ability.
6. Calculate the concurrent validity of lexical and sublexical orthographic knowledge assessments.
7. Replicate and extend the study to test the null hypothesis with other demographics.

8. Extend the timeline of a replicated study to a longitudinal study that examines the correlation between early reading indicators and spelling and long-term reading outcomes.

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APPENDIX A

Request for Permission for Data Collection

Mrs. Jessie Reed
624 Washington Avenue
Mifflintown, PA 17059

June 28, 2022

[redacted]

Dear [redacted]

I am writing to request permission to use district data for a dissertation study completed during the 2022–2023 school year. I am a teacher in the district and a doctoral student of curriculum and instruction with Liberty University. I will be conducting research on indicators of early literacy and would like to include Acadience data for second grade students during the fall and winter benchmarks.

The study will examine the predictive ability of early reading indicators and spelling on students' oral reading ability. Data collection will be completed during the routine benchmark assessment schedule by the Title I Instructional team. In addition, second grade teachers will be asked to complete a one-time spelling inventory with their classes. All materials for the spelling inventory will be provided to the teachers and will take an estimated 10 minutes to complete in one school day. Student, teacher, school, and district-level identifiers will be removed to create an anonymous set of data. Prior to data collection, I will secure Liberty University's Institutional Review Board (IRB) approval.

Perhaps the results of this study can glean insight into improving literacy instruction in the district. I will gladly share the results of the study upon completion. This letter has been sent to the superintendent, assistant superintendent, and elementary building principals. If you have any further questions regarding this request, please contact me at ([redacted]) [redacted]-[redacted] or [redacted]@jcsdk12.org. Thank you for your consideration.

Sincerely,

Jessie Reed

APPENDIX B

IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

July 22, 2022

Jessie Reed
Jessica Talada

Re: IRB Exemption - IRB-FY22-23-61 The Predictive Ability of Early Reading Indicators and Spelling on Oral Reading Fluency

Dear Jessie Reed, Jessica Talada,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

(4) Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:

(ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;

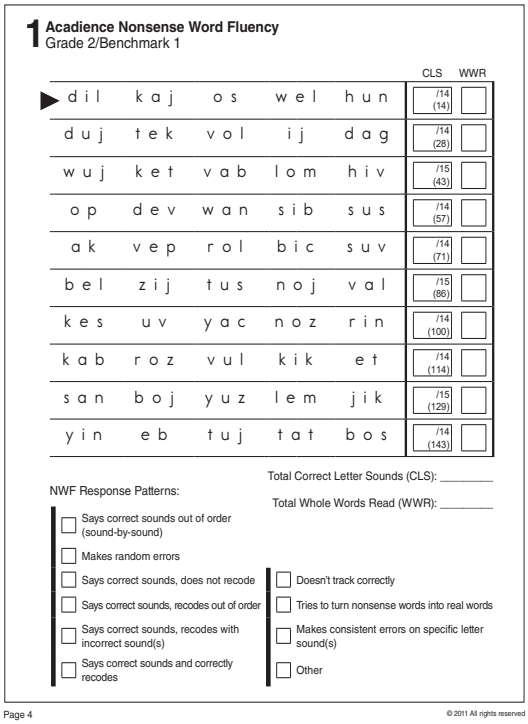
Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,
G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

APPENDIX C

Acadience® Nonsense Word Fluency Grade 2 Benchmark 1



1 Acadience Nonsense Word Fluency
Grade 2/Benchmark 1

						CLS	WWR
▶	dil	kaj	os	wel	hun	/14 (14)	
	duj	tek	vol	ij	dag	/14 (28)	
	wuj	ket	vab	lom	hiv	/15 (43)	
	op	dev	wan	sib	sus	/14 (57)	
	ak	vep	rol	bic	suv	/14 (71)	
	bel	zij	tus	noj	val	/15 (86)	
	kes	uv	yac	noz	rin	/14 (100)	
	kab	roz	vul	kik	et	/14 (114)	
	san	boj	yuz	lem	jik	/15 (129)	
	yin	eb	tuj	tat	bos	/14 (143)	

Total Correct Letter Sounds (CLS): _____

Total Whole Words Read (WWR): _____

NWF Response Patterns:

- ☐ Says correct sounds out of order (sound-by-sound)
- ☐ Makes random errors
- ☐ Says correct sounds, does not recode
- ☐ Says correct sounds, recodes out of order
- ☐ Says correct sounds, recodes with incorrect sound(s)
- ☐ Says correct sounds and correctly recodes
- ☐ Doesn't track correctly
- ☐ Tries to turn nonsense words into real words
- ☐ Makes consistent errors on specific letter sound(s)
- ☐ Other

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Notes:

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APPENDIX D

Acadience® Oral Reading Fluency Grade 2 Benchmark 1

1 **Acadience Oral Reading Fluency**
Grade 2/Benchmark 1.1

Total words: _____
Errors (include skipped words): – _____
Words correct: = _____

Picture Day

0 The teacher told the class that they would have their pictures 11
11 taken the next day. Nick did not look forward to picture day. He did not 26
26 understand why all of the other kids were so excited. Why did they like 40
40 picture day so much? 44
44 Nick took the picture order form home and gave it to Mom. Even 57
57 she was excited. She filled out the form and put it in an envelope with 72
72 money. Then she went into Nick's room to find the right outfit. Nick 85
85 wondered again why everyone got so excited about picture day. 95
95 The next day, Nick went to school in his best red shirt and new blue 110
110 jeans. His hair was combed neatly. His mom had even sprayed his hair 123
123 with hair spray! 126
126 The classroom buzzed with excitement. The other children could 135
135 not wait to have their picture taken! Nick sat at his desk and felt puzzled. 150
150 Someone sat down at the desk next to him. Nick saw that it was his 165
165 friend Cody, and he was smiling. Nick asked Cody why he was so happy. 179
179 Nick could not believe his ears when Cody told him that the school had 193
193 a new plan for picture day. This year there would be real animals in 207
207 the pictures! You could pet the animal while they took the picture. Nick 220
220 suddenly was looking forward to picture day! 227

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3 **Acadience Oral Reading Fluency**
Grade 2/Benchmark 3.3

Retell: Roller Skating Fun

▶ ***Now tell me as much as you can about the story you just read. Ready, begin.***

Timing	1-minute maximum. Start your stopwatch after telling the student to begin. Say ***Stop*** after 1 minute.
Wait/ Reminder	If the student stops or hesitates for 3 seconds, select *one* of the following (allowed one time): —If the student has not said anything at all, provides a very limited response, or provides an off-track response, say ***Tell me as much as you can about the story.*** —Otherwise, ask ***Can you tell me anything more about the story?***
Discontinue	After the first reminder, if the student does not say anything or gets off track for 5 seconds, say ***Thank you*** and discontinue the task.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48			
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71			
72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94			

Retell Total: _____

Quality of Response: (Note: If the student provides only a main idea, it is considered one detail.)

1 Provides 2 or fewer details
2 Provides 3 or more details
3 Provides 3 or more details in a meaningful sequence
4 Provides 3 or more details in a meaningful sequence that captures a main idea

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APPENDIX E

Acadience® Oral Reading Fluency Grade 2 Benchmark 2

2 Acadience Oral Reading Fluency
Grade 2/Benchmark 2.1

Total words: _____
Errors (include skipped words): – _____
Words correct: = _____

Check Out a Book

0 There are many reasons to go to a library. You can find many books 14
14 there. Did you know that a library also has movies and music? Many 27
27 have programs just for kids, too. You can go to story time or meet a real 43
43 author. 44
44 If you want to borrow something from the library, you need to get 57
57 a library card. To get a card, an adult must fill out a form. The form has 74
74 information such as the person's name and address. At many libraries, 85
85 children may get a card too, but an adult must sign the form. When you 100
100 get your card, learn the library's rules. Ask how many items you can 113
113 check out at one time. Also ask how long you may keep them. 126
126 Once you have your card, you are ready to find something to 138
138 check out. You can use the library's computer to find a book or a 152
152 movie. Search by title, author's name, or subject. Or, you can always 164
164 just browse. Maybe you want to read a fiction book. Look at the books 178
178 in the fiction section. Or browse the movie section. You are sure to find 192
192 something you like! 195
195 Once you have chosen the items you want, take them to the front 208
208 desk. Give the librarian your library card and your items. He or she 221
221 will check them out for you and tell you when to bring them back. 235
235 Remember to return the items by their due date. Then come back to 248
248 the library to check out more items! 255

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2 Acadience Oral Reading Fluency
Grade 2/Benchmark 2.3

Retell: The Best Big Brother

▶ ***Now tell me as much as you can about the story you just read. Ready, begin.***

Timing	1-minute maximum. Start your stopwatch after telling the student to begin. Say ***Stop*** after 1 minute.
Wait/ Reminder	If the student stops or hesitates for 3 seconds, select *one* of the following (allowed one time): —If the student has not said anything at all, provides a very limited response, or provides an off-track response, say ***Tell me as much as you can about the story.*** —Otherwise, ask ***Can you tell me anything more about the story?***
Discontinue	After the first reminder, if the student does not say anything or gets off track for 5 seconds, say ***Thank you*** and discontinue the task.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48			
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71			
72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94			

Retell Total: _____

Quality of Response: (Note: If the student provides only a main idea, it is considered one detail.)

1 Provides 2 or fewer details
2 Provides 3 or more details
3 Provides 3 or more details in a meaningful sequence
4 Provides 3 or more details in a meaningful sequence that captures a main idea

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APPENDIX F

Words Their Way Primary Spelling Inventory

***Words Their Way* Primary Spelling Inventory Feature Guide**

Student's Name _____ Teacher _____ Grade _____ Date _____

Words Spelled Correctly: ____ / 26 *Feature Points:* ____ / 56 *Total:* ____ / 82 *Spelling Stage:* _____

SPELLING STAGES →	EMERGENT		LETTER NAME–ALPHABETIC				WITHIN WORD PATTERN			SYLLABLES AND AFFIXES			
	LATE		EARLY	MIDDLE	LATE		EARLY	MIDDLE	LATE	EARLY			
Features →	Consonants Initial	Consonants Final	Short Vowels	Digraphs	Blends		Long Vowel Patterns	Other Vowels		Inflected Endings		Feature Points	Words Spelled Correctly
1. fan	f	n	a										
2. pet	p	t	e										
3. dig	d	g	i										
4. rob	r	b	o										
5. hope	h	p					o-e						
6. wait	w	t					ai						
7. gum	g	m	u										
8. sled			e		sl								
9. stick			i		st								
10. shine				sh			i-e						
11. dream					dr		ea						
12. blade					bl		a-e						
13. coach				-ch			oa						
14. fright					fr		igh						
15. chewed				ch				ew		-ed			
16. crawl					cr			aw					
17. wishes				-sh						-es			
18. thorn				th				or					
19. shouted				sh				ou		-ed			
20. spoil								oi					
21. growl								ow					
22. third				th				ir					
23. camped										-ed			
24. tries					tr					-ies			
25. clapping										-pping			
26. riding										-ding			
Totals	/ 7	/ 7	/ 7	/ 7	/ 7		/ 7	/ 7		/ 7		/ 56	/ 26