THE PREDICTIVE VALUE OF PHONEMIC AWARENESS CURRICULUM-BASED MEASURES ON KINDERGARTEN WORD READING FLUENCY

by

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DISSERTATION ABSTRACT

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This manuscript synthesizes the importance of the alphabetic principles of reading, building blocks of teaching reading, indicators of early reading success, and curriculum-based measures (CBM) within the Response to Intervention (RtI) process from empirical research. A review of the literature reflects contrasting views on which specific pre-reading skill is most predictive of word reading success toward the end of kindergarten and the important role of CBM in such an analysis. Therefore, my research questions analyzed (a) the correlations between letter naming, letter sounds, phonemic segmentation, and word reading fluency in kindergarten; (b) the relative predictive relation of letter names, letter sounds, and phonemic segmentation measures to word reading fluency for kindergarten students; and, (c) the relation of non-academic variables of special education status, English language learner status, attendance, free-and-reduced-meals, and NonWhite Race to word reading fluency in kindergarten. Correlation results indicated the correlation between winter word reading fluency and spring word reading fluency in kindergarten was $r = .82$, spring word reading and fall letter sounds was $r = .57$, spring word reading and winter letter sounds was $r = .66$, and spring word reading and spring letter sounds was $r = .58$. All the non-academic variables weakly correlated to spring word reading, with the exception of fall attendance percentage showing a negative to low correlation range (-0.15 to 0.11). In addition, regression results indicated that Winter Word Reading Fluency (Winter WRF) (β = .64) was predictive of Spring Word Reading. Spring Letter Sounds (Spring LS) (β = .29) also were predictive of Spring Word Reading as was Fall Letter Sounds (Fall LS) (β = .11). These results frame practical implications for reading instruction that suggest ways in which schools and districts to think about staffing, instruction, and schedules to better meet student needs in preparation for state-mandated all-day kindergarten in the fall of 2017 and beyond.

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CHAPTER I

INTRODUCTION

One of Oregon's literacy goals for 2015, as set by the previous governor, focused on early reading skills. As part of this goal, the Oregon Education Investment Board (OEIB) was to advise and support the building, implementation and investment in a unified public education system in Oregon to meet the diverse learning needs of our youngest Oregonians. One of OEIB's five initiatives was a focus on Early Literacy. The OEIB Early Literacy initiative plan emphasized starting early, thinking integration, getting specific, building awareness and collective responsibility state wide for early literacy efforts (Oregon Education Investment Board, 2014).

As in Oregon, a critical goal in education is the prevention of reading difficulties in youth to ensure that all children are early readers in their educational careers. The demands of the knowledge-based, 21st century workplace have raised the literacy bar for students, and schools must now respond to heightened expectations around student learning needs (Good, Simmons, & Kame'enui, 2001). Good and colleagues identified three foundational beginning reading skills: (a) phonological awareness, or the ability to hear and manipulate the sound structure of language; (b) alphabetic understanding, or the mapping of print to speech and the phonological recoding of letter strings into corresponding sounds and blending stored sounds into words; and (c) accuracy and fluency with connected text, or the facile and seemingly effortless recognition of words in connected text. In schools, we refer to these three foundational skills as phonemic awareness, phonics, and fluency.

As students enter kindergarten, teachers must estimate where each child is developmentally and build on that base. This base is a key feature of good teaching that is particularly important for a kindergarten teacher (Neuman et al., 2000). Instruction needs to be adapted to account for children's beginning pre-reading differences. For those children with considerable print experiences, instruction will extend their knowledge as they learn more about the formal features of letters and their sound correspondences. For children with fewer print experiences, initiating them to the alphabetic principle will require more focused and directed instruction. Neuman and colleagues defined the alphabetic principle as the understanding that the English alphabet comprises a limited set of letters and that these letters stand for the sounds that make up spoken words. Friesen and Butera (2012) have also established that early reading development is a complex process that includes the acquisition of skills, such as alphabet recognition, phonemic awareness, and vocabulary development.

Instruction takes on a more formal nature as children move into the primary grades. Although research (Friesen & Butera, 2012) has clearly established that no one method is superior for all children, approaches that favor a *systematic code instruction* along with meaningful connected text reading tend to support progress in literacy development. Friesen and Butera (2012) related the concept of learning to read to learning to drive. They said that a new driver needs to understand, practice, and attain simultaneous fluency with key mechanical parts of a car such as the steering wheel, foot pedals, and gear shift so too must a new reader acquire ease in key reading components such as alphabetic recognition, phonological awareness, vocabulary, and comprehension.

Importance of Teaching Reading in the Classroom

Teaching children to read is a complex endeavor at which educators become adept only after several years of teaching (Menzies, Mahdavi, & Lewis, 2008). Torgesen (2002) illustrated the challenges and responsibilities facing our nations' schools with regards to teaching reading skills in the classroom. These challenges and responsibilities are depicted well with research identified by NAEP 2000 Reading report (Donahue, Finnegan, Lutkus, Allen, & Campbell, 2001) and the National Reading Panel (2000) report. Fueled by facts that 37% of fourth-grade school children cannot read well enough to effectively accomplish grade-level work (Donahue et al., 2001), there is an emerging sense of urgency about improving reading instruction and literacy outcomes in our country. Clearly, children who become adults without fully developed literacy skills are at a disadvantage in a society that is creating ever-higher demands for effective reading skills within the workplace. These rising demands can only be met by changing the way we teach reading so that we produce better literacy outcomes for more children than ever (Torgesen, 2002).

The National Reading Panel (1990) identified five essential component skills for reading development: (a) phonemic awareness, (b) phonics, (c) oral reading fluency, (d) vocabulary, and (e) comprehension. Two of the five, phonemic awareness and phonics, are embedded in the alphabetic principle of reading. These skills became the foundation for the Reading First legislation that was part of the No Child Left Behind Act (Paris, 2005).

The methodological dimension of scientifically-based reading instruction involves the *how* of teaching reading as well (Smartt & Reschly, 2007). According to the National

Reading Panel (2000), the five essential components of reading must be directly taught in an explicit and systematic manner to ensure that all students are successful readers by the end of third grade. Also important is the frequent assessment of individual student progress coupled with formative evaluation principles leading to possible changes in instructional practice or goals (Good et al., 2001; Smartt & Reschly, 2007).

Intentional teaching is the practice of teachers acting with specific outcomes or goals in mind for children's development and learning (Friesen & Butera, 2012). In this context, teachers ensure all children acquire important abilities, including early reading. Given the differences in early reading knowledge between children in poverty and their middle and upper class peers, intentional teaching may be particularly important in closing the gap at this young age and establishing early literacy skills. Al Otaiba and Fuchs (2002) described children who began their school career as successful readers as likely to experience academic success, graduate from high school and college, and find employment. Given the pivotal role reading plays in and out of school and the cumulative long-term cost of illiteracy, early literacy intervention is critical (Al Otaiba & Fuchs, 2002). Bryne (1998) suggests children will not, for the most part, make the reading discovery unaided, and the consequences for literacy growth of not discovering the alphabetic principle are serious. Thus, understanding and measuring those foundational early literacy skills is paramount.

The Alphabetic Principle of Reading

The term alphabetic principle refers to the relatively straightforward idea that the letters that comprise our printed language stand for the individual sounds that compromise our spoken language (Bryne, 1998). The importance of learning to read has also stimulated considerable debates: theoretical, practical, and political, about which teaching methods and materials are most effective (Afflerbach, Pearson, & Paris, 2008). During the past 10 years, the debates have become more strident as calls for school accountability have increased. The debates about teaching reading are taken seriously by educators, who have been increasingly influenced by legislated policies that determine what, how, and when to teach reading to students in their classrooms (Afflerbach et al., 2008). The debates also have stimulated a greater reliance on scientific evidence by educational administrators and policymakers, who want all teachers to use effective methods and materials (Afflerbach et al., 2008).

Ball and Blachman (1988) described the nature of the relation between oral language development and reading fluency, including phonemic awareness and phonics. Phonemic awareness (sometimes called phonological awareness or phonemic analysis) is the ability to recognize that a spoken word consists of a sequence of sounds and is often measured by students' ability to segment words or blend sounds into a word (Ball & Blachman, 1988). Despite the ease with which most children learn to communicate orally, substantial numbers of these children experience difficulty learning to read. One explanation for the discrepancy between the ease with which children acquire oral language skills and the difficulty many children have in acquiring reading skills has focused on alphabetic principle or linguistic awareness (Ball & Blachman, 1988). Linguistic awareness is the ability to reflect deliberately on language in and of itself, as opposed to the automatic use of language to convey meaning. One category of linguistic awareness that continues to attract attention as an important component of early reading skills was letter knowledge, phonemic awareness, letter sounds. As Good et al. (2001)

noted, those skills are precursors to fluency with text. Ritchey and Speece (2006) stated that "phonemic awareness, letter name, and letter sound knowledge are considered *sublexical* skills as they operate below the word level" (p. 302). They also stated that "current thinking suggests that fluent word reading is the result of fluency with sublexical processes as defined in this study but the linkages among letter names, letter sounds, and phonological segmentation are not well specified" (p. 303).

Letter Knowledge as a Precursor to Phonemic Awareness

Carroll's (2004) research hypothesized that letter knowledge was part of the scientifically-based reading instruction and was an important precursor for phoneme awareness. Carroll's research included a small-scale intervention study with 10 children. Those children were taught letters and their phoneme awareness was monitored. Letter knowledge was specifically related to the development of the ability to segment phonemes in preliterate children, suggesting that letter knowledge is a necessary precursor to the development of phoneme awareness. Studies examining the phonological awareness of pre-readers (Liberman, Shankweiler, Fischer, & Carter, 1974) have shown that reading seems to play a role in the development of explicit phonemic awareness. More specifically, learning letters seems an element of reading causally-related to phoneme awareness. Another study, by Read, Zhang, Nie, and Ding (1986), showed that the development of explicit phonemic awareness was limited to languages with an alphabetic writing system. Thus, according to these researchers the learning of letter names must play a crucial role in the development of phonemic awareness.

The finding that letter knowledge was an important factor in the development of phoneme awareness is in line with previous work showing the interaction between the two (Hatcher, Hulme, & Ellis, 1994). In particular, it fits with previous findings that knowing at least a few letters is an important precursor to early phoneme awareness (Johnston, Anderson, & Holligan, 1996), and that teaching letters improves phoneme awareness (Murray, Stahl, & Ivey, 1996). Carroll's (2004) work extended these findings by showing that the growth of letter knowledge affects different phoneme awareness tasks to different extents. Letter knowledge was most closely associated with phoneme completion, and less associated with phoneme matching and deletion. The above studies suggested that letter knowledge is crucial to developing phoneme completion ability.

Phonemic Awareness

Phillips, Clancy-Menchetti, and Lonigan (2008) described phonemic awareness as the ability to detect and manipulate the sound structure of words independent of their meaning. It is an increasingly sophisticated capability that is highly predictive of, and causally related to, children's later ability to read (Ehri et al., 2001). Decades of research converge on the idea that most children who have difficulties learning to read have a core deficit in phonological awareness and related processing skills (Wagner et al., 1997). In other words, regardless of what other types of language and cognitive difficulties a child might display, a problem in performing and applying phonological awareness capabilities is at the heart of many children's reading problems (Phillips et al., 2008). One key goal of instruction and intervention in the preschool period is, therefore, to minimize the number of children who develop later reading problems by maximizing the number who enter kindergarten with sufficient phonological skills to benefit from formal reading instruction (Phillips et al., 2008).

Phillips et al. (2008) explained that children's understanding that words are made up of smaller sounds such as syllables and phonemes helps them to *break the code* of written language and acquire the alphabetic principle. The alphabetic principle refers to the understanding that written words represent spoken words in a sound-by-sound correspondence. Sounds are signified by a single letter, or, in some cases, several letters indicating a single sound in a word (Phillips et al., 2008). When teachers or parents tell a child who is trying to write or read to "sound it out," this suggestion will only make sense if the child grasps the concept that the word can be broken down into these smaller components (Ehri et al., 2001). Phonemic awareness, letter name knowledge, and letter sound knowledge work together in young children to forge conceptual understanding and to facilitate reading and writing development (Phillips et al., 2008). This convergence is accomplished when children use their understanding of the regular relations between sounds and letters to sound out or *decode* unknown words (Ehri et al., 2001).

Phonemic awareness, as with other decoding skills, is not an intuitive or naturally developing ability, as language skills may be for some children, but may require deliberate teaching and practice opportunities (Phillips et al., 2008). The greater challenge in learning is, in part, because phonemes do not naturally exist in spoken language (Phillips et al., 2008). When people speak, they do not distinctly pronounce each isolated phoneme (Ehri et al., 2001). Instead, human speech includes what is called *co-articulation* of the speech sounds, with each phoneme affected by the ones preceding it, subsequent to it, or both (Phillips et al., 2008). Phonemes do not exist as distinct units of sound when people speak, and that children may be more disposed to pay attention to the meaning of words than to the specific sounds of words represents a potential barrier to developing phonological awareness at the phoneme unit level (Phillips et al., 2008). This research suggests that a key early focus of reading instruction for many children is to prompt them to learn to attend to the sound structure of words, practice phonemic segmentation, and explicitly teach phonemic awareness.

Hogan, Catts, and Little (2005) reported a reduction in the amount of information offered by phonemic awareness assessments once reading is underway. This may be explained, at least in part, by the reciprocal relation between phonemic awareness and reading (Hogan et al., 2005). Initially, phonemic awareness influences reading, but once reading is underway, the process of learning to read influences phonemic awareness (Hogan et al., 2005). In support of the reciprocity between reading and phonemic awareness, research has shown that reading instruction with an emphasis on decoding printed words highlights the sound structure of language and facilitates children's performance on tests of phonemic awareness (McGuinness, McGuinness, & Donohue, 1995). Because of this relation, phonemic awareness may become so highly correlated with word reading that it may offer little unique information to the prediction of reading once a measure of reading is available (Hogan et al., 2005). Thus, tests of word reading may provide a majority of the information when predicting future reading, leaving no additional variance to be accounted for by phonemic awareness.

The research conducted by Hogan et al. (2005) addressed the relation between phonemic awareness and the prediction of passage reading fluency. Specifically, Hogan et al.'s research investigated the usefulness of phonemic awareness assessments in the prediction of reading in the early school grades. Their study investigated the usefulness of phonemic awareness in the prediction of reading in the early school grades. They first sought to determine if phonemic awareness, measured in kindergarten, would predict word reading in second grade beyond a measure of letter identification. Hogan and colleagues also revealed that both letter identification and phonemic awareness were significant predictors of second-grade word recognition. Reading and Van Deuren (2007) focused on the optimal time to teach phonemic awareness, the amount of time needed to learn phonemic awareness, and how well these skills need to be learned. They discovered systematic phonemic awareness instruction was just as successful in promoting early literacy skills when taught only during first grade as it was when it was administered during both kindergarten and first grade (Reading & Van Deuren, 2007).

Letter Sounds

One key foundational skill in learning to read is learning the relationship between letters and their sounds (Adams, 1990; Ehri & McCormick, 1998). Although isolated knowledge of letter sounds does not assure successful reading, it is a precursor that students need when gaining beginning word reading skills, especially the ability to sound out words. Poor letter sound association and phonological decoding are often the underlying and persistent characteristic of children with reading-based learning disabilities (Stanovich, 1990). Ehri and McCormick (1998) stated that less skilled readers do not form connections between letter sounds and sounding out words. They implied that initial skill in fluent reading of connected text and or words reading “requires knowledge of and fluency with sublexical phonological units and their orthographic counterparts (e.g., letter sounds) . . . [and] “that phonological awareness and letter-sound fluency were the best predictors of oral reading fluency in first grade.” (Speece & Ritchey, 2005, p. 388). Hudson, Pullen, Lane, and Torgesen (2009) summarized the importance of letter sound relationships by stating that "learning grapheme-phoneme (letter-sound) relationships is at the heart of the alphabetic principle. Without the knowledge of how sounds are systematically represented by letters, children cannot be successful readers in an alphabetic language" (p. 10).

Word Reading Fluency

Over the past decade, the field of literacy education has seen a major shift in word and oral reading fluency's role in the literacy curriculum, as it has moved from a rarely-encountered instructional component to one that is often responsible for driving major instructional decisions (Kuhn, Schwanenflugel, Meisinger, Levy, & Rasinski, 2010). This shift is due, in part, to the identification of word and oral reading fluency as one of the areas reviewed by the National Reading Panel (2000). The recognition of the importance of word and oral reading fluency that has emerged as part of our developing understanding of the construct has led to a corresponding emphasis on fluency assessment and instruction within the literacy curriculum (Kuhn et al., 2010).

Word reading fluency, as measured by the fast and accurate identification of single words, predicts both general reading ability and reading comprehension (Martin-Chang & Levy, 2006). Word-level reading skill plays a necessary and central role in reading ability and its development, representing the major determinant of reading ability in the elementary grades (Gough, Hoover, & Peterson, 1996; Juel, 1988; Stanovich, 1990). Skilled word reading provides the reader with the raw materials for subsequent comprehension processing. Together with listening comprehension, word-reading skill accounts for nearly all of the reliable variance in reading ability, and individual differences in word recognition explain significant variance in reading ability, even after controlling for listening comprehension (Curtis, 1980; Hoover & Gough, 1990).

Theoretical underpinnings of word reading ability. The alphabetic principle is explicit knowledge of how the language sounds (i.e., phonemes) map onto the letters (i.e. graphemes), which enable beginning readers to acquire word-reading skills. The ability to fluently use the alphabetic principle facilitates automatic word recognition and, therefore, aides reading comprehension (Stage, Sheppard, Davidson, & Browning, 2001) Word reading *accuracy* refers to the ability to recognize or decode words correctly. Strong understanding of the alphabetic principle, the ability to blend sounds together (Ehri & McCormick, 1998), the ability to use other cues to the identity of words in text (Tunmer & Chapman, 1995), and knowledge of a large bank of high frequency words is required for word reading accuracy (Torgesen, 2002; Torgesen & Hudson, 2006).

Word-reading skill occupies a foundational position in theoretical accounts of reading ability, with direct bearing on reading-comprehension success. Researchers rely on measures of word reading in comparing the efficacy of approaches to reading instruction (e.g., Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Torgesen, Wagner, & Rashotte, 1997; Wise, Ring, & Olson, 2000). More practically, the strong association between context-reading speed and reading-comprehension ability inspired the development of curriculum-based measurement (CBM; Deno, 1985), an approach for ongoing assessment of reading development, which includes timed, repeated measurement of correct words read in context as one of the most common measures.

Measuring word reading skills. Measuring fluency skills was based in the concept that automaticity of lower order skills allows room for higher level cognitive functioning (Samuels, 1979). Studies have associated oral reading fluency with vocabulary and comprehension skill acquisition (Good, et. al., 2001). Assessing fluency is not just measuring the speed at which a student reads; fluency measures the more complex skills of fluidly decoding words and orally forming sentences with prosody (Adams, 1990). The acquisition of these fluency skills is an indication that students are developing reading proficiency.

Phonemic awareness, phonics, and fluency are measured as foundational skills to track student progress as beginning readers using CBM. According to Good et al. (2001), mastery of rudimentary skills predicts mastery of more complex skills. Good et al. (2001) argued that students who met the spring kindergarten benchmark on an assessment that measures word reading fluency, had a significantly higher chance of reaching the winter first grade measure of phonics (nonsense word fluency). This progression continued as students who met the phonics first grade benchmark had a significantly better chance of meeting the spring first grade oral reading fluency benchmark.

Word reading and demographic variables. Crowe, Connor, and Petscher (2009) examined the relations among six reading curriculums. The purpose of their study was to compare the effects of six core reading curricula on oral reading fluency growth, while evaluating whether these effects differ by grade level and for children living in lower socioeconomic (SES) households. Crowe et al. (2009) found students in the Reading Mastery curriculum demonstrated greater overall ORF (oral reading fluency) growth than students in other curricula and in first grade, regardless of SES status students generally met adequate achievement benchmarks.

Other research done in Florida with Kindergarten teachers and students suggested the response to intervention research, which has reported that vocabulary skills and home environment factors such as poverty and parental education are among variables that play a role in children's ability to learn (Al Otaiba et al., 2008). Al Otaiba et al's findings showed that children with lower levels of initial reading and vocabulary skill were more vulnerable to the quality and quantity of instruction they received (Al Otaiba & Fuchs, 2002). Lonigan (2003) also reported that preschoolers from low socioeconomic backgrounds who have lesser-developed phonological sensitivity generally experience significantly less growth in phonological skills even in the face of high quality preschool instruction. Thus, there is an unfortunate connection between a student's socio-economic status and their initial reading abilities. Students from low SES backgrounds need more high quality initial reading instruction to overcome their adverse demographic variables.

Study Context and Research Questions

My research builds upon the body of evidence in my literature review by more closely examining the ways in which early reading skills predict word reading fluency in the spring of the kindergarten school year. Two lines of research have been documented. One line of research (Carroll, 2004; Hatcher et al., 1994; Read et al., 1986) supports the importance of letter naming knowledge and the crucial role it plays in the development of a reader. Conversely, other researchers, including Phillips et al. (2008), Ehri et al. (2001), and Wagner et al. (1997) suggest that a key focus of reading instruction for children should be to prompt them to learn to attend to the sound structure of words. Because of these two contrasting research results, I wanted to distinguish which early reading factors are more predictive of spring kindergarten word reading fluency. In my study, I analyzed which student's early reading skills best predicted their word reading ability. Using data systematically to ask questions and obtain insight about student progress is a logical way to monitor continuous improvement and tailor instruction to the needs of each student and to inform an instructional plan. Most importantly, my findings will be used to inform the direction that schools and districts should take to better tailor staffing, instruction, and schedules to student needs as we prepare for all day kindergarten in the fall of 2017 and beyond. Thus, my research questions were:

1. What are the relations between the CBM of letter names, letter sounds, phonemic segmentation and spring word reading in kindergarten?
2. What is the relative predictive nature of letter names, letter sounds and phonemic segmentation measures in relation to spring word reading fluency in kindergarten students using both scores and gain scores?
3. What is the unique contribution of the non-academic variables of: (a) Economically Disadvantaged (FARMs), (b) Special Education Status (SpEd), (c) Limited English Proficiency Status (LEP), (d) NonWhite Race (Other than White), and (e) Attendance to spring word reading fluency in kindergarten?

CHAPTER II

METHODS

I used extant data from a sample of convenience obtained in the 2012 – 2013 school year from a district-wide kindergarten sample. The measures used included: (a) letter naming (LN), (b) letter sounds (LS), (c) phonemic segmentation (PS), and (d) word reading fluency (WRF). My research examined the district's curriculum based measure results using an intact group of students who had complete scores from all three assessment periods (kindergarten fall, winter, and spring). I used an intact group to reduce the potential for attrition reducing the internal validity of the study's findings, by eliminating the negative effects that mobility might have brought to my analysis.

Research Design

My study used a non-experimental, descriptive research design that used bivariate correlations and stepwise regression analyses to examine the concurrent and predictive validity of easyCBM© in a sample of kindergarten students. An alpha value of .05 was used as the cutoff criteria for all statistical significance tests.

Research question one analysis. I used bivariate correlations to answer my first question, about the relation between the CBM of LN, LS, PS, and WRF in kindergarten for general education students.

Research question two analysis. I used a multiple regression analysis to answer my second question concerning which CBM (LN, LS, or PS) best predicts kindergarten WRF for general education students. I first ran a regression using Fall, Winter and Spring raw scores. I then ran a regression using Gall to Spring gain scores.

Research question three analysis. I also used linear regression to answer my third question, regarding how non-academic variables of (a) FARMs, (b) SpEd, (c) LEP, (d) NonWhite Race, and (e) Attendance variables predicted kindergarten Spring WRF.

Setting and Participants

This study was conducted using data from elementary schools in a school district in a city in the Pacific Northwest with approximately 59,000 residents and 10,900 students from elementary to high school level. Of those, approximately 5000 students are enrolled in grades kindergarten through fifth grade served at 12 elementary schools. The district's population was relatively homogenous with approximately 33% of students reported as coming from backgrounds other than Caucasian. Economically disadvantaged students, based upon the district's free and reduced price lunch data, account for approximately 60% of the student population across all the schools in the district.

The participants in the study included all kindergarten students in the fall of 2012 through the spring of their kindergarten year in 2013. I utilized an *a priori* participation criteria that specified that only students with complete kindergarten fall, winter and spring easyCBM© scores were included in the analysis.

Instrumentation

CBM provides teachers with reliable, valid, and efficient indicators of academic competence with which to gauge individual student standing at one point in time or to track student progress across time (Deno, 1985). Fuchs, Fuchs, and Compton, (2004) found that CBM was the most widely studied form of classroom assessment, with more than 150 studies in peer-reviewed journals establishing its psychometric tenability and its instructional utility. Given the strength of the existing literature, CBM is a signature feature associated with effective reading education (McDonnell, McLaughlin, & Morrison, 1997). My research study builds upon this body of evidence by examining the ways in which pre-reading skills influence the development of reading success in the spring of the kindergarten year, as measured by WRF assessments.

Gersten et al. (2008) recommended schools use measures that are efficient, reliable, and reasonably valid. For students who are at risk for reading difficulties, progress in reading and related skills should be monitored on a monthly or even a weekly basis to determine whether students are making adequate progress or need additional support. An additional recommendation by Hamilton et al. (2009) suggested a strong culture of data use, conveyed through a clear school-wide vision, is critical to ensure that data-based decisions are made routinely, consistently, and effectively. Students whose screening scores indicate potential difficulties with learning to read are provided with more intensive reading interventions. Student responses to the interventions are then measured to determine whether they have made adequate progress and either (a) no longer need the intervention, (b) continue to need some intervention, or (c) need even more intensive intervention.

The primary purpose of a study by Hosp and Fuchs (2005) was to assess whether the relation between curriculum-based measurement (CBM) and specific reading skill changes as a function of grade. Reading is one of the most critical academic skills students learn. This, combined with the attention reading receives at the national and state level, indicates the importance of finding assessments that allow educators to efficiently and accurately screen, diagnose, and monitor the progress of students' reading skills across the early grades (Hosp & Fuchs, 2005). Results from Hosp and Fuchs' study provided further evidence that CBM is appropriate for monitoring specific reading sub-skills, such as decoding, word reading, comprehension, and for tracking more global reading competence (e.g., basic skills and total reading). In addition, CBM cut scores at each grade level may assist practitioners in identifying students who require further diagnostic testing to determine deficits in specific sub-skills and students who need more intensive instruction in reading in general (Fuchs, Fuchs, & Compton, 2004).

Armed with data (Hamilton et al., 2009) and the means to harness the information data can provide, educators can make instructional changes aimed at improving student achievement, including: (a) prioritizing instructional time, (b) targeting additional individual instruction for students who are struggling with particular skills, (c) more easily identifying individual students' strengths and instructional interventions that can help students continue to progress, (d) gauging the instructional effectiveness of classroom lessons, (e) refining instructional methods, and (f) examining school-wide data to consider whether and how to adapt the curriculum based on information about students' strengths and weaknesses. To accomplish the instructional changes for improving student achievement, CBM assessments are needed to help educators efficiently and accurately screen, diagnose, and monitor the progress of students' reading skills across the early grades to measure student's acquisition of the alphabetic principle.

The CBM instrument I used was easyCBM©, a formative assessment measure. The easyCBM© system includes benchmark and progressing monitoring assessments as well as formative reporting assessment tool for grades K-8. It was designed for use in measuring student achievement in math and reading, and contains assessments that are aligned to Common Core State Standards.

Reliability of easyCBM©. The easyCBM© Technical manual published in 2014, reports on three types of reliability that are relevant to easyCBM©: (a) internal consistency, (b) alternate form, and (c) test-retest. Internal consistency refers to the consistency of the test items, or test features, in measuring the same trait (Anderson et al., 2014). Alternate form reliability analyses empirically test this theory by examining correlations between multiple alternate test forms administered to students on the same day (Anderson et al., 2014).

Alonzo and Tindal (2009) reported the correlation between students' scores on each form ranged from .95-.97, which indicated a very strong relation for students in first grade. Alternate form reliability was evaluated with the standard Pearson's bivariate correlations. They found values above 0.8, which are generally considered strong for alternate form reliability (Anderson et al., 2014). Alonzo and Tindal (2009) found the test-retest correlations for first grade ranged from .91-.97, which indicated a strong relation. Test-retest forms of reliability use Cronbach's alpha for measurement. Cronbach's alpha ranges from 0-1.0, with higher values indicating more reliable measurement. Although no *rules* exist for interpreting Cronbach's alpha, general rules of thumb suggest, measures should have a value of at least 0.8 for acceptable internal consistency (Anderson et al., 2014).

Validity of easyCBM©. Validity of easyCBM© measures were developed and investigated within the context of an RTI framework (Anderson et al., 2014). Criterion validity explores the relation between a focal measure (e.g., easyCBM©) and a criterion measure (e.g., state test) and the relation between the measures then more accurately represents the degree to which the measures tap the same underlying skill (Anderson et al., 2014). Wray, Lai, Saez, Alonzo, and Tindal (2014) found:

> Evidence of the relation between the easyCBM© battery of reading measures and a compilation of some of the sub-tests from a standardized test of reading, the SAT-10. At each time point, student performance on the easyCBM© measures explained 40-50% of the variance on the SAT-10 measures. When used in conjunction with one another, easyCBM© LN, LS, PS and WRF explain significantly more variance than they do as stand-alone measures. Additionally, easyCBM© measures accounted for more variance when the criterion outcome was limited to word reading (SAT-10 WR for kindergarten and easyCBM© WRF at time 5 for grade 1) rather than constructs other than word reading (SAT-10 SL for kindergarten or SAT-10 WSS for grade 1). Nearly half the variance in performance on the standardized reading assessment (SAT-10) was accounted for by performance on the easyCBM© early literacy measures (Wray et al., 2014, pp. 8).

Criterion validity studies typically use linear regression to examine the relation between the focal and criterion measures. Regression slopes are calculated, from which the percent of variance in the criterion measure accounted for by the focal measure can be analyzed. The percent of variance accounted for provides some indication of how accurate the regression slope is in predicting the students' scores, with higher variance accounted for resulting in more accurate predictions (Anderson et al., 2014).

I used easyCBM© reading measures in kindergarten including: (a) LN, (b) LS, (c) PS, and (d) WRF. Table 2.1 displays when each of these measures is administered.

Table 2.1

easyCBM© Benchmark Measures and Seasonal Administration

Benchmark	LN	LS	PS	WRF
Fall	X	X	X	
Winter		X	X	X
Spring		X	X	X

Note. LN = Letter Names; LS = Letter Sounds; PS = Phonemic Segmentation; WRF = Word Reading Fluency

Procedure and Analysis

My study used a non-experimental, descriptive research design using correlation and regression analyses to examine the concurrent and predictive validity of easyCBM© in a sample of kindergarten students. The data collected included scores on: (a) kindergarten LN in the fall; (b) kindergarten LS in the fall, winter, and spring; (c) kindergarten PS in fall, winter, and spring; and (d) WRF in winter and spring. In addition, the following non-academic variables were collected: (a) FARMs, (b) SpEd, (c) LEP, (d) NonWhite Race, and (e) Attendance. The analyses included descriptive statistics with means and standard deviations of each measure. In addition, bivariate correlations were calculated for all variables used. Finally, linear regression was used to estimate the variance accounted for by the academic and non-academic predictor variables. Table 2.2 lists the academic outcome and predictor variables used in my analyses; Table 2.3 displays the academic outcome, and non-academic demographic predictor variables included in the study.

Table 2.2

Academic Variables Included in the Study

Grade	Outcome variable	Predictor variable
Kindergarten	Spring WRF	Fall LN
		Fall, Winter, and Spring LS
		Fall, Winter, and Spring PS
		Winter and Spring WRF

Note. LN = Letter Names; LS = Letter Sounds; PS = Phonemic Segmentation; WRF = Word Reading Fluency.

Table 2.3

Non-academic (Demographic) Variables Included in the Study

Grade	Outcome Variable	Predictor Variables
Kindergarten	Spring WRF	SpEd
		FARMs
		Attendance
		LEP
		NonWhite Race

Note. SpEd = Special education status; FARMs = Economically disadvantaged; Attendance = Attendance (present) percentage; LEP = Limited English proficiency status; NonWhite Race = Other than White.

CHAPTER III

RESULTS

In this chapter, I present results for each of the three study research questions. The first question investigated the relationship between the CBMs of LN, LS, PS and word reading in kindergarten using student scores on easyCBM© reading measures. I used bivariate correlation coefficients to answer Question One.

Question Two examined the extent to which LN, LS, PS, and Winter WRF predicted performance on the kindergarten Spring WRF measure. I used separate analyses to answer Question Two. The first used a multiple regression analysis using easyCBM© raw scores, whereas for the second analysis I first calculated gain scores from Fall to Spring, and then used these gain scores for the multiple regression analysis.

Question Three examined whether adding specific nonacademic demographic indicators into the multiple regression model would account for more of variance in the Spring WRF outcome. Nonacademic variables included: (a) FARMs, (b) SpEd, (c) LEP, (d) NonWhite Race, and (e) Attendance. Lastly, it is important to remember that *a priori* I limited the sample to students who had scores reported for each of the four measures: (a) LN, (b) LS, (c) PS, and (d) WRF.

Descriptive Statistics for Study Sample

I prepared overall descriptive statistics for (a) FARMs, (b) SpEd, (c) LEP, (d) NonWhite Race, and (e) Attendance. Table 3.1 displays the number of cases, means, standard deviations, minimum scores, and maximum scores by demographic indicator for the entire sample of 931 kindergarteners. Table 3.1 also shows Oregon's overall averages (ODE, 2014) as a comparison. As noted previously, a total of 931 students attended kindergarten in the district during the school year. However, applying the *a priori* inclusion criteria resulted in different numbers of kindergarten students who had two academic scores reported for the CBM across fall, winter and spring and were thus differentially included in the sample (for example, see Table 3.2). Because my *a priori* rule influenced the number of participants by analysis, I listed the demographic variables specific to each analysis within the regression model using gain scores.

Table 3.1

Descriptive Statistics by Non-academic Demographic Indicator

Demographic indicator	*n*	*M*	*SD*	Min	Max	Oregon*
FARMs	931	0.66	0.48	0.00	1.00	.51
SpEd	931	0.14	0.35	0.00	1.00	.14
LEP	931	0.13	0.33	0.00	1.00	.11
NonWhite Race	931	0.32	0.47	0.00	1.00	.34
Attendance	931	0.97	0.04	0.74	1.00	.96

Note. FARMs = Economically disadvantaged; SpEd = Special education status; LEP = Limited English proficiency status; NonWhite Race = Other than White; Attendance = Attendance % (present) percentage changed to decimal. *Data from 2013-2014 Oregon State wide Annual Report Card.

Descriptive Statistics for CBM Measures

Table 3.2 displays descriptive statistics for the kindergarten CBM measures used in the following correlation analysis. The number of participants varies by correlation due to missing data. The CBM measures included (a) LN in fall (predictor), (b) LS in fall, winter and spring (predictors), (c) PS for fall, winter and spring (predictors), and (d) WRF for winter and spring (predictor and outcome, respectively).

Table 3.2

Descriptive Statistics for CBM Measures

Measure	*n*	*M*	*SD*	Min	Max
FALL_LN	803	16.44	15.04	0	72
FALL_LS	803	5.70	8.76	0	46
FALL_PS	721	10.90	13.00	0	64
WINTER_LS	820	19.85	12.43	0	66
WINTER_PS	821	33.33	16.06	0	68
WINTER_WRF	822	4.68	7.98	0	118
SPRING_LS	829	36.42	14.86	0	97
SPRING_PS	828	46.79	13.57	0	70
SPRING_WRF	828	12.73	12.25	0	109

Note. LN = Letter Names; LS = Letter Sounds; PS = Phonemic Segmentation; WRF = Word Reading Fluency

Research Question 1: Correlations

Table 3.3 shows correlations ranging from.82 (between Winter WRF and Spring WRF) to -0.35 (between SpEd and Spring PS). Because no correlations showed the degree of redundancy or overlap necessary for multicollinearity, all variables were used in follow-up analysis. Table 3.3 shows correlations for all variables. Winter WRF was predictive of Spring WRF in kindergarten ($r = .82, p \leq .05$). LS in fall ($r = .57, p \leq .05$), winter ($r = .66, p \leq .05$), and spring ($r = .58, p \leq .05$) were also correlated to Spring WRF in kindergarten. All non-academic variables weakly correlated to Spring WRF.

Research Question 2a: Multiple Regression Model Using Scores

Model summary. The R^2 was .76. Additionally, the coefficients (adjusted R^2 = .76) indicated that about 76% of the variance was explained by the nine academic predictor variables (see table 3.4).

Tale 3.4

Model Summary Statistics for Research Question 2a

R	R^2	Adjusted R^2	*SEE*
0.87	0.76	0.76	6.09

ANOVA. ANOVA statistics indicated that at least one of the variables significantly predicted ($p < .001$) the Spring WRF outcome measure (Table 3.5).

Table 3.5

ANOVA Statistics for Research Question 2a

	SS	*df*	*MS*	*F*	*Sig.*
Regression	76180.03	8	9522.50	257.04	< .01
Residual	24043.65	649	37.05		
Total	100223.68	657			

Coefficients. Table 3.6 presents the standardized coefficients for the predictor variables. Only three variables were statistically significant at .05 alpha level in predicting the outcome variable (Spring WRF). Table 3.6 shows that Winter WRF (β = .64) predictive of Spring Word Reading. Spring LS (Spring LS) (β = .29) also was

Table 3.3

Bivariate Correlations for All Predictor and Outcome Variables

Variable	FARMs	SpEd	LEP	NwR	Att	F_LN	F_LS	F_PS	W_LS	W_PS	W_WR	S_LS	S_PS
SpEd	0.10*	-	-	-	-	-	-	-	-	-	-	-	-
LEP	0.18*	0.01	-	-	-	-	-	-	-	-	-	-	-
NwR	0.19*	-0.01	0.53*	-	-	-	-	-	-	-	-	-	-
Att	-0.25*	-0.04	0.02	-0.04	-	-	-	-	-	-	-	-	-
F_LN	-0.24*	-0.16*	-0.24*	-0.15*	0.21*	-	-	-	-	-	-	-	-
F_LS	-0.23*	-0.12*	-0.19*	-0.15*	0.17*	0.69*	-	-	-	-	-	-	-
F_PS	-0.19*	-0.17*	-0.19*	-0.14*	0.13*	0.50*	0.52*	-	-	-	-	-	-
W_LS	-0.24*	-0.23*	-0.23*	-0.17*	0.27*	0.66*	0.55*	0.47*	-	-	-	-	-
W_PS	-0.19*	-0.34*	-0.27*	-0.17*	0.21*	0.42*	0.37*	0.46*	0.57*	-	-	-	-
W_WR	-0.17*	-0.09*	-0.14*	-0.08*	0.14*	0.49*	0.54*	0.41*	0.57*	0.34*	-	-	-
S_LS	-0.12*	-0.26*	-0.07*	-0.04	0.16*	0.44*	0.32*	0.28*	0.70*	0.43*	0.35*	-	-
S_PS	-0.13*	-0.35*	-0.01*	-0.04	0.15*	0.24*	0.23*	0.32*	0.44*	0.51*	0.24*	0.56*	-
S_WR	-0.13*	-0.17*	-0.15*	-0.07*	0.11*	0.55*	0.57*	0.41*	0.66*	0.39*	0.82*	0.58*	0.34*

Note. SpEd = Special education status; LEP = Limited English proficiency status; FARMs = Economically disadvantaged; NwR = NonWhite Race (Other than White) percentage; Att = Attendance (present) percentage; F_ = Fall; W_ = Winter; S_ = Spring; LN = Letter Names; LS = Letter Sounds; PS = Phonemic Segmentation; WR = Word Reading. * = $p \leq .05$.

predictive of Spring Word Reading as was Fall LS (Fall LS) ($\beta = .11$). Again, Table 3.6 provides complete information pertaining to the unstandardized and standardized coefficients from the regression analysis.

Table 3.6

Regression Coefficients for Research Question 2a

Predictor / Measure	Unstandardized Coefficients		Standardized Coefficients	*t*	*Sig.*
	B	*SE*	*Beta*		
Constant	-1.36	0.95		-1.43	.15
FALL LN	0.02	0.03	0.02	0.63	.53
FALL LS	0.15	0.04	0.11	3.75	< .01
FALL PS	-0.01	0.02	-0.01	-0.58	.56
WINTER LS	0.04	0.04	0.04	1.22	.22
WINTER PS	0.00	0.02	0.00	-0.05	.96
WINTER WRF	0.98	0.04	0.64	25.90	<.01
SPRING LS	0.24	0.02	0.29	9.98	<.01
SPRING PS	-0.03	0.02	-0.03	-1.13	.26

Note. LN = Letter Names; LS = Letter Sounds; PS = Phonemic Segmentation; WRF = Word Reading Fluency

Partial Correlations. The semi-partial correlations in Table 3.7, reveal that Winter WRF (.50) uniquely accounted for more of the variance in the Spring WRF than Spring LS ($r = .19$), or any of the other predictor variables. Squaring the semi-partial correlation coefficients shows that Winter WRF accounted for 24.8% of the variance, Spring LS accounted for 3.68% of the variance, and all of the other predictor variables accounted for less than 1% of the variance in the outcome. Table 3.7 shows complete semi-partial regression results.

Table 3.7

Semi-partial Regression Coefficients for Research Question 2a

Measure	*Zero-order*	*Partial*	*Part*	*Part*^{2} (%)
FALL_LN	0.54	0.03	0.01	0.01
FALL_LS	0.56	0.15	0.07	0.52
FALL_PS	0.41	-0.02	-0.01	0.01
WINTER_LS	0.65	0.05	0.02	0.06
WINTER_PS	0.38	0.00	0.00	0.00
WINTER_WRF	0.81	0.71	0.50	24.80
SPRING_LS	0.55	0.37	0.19	3.68
SPRING_PS	0.31	-0.04	-0.02	0.05

Note. LN = Letter Names; LS = Letter Sounds; PS = Phonemic Segmentation; WRF = Word Reading Fluency

Research Question 2b: Multiple Regression Model Using Gains

Below are the results of the multiple linear regression models. Each is discussed briefly, in turn. The regression model using gain scores, displayed in Table 3.8, uses students' (a) Winter WRF, (b) Fall LN, and (c) the *gains* (from Fall to Spring) for LS and PS, as predictors of students Spring WRF. Each of these predictors has been centered (i.e., the *mean* of the predictor was subtracted from each individual value in the predictor), so the model intercept represents the average Spring WRF for students with an average value on each of the predictor variables.

As Table 3.8 shows, each of the predictor variables accounted for a significant (i.e., non-zero) portion of students' Spring WRF scores, with the exception of their Fall-to-Spring gains on PS. In Table 3.8, the outcome is Spring WRF, and the intercept represents the mean Spring WRF score for students who had an *average* (i.e., zero, because they are centered) score on each of the predictors. The *estimate* column below represents the regression coefficient for each predictor in the model, all of which were grand-mean centered. Thus, the estimates for each of the predictors denotes the *average change* in students' expected spring WRF given a one-unit increase in the predictor. For example, for every one unit of increase to Winter WRF, the Spring WRF would increase by a score of 1.10 words. For kindergarteners included in this regression Model, the R^2 for the model was 0.73, with a residual standard deviation of 6.46.

Table 3.8

Regression Coefficients for Spring WRF Outcome for Research Question 2b

Measure	*Estimate*	*Std. Error*	*t value*	*Pr(>|t|)*
Winter WRF	1.10	0.04	30.61	0.00
Fall LN	0.16	0.02	8.21	0.00
LS gain	0.18	0.02	9.52	0.00
PS gain	0.00	0.02	-0.02	0.99
(Intercept)	12.78	0.25	50.72	0.00

Note. LN = Letter Names; LS = Letter Sounds; PS = Phonemic Segmentation; WRF = Word Reading Fluency

Residual Plots

Following the estimation of the multiple regression models, I produced residual plots, which display the relation between a given predictor and the outcome (Spring

WRF), holding all other variables in the model constant. These plots were produced only for the regression model using gain scores because the model's R^2 accounted for 73%. Thus, I stayed with the simpler regression model using gain scores to avoid over-fitting to the sample. Also, I report students included by my *a priori* rule in analyses, below.

Predictor residual plot – Spring WRF. In total, 778 out of the 931 students (83.57%) had Winter and Spring WRF scores. Table 3.9 shows that the 778 students *with* two scores were 17.80% less likely to be participating in FARMs, had slightly lower percentages of SpEd, and slightly higher percentages of LEP, NonWhite, and Attendance.

Table 3.9

Demographic Data for WRF Participants

Student Group	Meas	Count	FARMs	SpEd	LEP	NonWhite	Attend
Grp1 - Two Scores WRF	WRF *M*	778	62.60%	14.01%	13.50%	32.01%	97.13%
	WRF *SD*		48.42%	34.73%	34.19%	46.68%	2.88%
Grp2 - Not Two Scores WRF	WRF *M*	153	80.39%	15.69%	9.15%	31.37%	93.53%
	WRF *SD*		39.83%	36.49%	28.93%	46.55%	5.50%
Total WRF	WRF *M*	931	65.52%	14.29%	12.78%	31.90%	96.54%
	WRF *SD*		47.56%	35.01%	33.41%	46.63%	3.69%

Figure 3.1 displays the relation between Winter and Spring WRF while accounting for students' Fall LN score and their annual gains in LS and PS. The blue line on the plot represents the regression line. The gray polygon around the regression line represents the uncertainty about the line (i.e., standard error). For the WRF plot, the x-axis was restricted from -10 to 20, which is where the majority of observations were.

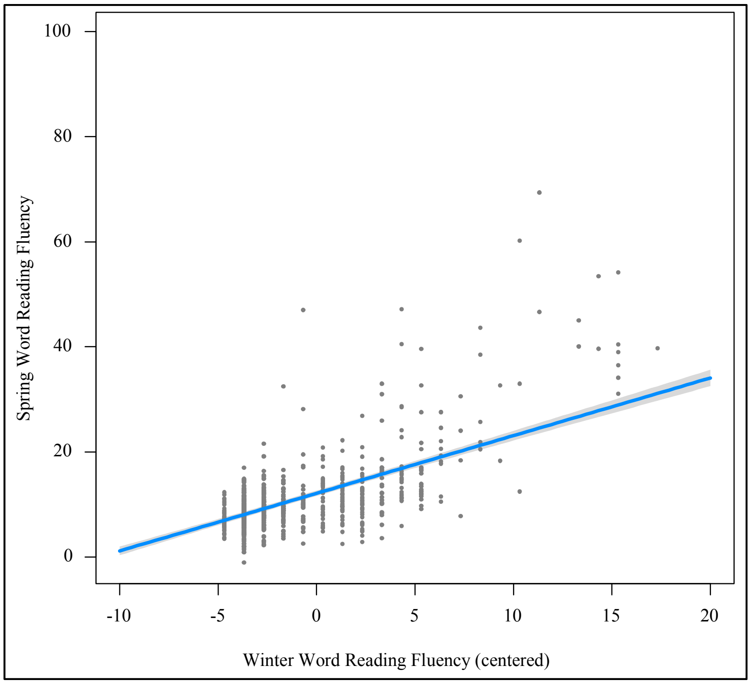

Figure 3.1. Spring WRF by Winter WRF residual plot.

Predictor residual plot – LN. Eight hundred three students out of the 931 total (86.25%) in my study had Fall LN and Spring WRF scores. Table 3.10 showed that the 803 students *with* two scores were 15.52% less likely to be participating in FARMs and only slightly less likely to be participating in special education and being NonWhite. The 803 students had only slightly higher percentages for LEP and Attendance.

Figure 3.2 illustrates the relation between Spring WRF and Fall LN, while accounting for students' annual gains in LS and PS. Note a positive relation is apparent, even after accounting for the other variables in the model. Again, the blue line represents the regression line. The gray polygon around the line represents the uncertainty (i.e., standard error). For the plot above, the x-axis was restricted from -10 to 50; however, there were outlier observations across all scores on the x-axis.

Table 3.10

Demographic Data for LN Fluency Participants

Student Group	Meas	Count	FARMs	SPED	LEP	NonWhite	Attend
Grp 1 - Two Scores LN	LN *M*	803	63.39%	13.70%	12.95%	31.38%	96.81%
	LN *SD*		48.20%	34.40%	33.60%	46.43%	3.34%
Grp 2 - Not Two Scores LN	LN *M*	128	78.91%	17.97%	11.72%	35.16%	94.81%
	LN *SD*		40.96%	38.54%	32.29%	47.93%	5.09%
Total LN	LN *M*	931	65.52%	14.29%	12.78%	31.90%	96.54%
	LN *SD*		47.56%	35.01%	33.41%	46.63%	3.69%

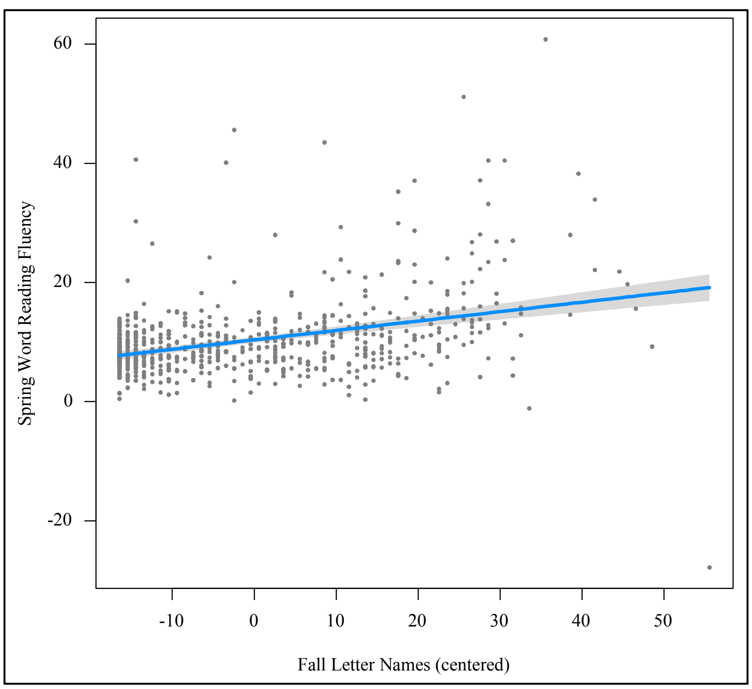

Figure 3.2. Spring WRF by Fall LN residual plot.

Predictor residual plot – LS. Seven hundred forty-three students out of the 931 total participants (79.81%) in my study had Fall LS and Spring LS scores. Table 3.11 showed that the 743 students *with* two scores were 17.88% less likely to be participating in FARMs, with only slightly lower percentages for special education and NonWhite. The 743 students had only slightly higher percentages for LEP and Attendance.

Table 3.11

Demographic Data for LS Fluency Participants

Student Group	Meas	Count	FARMs	SpEd	LEP	NonWhite	Attend
Grp1 - Two Scores LS	LS *M*	743	61.91%	14.13%	13.46%	31.90%	97.15%
	LS *SD*		48.59%	34.86%	34.15%	46.64%	2.88%
Grp2 - Not Two Scores LS	LS *M*	188	79.79%	14.89%	10.11%	31.91%	94.10%
	LS *SD*		40.27%	35.70%	30.22%	46.74%	5.24%
Total LS	LS *M*	931	65.52%	14.29%	12.78%	31.90%	96.54%
	LS *SD*		47.56%	35.01%	33.41%	46.63%	3.69%

Figure 3.3 displays the predictor residual plot for LS Gains. The plot exhibits the relation between Spring WRF and the annual gain for LS while accounting for students' Fall LN score and their annual gain for PS. The line represents the regression line. The gray polygon around the line represents the uncertainty (i.e., standard error). For figure 3.3, the x-axis was restricted from -40 to 60, which is where the majority of observations were. Again, a strong relation can be seen through visual analysis, even after accounting for the other variables in the model, despite a few outliers on the mid-upper end.

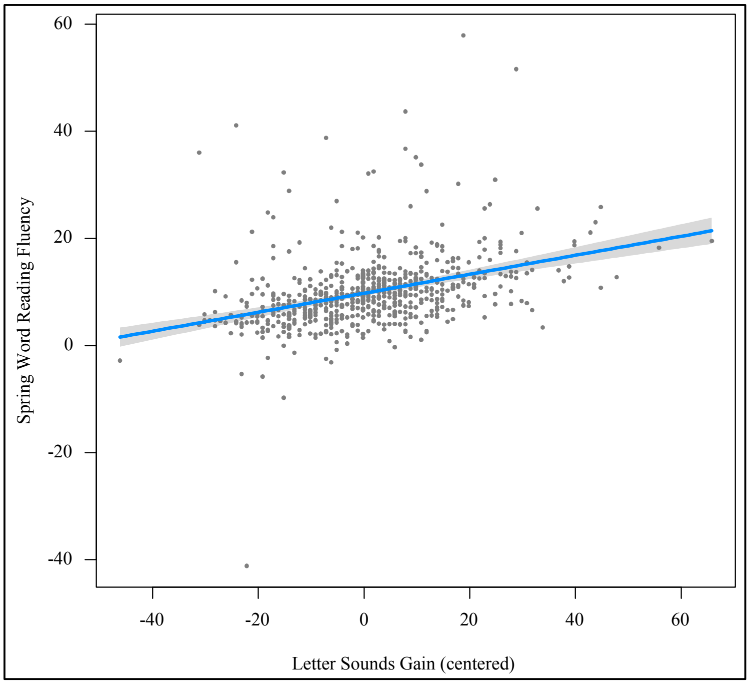

Figure 3.3. Spring WRF by LS annual gain residual plot.

Predictor residual plot – PS. Six hundred sixty-eight students out of the 931 total in my study (71.75%) had Fall PS and Spring PS scores. Table 3.12 showed that the 668 students *with* two scores were 17.88% less likely to be participating in FARMs and had only slightly lower percentages for special education and NonWhite. The 668 students had only slightly higher percentages for LEP and Attendance.

Figure 3.4 reveals the predictor residual plot for PS annual gains was essentially flat, indicating little to no relation with the outcome (Spring WRF) after accounting for the other variables in the model. Specifically, the PS plot displays the relation between Spring WRF and PS annual gain, while accounting for students' Fall LN score and their annual gain in LS. The line represents the regression line. The gray polygon around the line represents the uncertainty about the line (i.e., standard error). For the PS plot, the x-axis was restricted from -40 to 20, which is where the majority of observations were; however, there were outlier observations across most of the x-axis.

Table 3.12

Demographic Data for PS Fluency Participants

Student Group	Meas	Count	FARMs	SpEd	LEP	NonWhite	Attend
Grp1 - Two Scores PS	PS *M*	668	63.62%	15.42%	13.92%	33.38%	97.05%
	PS *SD*		48.14%	36.14%	34.64%	47.19%	2.95%
Grp2 - Not Two Scores PS	PS *M*	263	70.34%	11.41%	9.89%	28.14%	95.22%
	PS *SD*		45.76%	31.85%	29.90%	45.05%	4.88%
Total PS	PS *M*	931	65.52%	14.29%	12.78%	31.90%	96.54%
	PS *SD*		47.56%	35.01%	33.41%	46.63%	3.69%

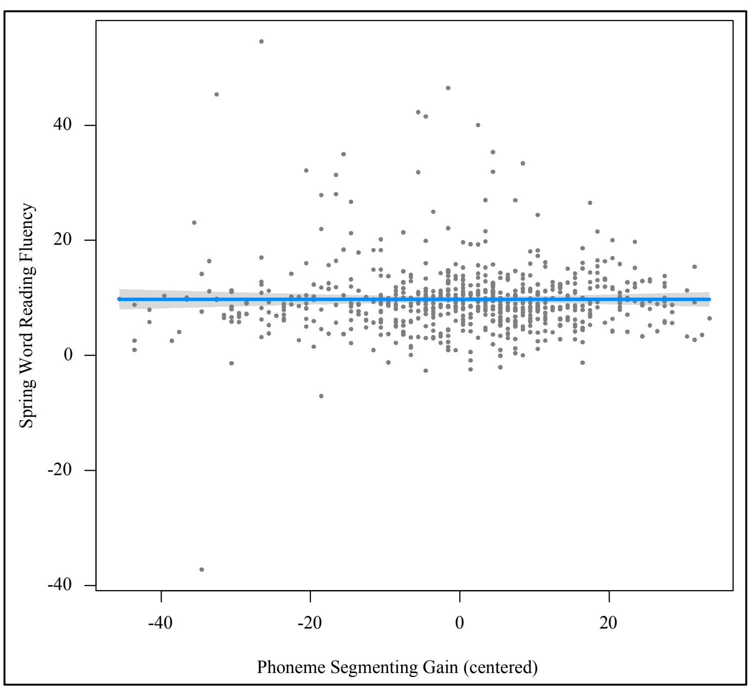

Figure 3.4. Spring WRF by PS annual gain residual plot.

Research Question 3: Multiple Regression Model Demographic Scores

Research Question Three addressed the relation between demographics (FARMs, SpEd, LEP, NonWhite, and Attendance) and Spring WRF. Correlations between Spring WRF and the demographic variables were weak and negative, except for Attendance, which was predictably positive (see Table 3.13).

Table 3.13

Bivariate Correlations Between Spring WRF and Demographic Variables

	Spring WRF	FARMs	SpEd	LEP	NonWhite
FARMs	-0.13*				
SpEd	-0.17*	0.12*			
LEP	-0.15*	0.20*	0.03		
NonWhite	-0.07*	0.21*	-0.01	0.53*	
Attendance	0.11*	-0.30*	-0.10	-0.02	-0.09

* = $p \leq .05$

ANOVA. The ANOVA statistics indicated that at least one of the five demographic variables significantly predicted Spring WRF (Table 3.14).

Table 3.14

ANOVA Statistics for Research Question 3

	SS	*df*	*MS*	*F*	*Sig.*
Regression	7573.14	5	1514.63	10.69	< .01
Residual	116476.87	822	141.70		
Total	124050.01	827			

Coefficients. Coefficients (adjusted R^2 = .06) indicated that about 6% of the variance could be explained by the demographic variables. See Table 3.15 for complete model summary statistics.

Table 3.15

Model Summary Statistics for Research Question 3

R	R^2	*Adj.* R^2	*SEE*	Change Statistics		*df1*	*df2*	*Sig. F Change*
				R^2 *Change*	*F Change*			
0.25	0.06	0.06	11.90	0.06	10.69	5	822	<.01

Coefficients and correlations. The standardized coefficients indicated that SpEd (β = -0.15) was relatively more predictive than LEP (β = -0.14), Attendance (β = 0.07), FARMs (β = -0.07), and NonWhite Race (β = -0.02). Table 3.16 provides further information pertaining to the regression analysis. The semi-partial correlations included in Table 3.16, reveal that SpEd (-0.15) uniquely accounted for more of the variance than the other variables of LEP (-0.11), FARMs (-0.06), and NonWhite Race (0.02). Squaring the semi partial correlation coefficients revealed that SpEd only accounted for 0.02% of the variance, LEP accounted for 0.01% of the variance, Attendance accounted for 0.01% of the variance, FARMs accounted for 0.004% of the variance, and NonWhite Race accounted for 0.01% of the variance. See Table 3.16 for complete regression coefficient and partial correlation results.

Results Summary

Overall, the regression model using gain scores accounted for about 73% of the variance in students' Spring WRF scores. Thus, I went with this simpler model to avoid over-fitting to the sample. The strongest correlation with Spring WRF was Winter WRF,

Table 3.16

Regression Coefficients for Spring WRF Outcome for Research Question 3

	Unstd. coeff.		Std. coeff.	*t*	*Sig.*	Correlations		
	B	*Std. Error*	*Beta*			*Zero-order*	*Partial*	*Part*
Constant	-14.41	14.33		-1.01	.32			
FARMs	-1.76	0.93	-0.07	-1.89	.06	-0.13	-0.07	-0.06
SpEd	-5.21	1.19	-0.15	-4.37	<.01	-0.17	-0.15	-0.15
LEP	-4.89	1.45	-0.14	-3.38	<.01	-0.15	-0.12	-0.11
NonWhite	0.49	1.05	0.02	0.47	.64	-0.07	0.02	0.02
Attendance	30.42	14.56	0.07	2.09	.04	0.11	0.07	0.07

and thus, it was the most predictive of Spring WRF in kindergarten (r = .82). LS in fall (r = .57), winter (r = .66) and spring (r = .58) were the next most closely correlated to Spring WRF in kindergarten. Table 3.3 shows that all the non-academic variables weakly correlated to spring WRF. The semi-partial correlations revealed that Winter WRF (r = .50) uniquely accounted for more of the variance in Spring WRF compared to Spring LS (.19), or any of the other academic predictor variables. Squaring the semi-partial correlation coefficients revealed that Winter WRF accounted for approximately 24.8% of the variance in Spring WRF. The estimate coefficients for each of the predictors denoted the *average change* in students' expected Spring WRF given a one-unit increase in the predictor. The strongest gain score was for WRF, where every one unit of increase in Winter WRF increased the Spring WRF by a score of about 1.10 words.

CHAPTER IV

DISCUSSION

In this chapter, I provide (a) a review of the findings presented in the previous chapter, (b) a review of the limitations to this study, (c) a connection to previous research, (d) a discussion of the practical implications, and (e) suggestions for future research.

Review of Findings

In my study, I assessed which kindergarten student's pre-reading skills best predicted their WRF at the end of their kindergarten year. Using data systematically to ask questions and obtain insight about student progress is a logical way to monitor continuous improvement and tailor instruction to the needs of each student and to inform an instructional plan.

Overall, the regression model using gain scores accounted for about 73% of the variance in students' Spring WRF scores. Winter WRF was the most predictive of Spring WRF in kindergarten (r = .82). Squaring the semi-partial correlation coefficients revealed that Winter WRF accounted for about 24.8% of the variance in Spring WRF. All non-academic variables weakly correlated to Spring WRF, with the exception of Attendance (present) percentage, fall into a negative correlation range from -0.15 to 0.11.

Results Review and Implications

Good et al. (2001) identified three foundational beginning reading skills: (a) phonological awareness, or the ability to hear and manipulate the sound structure of language; (b) alphabetic understanding, or the mapping of print to speech and the phonological recoding of letter strings into corresponding sounds and blending stored sounds into words; and (c) accuracy and fluency with connected text, or the facile and seemingly effortless recognition of words in connected text. In schools, we refer to these three foundational skills as phonemic awareness, phonics, and fluency. My study examined relations between all of these foundational pre-reading skills.

Research question one and two: Review and implications. The first two research questions examined the relation and the predictive nature of CBM including LN, LS, PS and WRF in kindergarten. According to the National Reading Panel (2000), the five essential components of reading must be directly taught in an explicit and systematic manner to ensure that all students are successful readers by the end of third grade. While some researchers (Carroll, 2004; Hatcher et al., 1994; Read et al., 1986) supported the importance of LN knowledge and the crucial role it plays in the development of a reader, my findings did not support this. As shown in Table 3.6, LN was a non-significant predictor (p = .53).

Oppositely, Phillips et al. (2008), Ehri et al. (2001), and Wagner et al. (1997) believed that a key focus of reading instruction for children was to prompt them to learn to attend to the sound structure of words, which can be measured by LS and PS. My results mirrored Phillips et al. (2008), Ehri et al. (2001), and Wagner et al. (1997). I found the strongest correlation between Winter WRF and Spring WRF in the kindergarten study sample (r = .82). The semi-partial correlations revealed that Winter WRF uniquely accounted for more of the variance in Spring WRF (.50) than any of the other pre-reading variables analyzed and Winter WRF accounted for approximately 24.8% of the variance.

The strong word reading effect could have been predicted because the Winter WRF and Spring WRF assessments are just alternate forms of the same assessment.

Thus, one would presume that Winter WRF should account for the most variance (24.80%). If I had not included Winter WRF in my analysis, I would envision LS becoming much more predictive because more variance would be available for predicting. As is, Spring LS predicted 3.68% of the variance, with Fall LS the next highest predictor. Another rationalization for my envisaging the importance of LS is that Table 3.3 shows Spring WRF was moderately correlated to Fall LS (.57), Winter LS (.66), and Spring LS (.58). A more quizzical finding was the lack of predictive nature of PS related to Spring WRF found in Table 3.7. Table 3.3 shows that Spring WRF had a low moderate correlation to Fall PS (.41), Winter PS (.39), and Spring PS (.34). My findings surrounding PS require further investigation.

Implications for these findings need to focus on framing the direction that schools and districts should take to better tailor staffing, instruction, and schedules to student needs as schools move to all-day kindergarten. Because all-day kindergarten offers a twofold increase in the instruction time allotted to the important skill of early reading, specific design of instructional blocks of time in the Fall should be devoted to early emerging literacy skills like LN, LS, and PS. Focusing on these early pre-reading skills would likely help build a solid base for a shift in instructional time towards word reading in the middle of the kindergarten school year to the end. Good et al. (2001) postulated that phonological awareness, alphabetic understanding, and connected text were foundational reading skills. Thus, as kindergarten students enter the middle of the academic year, they should be progressing through that foundational skill sequence that eventually will lead to reading connected text. However, a step between the first two (phonological awareness and alphabetic understanding) and the last (connected text) would be WRF. This foundational sequence (including word reading) needs to be at the forefront of reading instruction—though of course, instruction should be tailored to individual student needs. For example, the literature also shows that students struggling with sounding letters or identifying phonemes should likely focus on bolstering these skills as a foundation for later word reading.

Research Question three: Review and implications. Unique contributions of non-academic variables including (a) FARMs, (b) SpEd, (c) LEP, (d) NonWhite Race, and (e) Attendance to kindergarten Spring WRF was the focus of the third research question. Al Otaiba et al's (2008) findings showed that children with lower levels of initial reading and vocabulary skill were more vulnerable to the quality and quantity of instruction they received (Al Otaiba & Fuchs, 2002). Lonigan (2003) also reported that preschoolers from low socioeconomic backgrounds who had significantly less well-developed phonological sensitivity generally experienced significantly less growth in phonological skills even in the face of high quality preschool instruction. Research done by Crowe et al. (2009) found, regardless of SES status, students generally met adequate achievement benchmarks using the Reading Mastery curriculum. My study largely paralleled these results, with the correlations between Spring WRF and the demographic variables all weakly and negatively correlated, except for Attendance (present), which was predictably positive—the more one attends school, the more likely they one is to experience positive academic outcomes.

We cannot ignore the research regarding student populations and potential risks in their environment, which is out of their control, and connected to their ability to learn how to read. First, schools would be wise to create individual learning plans for all students. While such plans might account for students' demographic characteristics that may impede learning, the plans should also focus on instructional interventions over which the school has direct control. The second implication for these findings relates to an elementary school and preschool partnership. With these two distinct educational agencies working together, students could more seamlessly move from preschool to kindergarten and beyond following an organized transition plan that focuses on altering those academic variables that can be manipulated rather than trying to change or alter non-academic (and largely uncontrollable) variables. A partnership between the pre-school and elementary worlds might allow practitioners and school leaders to focus more closely on strengthening preschool partnerships in communities. Early identification of probable academic risks (e.g., slowly developing skills in phonemic awareness, phonics, or fluency) can allow districts and educators to be better equipped to respond to the instructional needs of their students.

Limitations

Although this study provides findings with possible implications for practitioners, several limitations should be considered. Two main limitations in this study are related to (a) internal validity and (b) external validity.

Internal validity. For my study, potential threats to internal validity included selection, mortality, and instrumentation. Selection in my study was not optional, nor random; I used an extant convenience sample from a single district that included all kindergarten students in the fall of 2012 through spring of 2013 that met my *a piori* rule—having scores for all benchmark measures administered. To the degree that my inclusion criteria resulted in an analytic sample that differs in substantive ways from the general student population, my results must be interpreted cautiously.

Mortality was also likely a potential issue with the loss of students during the 10-month period between assessment measures. One-way mortality can be determined is by using a district's mobility rate. This is a measure of how many students are transferring in and out of a school. Mobility is a concern because higher mobility tends to correlate with lower achievement. It is quite possible that many students who moved into or out of the district were not included in the analyses given the *a priori* exclusion rule, and thus, scores were artificially inflated or deflated.

Instrumentation threats to validity could involve the administration of easyCBM©. With different adult screeners in each elementary building administrating the easyCBM© measures, assessment administration was likely not conducted in a uniform manner, which might have introduced construct irrelevant variance and impacted predictor/outcome variables in a manner that means the measured scores were not a true reflection of students' actual skill.

The final internal limitation is around student identifiers—specifically, special education and language proficiency. At the kindergarten level, students identified for special education were usually identified at the preschool level for autism, intellectual disabilities, or speech. Usually, when people think of special education they automatically include the learning disabilities categorization, but that should not be the case with my data. The same pre-identification logic cannot be applied to English language proficiency, though. Language proficiency. When a kindergarten student enrolls, a form called the *Home Language Survey* (HLS) must be completed by the parent/guardian. If the form indicates the student speaks another language, the district then assesses the student for eligibility using the Pre-LAS assessment. If the student qualifies for ELD services, the district notifies the parents that the student is eligible and begins providing ELD services. For students in first grade and on, the district uses the Woodcock-Muñoz assessment and then follows the above process.

External validity. Threats to external validity included population, curriculum, instrumentation, and school level factors / effects. Duplicating the setting of the school district chosen in the Pacific-Northwest would be difficult, and thus, decreases the generalizability of my findings to other settings around the region and especially the rest of the United States. Table 3.1 identifies the differences between my research district and the state of Oregon. While not hugely discrepant, there were differences across all demographic categories. Moreover, I did not evaluate differences between the district and averages across the United States.

Because I did not evaluate curriculum interventions, the district's chosen curriculum could affect external validity. The type of materials and how they are taught can vary greatly from classroom to classroom and school to school given the human factor and school policies. This variation adds to how instrumentation can contribute to external validity also. The variation of implementation of the instruments can affect the outcomes, with the human factor again contributing to a possible discrepancy in scores. Because I used existing extant data, I had no way to control or even document the consistency with which the measures were administered across the sample. Finally, while my research did not detect school level factors / effects, that does not mean those factors /

variables were not important. It is more probable that my analysis using binary-coding limited the variance detectable by those factors / variables.

Future Research

My study indicates a strong relation between CBM and success involving pre-reading skills, specifically with WRF. More importantly, the findings suggest kindergarten teachers should be sensitive to the time dedicated and instructional alignment of their phonemic awareness, phonics, and fluency reading curricula. Educators might be able to use my findings to identify students at risk for reading difficulties early in the kindergarten school year. My findings might provide them with the information regarding instruction and intervention to build up their student's foundational skills that lead to word reading ability, which would be monitored using the CBM benchmarking assessments that measure important pre-reading and emergent reading skills, including WRF.

Replication using full-day kindergarten in the same district. My study focused on a half-day kindergarten model in one school district. Further research is warranted using data from a full day kindergarten model in the same school district. The full-day kindergarten research should investigate how instructional blocks of time changed with a full day of school. It would be interesting to examine data from the same district comparing half-day kindergarten reading achievement data to that from a full-day kindergarten model collected this past school year, when full-day kindergarten was implemented for the first time. Moreover, the full-day model should include both academic and non-academic (demographic) variables in the regression analysis. This proposed analysis would either offer support or refutation of my half-day findings.

Replication using full-day kindergarten across Oregon districts. This approach could also be replicated across different regions in Oregon, drawing comparisons between districts using half-day kindergarten and full day kindergarten models. These additional Oregon studies could use data from more rural school districts or more inner-city/urban school districts. With Oregon having 197 school districts, the smaller school districts east of the Cascades to the large metropolitan school districts in and around Portland would offer diverse settings to study the relation of the pre-reading skills targeted in the current study. It would be appropriate to use a research design similar to mine that included both academic and non-academic (demographic) variables in the regression analysis, but was applied to different geographical environments. It would also be interesting to apply the design across different geographical parts of the country to see if similar relations between pre-reading skills are observed.

Longitudinal studies. Future studies could also involve statistics from multiple years using easyCBM© as the data source. Following an intact group of students over multiple academic years, examining their pre-reading skills, emergent reading skills, and up to their passage reading fluency, and reading comprehension and vocabulary scores, as well as the long-term effects on their state-wide summative exams. For example, such longitudinal data could be used to examine the long-term prediction of CBMs on passage reading fluency and higher-order reading comprehension giving the district a comprehensive view of reading development over time. The longitudinal study also should focus on both academic and non-academic (demographic) variables in the regression analysis. This data could help inform how educators, schools, and districts design their approaches to reading instruction across grades.

Inclusion of additional demographic variables. An additional line of research could be replicating this study in later grade levels involving additional demographic variables. Those demographics could include disaggregating classifications within Special Education to include identification classification such as Autism, Communication, Learning Disabled, and Emotionally Disturbed. Disaggregation could also involve breaking down Language Proficient Learners into their respective levels of learning English. Because my study had weak correlations to the non-academic variables used, it would be worth conducting future analyses linking additional reading measures at older grade levels to see if those variables had stronger relations to later reading skills.

Conclusions

Schools and districts are held accountable for student achievement. One of Oregon's literacy goals for 2015, as set by the previous governor, focused on early reading. As part of this goal, the Oregon Education Investment Board (OEIB) was to advise and support the building, implementation and investment in a unified public education system in Oregon that meets the diverse learning needs of our youngest Oregonians. One of OEIB's five initiatives was a focus on Early Literacy. The OEIB Early Literacy initiative plan emphasized starting early, thinking integration, getting specific, building awareness and collective responsibility state wide for early literacy efforts (Oregon Education Investment Board, 2014).

My study provides evidence that pre-reading skills are predictive of WRF and support OEIB's claim on focus early on literacy in schools. A critical goal in education is the prevention of reading difficulties in youth to ensure that all children are readers early on in their educational careers. The demands of the knowledge-based, 21st century workplace have raised the literacy bar for students, and schools must now respond to heightened expectations around student learning needs (Good et al., 2001).

Practitioners in elementary education should find the results of my study useful for two reasons. First, the results provide information that could be practical in establishing a time-sequenced instructional approach to (pre)reading instruction in kindergarten. Time dedicated to building a systematic approach to teaching reading would likely be well spent as it would better ensure that students' developmental reading needs are met. Focus time dedicated to word reading in the middle of the kindergarten school year will likely yield greater word reading skill in the spring. Therefore, students assessed in the winter can provide teachers with a strong indicator of how the student will perform in the spring, and teachers can thus apply targeted interventions in reading as needed. Second, an educator's concentration in kindergarten should be focused on developing students' skills, and not the non-academic variables associated with that student.

REFERENCES CITED

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge: MIT press.

Afflerbach, P., Pearson, P. D., & Paris, S. G. (2008). Clarifying differences between reading skills and reading strategies. *The Reading Teacher*, *61*, 364–373. doi: 10.1598/RT.61.5.1

Al Otaiba, S., Connor, C., Lane, H., Kosanovich, M. L., Schatschneider, C., Dyrlund, A. K., Miller, M. S., & Wright, T. L. (2008). Reading First kindergarten classroom instruction and students' growth in phonological awareness and letter naming–decoding fluency. *Journal of School Psychology*, *46*(3), 281-314.

Al Otaiba, S., & Fuchs, D. (2002). Characteristics of children who are unresponsive to early literacy intervention. *Remedial and Special Education*, *23*, 300-316. doi: 10.1177/07419325020230050501

Alonzo, J., & Tindal, G. (2009). Alternate form and test-retest reliability of easyCBM© reading measures (Technical Report No. 0906). Eugene, OR: Behavioral Research and Teaching, University of Oregon.

Anderson, D., Alonzo, J., Tindal, G., Farley, D., Irvin, P. S., Lai, C., Saven, J. L., & Wray, K. A. (2014). Technical manual: easyCBM© (Technical Report No.1408). Eugene, OR: Behavioral Research and Teaching, University of Oregon.

Ball, E. W., & Blachman, B. A. (1988). Phoneme segmentation training: Effect on reading readiness. *Annals of Dyslexia*, *38*, 208-225. doi: 10.1007/BF02648257

Bryne, B. J. (1998). *The foundation of literacy: The child's acquisition of the alphabetic principle*. Abingdon, United Kingdom: Psychology Press.

Carroll, J. M. (2004). Letter knowledge precipitates phoneme segmentation, but not phoneme invariance. *Journal of Research in Reading*, *27*, 212-225. doi: 10.1111/j.1467-9817.2004.00228.x

Crowe, E. C., Connor, C. M., & Petscher, Y. (2009). Examining the core: Relations among reading curricula, poverty, and first through third grade reading achievement. *Journal of School Psychology*, *47*(3), 187-214.

Curtis, M. E. (1980). Development of components of reading skill. *Journal of Educational Psychology*, *72*(5), 656.

Deno, S. L. (1985). Curriculum based measurement: The emerging alternative. *Exceptional Children, 52*, 219-232

Donahue, P. L., Finnegan, R. J., Lutkus, A. D., Allen, N. L., & Campbell, J. R. (2001). The nation's report card fourth-grade reading 2000. Washington DC: Office of Educational Research and Improvement, National Center for Education Statistics, U.S. Department of Education.

Ehri, L. C., & McCormick, S. (1998). Phases of word learning: Implications for instruction with delayed and disabled readers. *Reading & Writing Quarterly: Overcoming Learning Difficulties*, *14*(2), 135-163.

Ehri, L. C., Nunes, S. R., Willows, D. M., Schuster, B. V., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the national reading panel's meta-analysis. *Reading Research Quarterly*, *36*, 250-287. doi: 10.1598/RRQ.36.3.2/abstract

Foorman, B. R., Francis, D. J., Fletcher, J. M., Schatschneider, C., & Mehta, P. (1998). The role of instruction in learning to read: Preventing reading failure in at-risk children. *Journal of Educational Psychology*, *90*(1), 37.

Friesen, A., & Butera, G. (2012). "You introduce all of the alphabet…but I do not think it should be the main focus": Exploring early educators' decisions about reading instruction. *Early Childhood Education Journal*, *40*, 361-368. doi: 10.1007/s10643-012-0530-0

Fuchs, L. S., Fuchs, D., & Compton, D. L. (2004). Monitoring early reading development in first grade: Word identification fluency versus nonsense word fluency, *Council for Exceptional* Children, *71*(1), 7-21.

Good, R. H., Simmons, D. C., & Kame'enui, E. J. (2001). The importance and decision-making utility of a continuum of fluency-based indicators of foundational reading skills for third-grade high-stakes outcomes. *Scientific Studies of Reading*, *5*, 257-288. doi: 10.1207/S1532799XSSR0503_4

Gough, P. B., Hoover, W. A., & Peterson, C. L. (1996). Some observations on a simple view of reading. In C. Cornoldi & J. V. Oakhill (Eds.), *Reading Comprehension Difficulties: Processes and Intervention* (1-14). Abingdon, United Kingdom: Routledge.

Hamilton, L., Halverson, R., Jackson, S., Mandinach, E., Supovitz, J., & Wayman, J. (2009). Using student achievement data to support instructional decision-making. Washington DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

Hatcher, P. J., Hulme, C., & Ellis, A. W. (1994). Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. *Child Development*, *65*, 41–57. doi: 10.1111/j.1467-8624.1994.tb00733.x

Hogan, T. P., Catts, H. W., & Little, T. D. (2005). The relationship between phonological awareness and reading: Implications for the assessment of phonological awareness. *Language, Speech, and Hearing Services in Schools*, *36*, 285–293.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing*, *2*(2), 127-160.

Hosp, M. K., & Fuchs, L. S. (2005). Using CBM as an indicator of decoding, word reading, and comprehension: Do the relations change with grade? *School Psychology Review*, *34*, 9-26.

Hudson, R.F., Pullen, P. C., Lane, H. B., & Torgesen, J. K. (2009). The complex nature of reading fluency: A multidimensional view. *Reading & Writing Quarterly, 25*: 4–32.

Johnston, R., Anderson, M., & Holligan, C. (1996). Knowledge of the alphabet and explicit awareness of phonemes in pre-readers: The nature of the relationship. *Reading and Writing*, *8*, 217-234. doi: 10.1007/BF00420276

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology*, *80*(4), 437-437.

Kuhn, M. R., Schwanenflugel, P. J., Meisinger, E. B., Levy, B. A., & Rasinski, T. V. (2010). Aligning theory and assessment of reading fluency: Automaticity, prosody, and definitions of fluency. *Reading Research Quarterly*, *45*, 230-251. doi: org/10.1598/RRQ.45.2.4

Liberman, I. Y., Shankweiler, D., Fischer, F. W., & Carter, B. (1974). Explicit syllable and phoneme segmentation in the young child. *Journal of Experimental Child Psychology*, *18*, 201-212.

Lonigan, C. J. (2003). Development and promotion of emergent literacy skills in children at-risk of reading difficulties. In B. R. Foorman (Ed.) *Preventing and remediating reading difficulties: Bringing science to scale* (23-50). Austin, TX: Pro-Ed, Inc.

Martin-Chang, S. L., & Levy, B. A. (2006). Word reading fluency: A transfer appropriate processing account of fluency transfer. *Reading and Writing*, *19*(5), 517-542.

McDonnell, L, M, McLaughlin, M. J., & Morison, P. (1997). *Educating one and all: Students with disabilities and standards-based reform.* Washington, DC: National Academic Press

McGuinness, D., McGuinness, C., & Donohue, J. (1995). Phonological training and the alphabet principle: Evidence for alphabet reciprocal causality. *Reading Research Quarterly*, *30*, 830-852.

Menzies, H. M., Mahdavi, J. N., & Lewis, J. L. (2008). Early intervention in reading: from research to practice. *Remedial and Special Education*, *29*, 67-77. doi: 10.1177/0741932508315844

Murray, B. A., Stahl, S. A., & Ivey, M. G. (1996). Developing phoneme awareness through alphabet books. *Reading and Writing*, *8*, 307-322. doi: 10.1007/BF00395111

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

Neuman, S., Copple, C., & Bredekamp, S. (2000). Learning to read and write: Developmentally appropriate practices for young children. *Young Children*, *53*(4), 30-46.

Oregon Department of Education (ODE) (2014). *Statewide Annual Report Card*. Retrieved: http://www.ode.state.or.us/search/page/?id=1821

Oregon Education Investment Board. (2014). Retrieved January 31, 2015, from http://education.oregon.gov/Pages/Early-Literacy.aspx

Paris, S. G. (2005). Reinterpreting the development of reading skills. *Reading Research Quarterly*, *40*, 184-202. doi: 10.1598/RRQ.40.2.3

Phillips, B. M., Clancy-Menchetti, J., & Lonigan, C. J. (2008). Successful phonological awareness instruction with preschool children. *Topics in Early Childhood Special Education*, *28*, 3-17.

Read, C., Zhang, Y. F., Nie, H. Y., & Ding, B. Q. (1986). The ability to manipulate speech sounds depends on knowing alphabetic writing. *Cognition*, *24*, 31-44.

Reading, S., & Van Deuren, D. (2007). Phonemic awareness: When and how much to teach? *Literacy Research and Instruction*, *46*, 267-285.

Ritchey, K. D. & Speece, D. L. (2006).From letter names to word reading: The nascent role of sublexical fluency. *Contemporary Educational Psychology*, *31,* 301–327.

Samuels, S. J. (1979). The method of repeated readings. *The Reading Teacher*, *32*(4), 403-408

Smartt, S. M., & Reschly, D. J. (2007). Barriers to the preparation of highly qualified teachers in reading. Nashville, TN: Vanderbilt University

Speece, D. L., & Ritchey, K. D. (2005). A longitudinal study of the development of oral reading fluency in young children at risk for reading failure. *Journal of Learning Disabilities, 38*, 387–39

Stage, S. A., Sheppard, J., Davidson, M. M., & Browning, M. M. (2001). Prediction of first-graders' growth in oral reading fluency using kindergarten letter fluency. *Journal of School Psychology*, *39*(3), 225-237

Stanovich, K. E. (1990). Concepts in developmental theories of reading skill: Cognitive resources, automaticity, and modularity. *Developmental Review*, *10*(1), 72-100.

Torgesen, J. K. (2002). The prevention of reading difficulties. *Journal of School Psychology*, *40*, 7–26. doi: 10.1016/S0022-4405(01)00092-

Torgesen, J.K. & Hudson, R. (2006). Reading fluency: critical issues for struggling readers. In S.J. Samuels & A. Farstrup (Eds.). *Reading fluency: The forgotten dimension of reading success* (1-22). Newark, DE: International Reading Association

Torgesen, J. K., Wagner, R. K., & Rashotte, C. A. (1997). Prevention and remediation of severe reading disabilities: Keeping the end in mind. *Scientific Studies of Reading*, *1*(3), 217-234

Tunmer, W. E., & Chapman, J. W. (1995). Context use in early reading development: Premature exclusion of a source of individual differences. *Issues in Education*, *1*(97), 100

Wagner, R. K., Torgesen, J. K., Rashotte, C. A., Hecht, S. A., Barker, T. A., Burgess, S. R., Donahue, J., & Garon, T. (1997). Changing relations between phonological processing abilities and word-level reading as children develop from beginning to skilled readers: A 5-year longitudinal study. *Developmental Psychology*, *33*, 468–79

Wise, B. W., Ring, J., & Olson, R. K. (2000). Individual differences in gains from computer-assisted remedial reading. *Journal of Experimental Child Psychology*, *77*(3), 197-235

Wray, K. A., Lai, C., Saez, L., Alonzo, J., & Tindal, G. (2014). *easyCBM© kindergarten beginning reading measures: alternate for reliability and criterion validity with the SAT-10 (technical report 1403)*. Eugene, OR: Behavioral Research and Teaching, University of Oregon.