A Comparison of Schools: Teacher Knowledge of Explicit Code-Based Reading Instruction

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A COMPARISON OF SCHOOLS: TEACHER KNOWLEDGE OF EXPLICIT CODE-BASED

READING INSTRUCTION

by

Rebecca A Cohen

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As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Rebecca Cohen, titled A Comparison of Schools: Teacher Knowledge of Explicit Code-Based Reading Instruction and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

_____ Date: (11/3/2014)
Nancy Mather

_____ Date: (11/3/2014)
C. June Maker

_____ Date: (11/3/2014)
Carl Liaupsin

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

_____ Date: (11/3/2014)
Dissertation Director: Nancy Mather

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SIGNED: Rebecca A Cohen

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ABSTRACT

In this study, 114 kindergarten through third grade teachers were surveyed using *The Survey of Preparedness and Knowledge of Language Structure Related to Teaching Reading to Struggling Students* to investigate how teachers perceived their preparedness to teach emergent and struggling readers, their knowledge level in the areas of phonemic awareness and phonics, their certainty of their knowledge level, and the extent they were able to define and apply this knowledge. Two groups of schools were compared. In one group, 60 teachers were using a school-wide, code-based reading program (CBRP), and in the other group 54 teachers were not (NCBRP). Both groups averaged 63% on the survey, and no significant differences existed between the two groups on levels of preparation or knowledge base. CBRP teachers believed they possessed more knowledge than the NCBRP teachers, although, they did not. The majority of teachers did not possess the necessary code-based reading knowledge, concepts, or skills to teach beginning and struggling readers. Thus, teacher preparation programs continue to fall short in providing teachers with adequate training on English language structure

      Keywords: teacher knowledge, phonology, reading, teacher preparation

CHAPTER 1: INTRODUCTION

Background

In a 2001 hearing before the House Committee on Education and the Workforce

Subcommittee on Education Reform, Dr. Reid Lyon, then Chief of the Child Development and

Behavior Branch within National Institute of Child Health and Human development (NICHD),

reported students with reading difficulties have higher dropout rates, criminal records, and

incidents of substance abuse (2001). He stated, "If children do not learn to read…their

opportunities for a fulfilling and rewarding life are seriously compromised. "…Failure to learn

to read places children's futures and lives at risk for highly deleterious outcomes" (Lyon, 2001 p.

15). For these reasons, Lyon described the nation's reading failure as "a major public health

problem." This health problem continues to exist. In fact, sixty-seven percent of fourth-grade

students in 2007, 2009, and 2011, performed at the *basic level* (the lowest level) demonstrating

partial mastery of fundamental reading knowledge and skill (NAEP, 2011). Although this is a

modest increase of 3-4% from 2002, 2003, and 2005, student scores from 1992 until the most

recent assessment have remained at the *basic level*.   So, while some students may learn to read

with little difficulty, a significant number of students are still having difficulty learning to read

and by the end of third grade, 75% of children who have difficulty learning to read will continue

to struggle until the end of high school (Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher,

1996; Lyon, 1998).

Use of effective classroom instruction, particularly in the early grades, can reduce the

severity of reading problems (IDA, 2010). However, teaching reading effectively to students

experiencing difficulty requires considerable knowledge and skill. A considerable amount of

research has been conducted about how to provide effective reading instruction for struggling

readers. One conclusion continues to be supported: struggling readers, often lacking in phonemic awareness skills, benefit from intensive, explicit, and systematic instruction of specific linguistic concepts such as phonology, phonics, and morphology (Brady & Moats, 2007; Moats, 1994). Reading instruction must include opportunities for students to learn the alphabetic writing system, understand the structure of spoken words, and understand how sounds are represented alphabetically (Snow, Burns, & Griffin, 1998).

Though the research is clear regarding exactly what knowledge and skills are needed for children to become good readers, the majority of teachers are not provided with adequate information and training on the structure of spoken and written language, or with methods and hands-on experience to help students develop their reading abilities (Brady & Moats, 1997). If teachers are expected to provide explicit, systematic reading instruction and evaluate student progress, they must: possess a working knowledge of the speech sounds, understand phoneme-grapheme correspondences, be able to provide instruction in word parts, both spoken and written, understand the organization of the spelling system, and know how our orthography represents spoken English (Brady & Moats, 1997; Moats, 1994, 2004, 2009; Moats & Lyon, 1996; Snow, Griffin & Burns, 2005; Spear-Swerling & Brucker, 2004). For example, teachers must be able to differentiate syllables from onsets and rimes and to count, produce, blend, segment, and manipulate individual speech sounds (Moats, 2009; Moats & Foorman, 2003). Those who teach students with reading and spelling difficulties must not only possess this knowledge, but must also be able to "illustrate and interpret" this knowledge for children (Moats, 1994, p. 86). Teachers also need linguistic knowledge to be able to create lessons following a research-based sequence for developing phonemic awareness, and to continue to create developmentally appropriate activities as the child's early reading abilities advance (Brady & Moats, 1997).

An understanding of both the ability to recognize and manipulate the individual sounds in spoken language (phonemic awareness) and the alphabetic principle plays a key role in teaching children to read (Cunningham, Perry, & Stanovich, 2004). However, many teachers lack this knowledge base and are therefore unable to provide explicit reading instruction to struggling readers (Moats, 1994). Often, teachers' knowledge of language concepts including phonology and orthography are underdeveloped, yet these are the very skills needed for teaching basic reading and writing skills in a clear and systematic fashion (Moats, 2009). For many teachers, this limited knowledge of language structure and concepts reduces their ability to teach reading explicitly to students who struggle (Mather, Bos, & Babur, 2001). Teachers cannot teach what they do not know (Binks-Cantrell, Washburn, Joshi, & Hougen, 2012; Moats, 2009; Moats & Foorman, 2003).

Even teachers of reading do not naturally develop explicit knowledge of language concepts. In other words, being highly literate does not necessarily guarantee one can teach reading and it may even interfere with the process (Cunningham et al., 2004; McCutchen & Berninger, 1999; Washburn, Joshi, & Binks-Cantrell, 2011). In the same way that deep knowledge of grammatical terminology is not necessary to speak English, one can also be a highly skilled reader without knowing terminology or concepts related to word structure (Spear-Swerling & Brucker, 2003). McCutchen and Berninger (1999) describe a teacher's literacy as "a two-edged sword" (p. 222) because for most literate adults, word sounds and knowledge of spelling patterns are so intertwined they are difficult to separate. Literate, experienced, university-educated teachers lack essential knowledge of basic language constructs needed to assess and teach beginning and struggling readers (Washburn, Joshi, and Binks-Cantrell, 2010). Moats (1994) and Moats and Lyon (1996) also discovered experienced reading and writing teachers

conceptualized words in their written rather than their spoken form unless they were specifically taught to pay attention to speech sounds and word structure. For example, when asked to count speech sounds, teachers will often count the number of letters rather than phonemes. Similarly, Spear-Swerling and Brucker (2003) found a literate adult's ability to recognize common words automatically interferes with the ability to analyze irregular words. Thus, even literate adults require explicit instruction on how to do this.

Without accurate knowledge of the language concepts associated with reading acquisition, teachers may provide inappropriate feedback to students regarding errors, resulting in confusion and frustration (McCutchen, Abbott, et al., 2002; McCutchen & Berninger, 1999; McCutchen, Harry, et al., 2002; Moats, 1994; Moats, 1999; Moats & Lyon, 1996). Teachers may also encourage the use of ineffective decoding strategies such as guessing at unknown words based on context rather than paying close attention to all of the letters (Spear-Swerling, Brucker, & Alfano, 2005). For struggling learners, in need of and reliant on direct, explicit instruction (Moats, 1994; Moats & Lyon, 1996), inaccurate and contradictory instruction can create substantial obstacles for learning. A teacher's limited knowledge base may impede a child's educational progress (Spencer, Schuele, Guillot, & Lee, 2008). Therefore, teachers must know much about the structure of language and research-based reading and spelling instruction to teach reading effectively to a diverse student population (Moats, 2009). Teachers must have a solid understanding of how students learn to read and the essential components of reading instruction (McCombes-Tolis & Spear-Swerling, 2011).

Over the years, quite a few commercially developed materials have been used to aid teachers in implementing explicit code-based reading instruction. However, these programs cannot replace the critical thinking of a teacher who understands how, why, and if students are

responding to instruction (Moats, 1994, 1999, 2000, 2009). Even if teachers use a structured program, they still need "specific and explicit linguistic knowledge" to address student needs adequately and appropriately (Moats & Foorman, 2003 p. 24). Students using adopted reading programs continue to make little to no progress due to insufficient implementation (Moats, 2009). Even with well-designed teaching materials to guide instruction, knowledgeable teachers are better able to choose the best examples for teaching decoding and spelling (e.g. choosing *Eddy* and *itchy* as better examples for illustrating the "short e" and "short i" sounds rather than *egg* and *igloo)*; effectively identify, assess, and correct student errors; and adapt instruction to meet individual needs (Moats, 1994, 2009). In other words, increased knowledge of language concepts helps teachers use the programs more effectively.

Purpose of the Study

The purposes of this study were: (a) to investigate how prepared kindergarten through third grade teachers believed they were to teach emergent and struggling readers; (b) how knowledgeable they were in the areas of phonemic awareness and phonics; (c) to what extent they were able to apply this knowledge; (d) and how certain the teachers believed they were of their answers. Two groups of teachers were compared. In one group the teachers were currently using a school-wide, code-based reading program and in the other group, teachers were not.

Significance of the Study

The results of this study contribute to the limited, but increasing, body of research investigating what teachers know about specific structured language concepts as they pertain to teaching struggling and emergent readers how to read. The knowledge base and preparedness of kindergarten through third grade teachers employed in a school that participated in a school-wide, code-based reading instruction program (CBRP) was compared with teachers employed in

a school without this type of school-wide program (NCBRP). Only kindergarten through third grade in-service teachers were surveyed because most direct reading instruction takes place and needs to take place in the primary grades as this provides the best chance for creating successful readers. In addition, the increasing number of students with disabilities being included in general education classrooms, the use of RTI as a school-wide reading initiative, the National Reading Panel's (NRP) recommendation for code-based reading instruction for all children, and the nation-wide shift to Common Core standards further substantiate the need for all teachers to be highly proficient in explicit code-based reading instruction.

The Survey of Preparedness and Knowledge of Language Structure Related to Teaching Reading to Struggling Students (Appendix E) was a compilation of questions used in past research (Bos et al., 1999; Bos et al., 2001; Mather et al., 2001; Moats, 1994; Moats & Foorman, 2003; Moats & Lyon, 1996; Podhajski et al., 2009; Washburn et al., 2010; Washburn et al., 2011) with special attention to questions geared toward understanding lower-level language organization such as phonology, morphology, and sound-symbol correspondences (Moats & Lyon, 1996). However, some questions were eliminated, redesigned, or replaced with new questions. Also unlike past studies, the knowledge and application questions had a one to one correspondence, so comparisons were made between participants' knowledge of a subject and their ability to apply that knowledge.

Research Questions

The following questions were addressed:

1. How prepared are kindergarten through third grade teachers employed at a school with a school-wide, explicit code-based reading program (CBRP) to teach phonemic awareness, phonics, fluency, vocabulary, and reading comprehension to struggling readers compared

with kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

2. What is the total knowledge (definitional knowledge and application knowledge) of kindergarten through third grade teachers employed at a school with an explicit code-based reading program (CBRP) about language structure compared to kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

3. How well do kindergarten through third grade teachers employed at a school with a school-wide, explicit code-based reading program (CBRP) perceive their total knowledge, their definitional knowledge, and their application knowledge compared with kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

4. What is the relationship between definitional knowledge and application knowledge?

5. What is the relationship between perceived knowledge and actual total knowledge?

6. What is the relationship between preparedness and knowledge?

Definition of Terms

Key terms in this study include:

- Alphabetic Principle- An understanding that spoken sounds are represented by written letters

- Blend-A combination of two or three consonants that keep their own sound identity (make their own sounds) when pronounced

- Digraph- A letter or combination of letters that represent a single speech sound

- Diphthong- A vowel sound composed of two parts that glide together

- Grapheme-A printed or written symbol that represent a particular sound

- Inservice teachers- Individuals currently teaching in a classroom setting

- Code-based reading instruction- The use of explicit, systematic instruction in phoneme/grapheme relationships to teach reading

- Morpheme- A single unit of meaning

- Morphology- The study of the meaning units of a language including affixes, roots, and parts of speech

- Phoneme- A single speech sound

- Phonemic Awareness- The ability to recognize and manipulate the individual sounds in spoken language

- Phonological Awareness- An individual's awareness of the phonological structure, or sound structure, of spoken words

- Phonology- The sound system of a given language

- Phonics- A reading method that teachers the relationship between the sounds of a language and the letters used to represent them

- Preservice teachers/students- Individuals studying to become teachers

- Schwa- A weak, mid-central vowel sound that occurs in unaccented syllables

- Voiced Consonants- Sounds in which the vocal chords are used

- Unvoiced Consonants- Sounds in which the vocal chords are not used

CHAPTER 2: LITERATURE REVIEW

The purpose of this chapter is to review the literature pertaining to (a) standards for reading teachers; (b) benefits of explicit code-based reading instruction; (c) teacher knowledge; (d) teacher belief; (e) perceived knowledge, ability, and preparedness; (e) university reading course syllabi and textbooks; and (f) teacher-educator knowledge.

Standards for Reading Teachers

The need for those teaching language, writing, and reading to have extensive knowledge of explicit code-based instruction is the general consensus among national educational organizations and committees. However, the majority of educational practitioners have not been sufficiently prepared to address reading problems. They are not able to recognize early signs of risk or appropriately teach students who are struggling with reading (International Dyslexia Association, 2010). In response to this concern, officials at the International Dyslexia Association (IDA) created standards for teachers of reading titled, "Knowledge and Practice Standards for Teachers of Reading." Included in this list are oral and written language concepts such as phonology, phonics, word study, fluency, and vocabulary as skills necessary for teaching students with dyslexia and other related reading and language difficulties (IDA, 2010).

Similarly, researchers at the Emily Hall Tremaine Foundation (2012) detailed the best practices for teaching students with learning disabilities how to read and proposed standards for the knowledge and practice of teachers of reading. These standards included high levels of knowledge about oral and written language, the structure of language, and structured language teaching.

Federal legislation has also been passed that supports the efficacy of providing emergent and struggling readers with direct, systematic, and explicit instruction in phonemic awareness,

phonics, and specific language concepts. For example, funding for quality teachers to provide direct, explicit, and systematic teaching of reading to primary-grade students is included in The Reading First Program, embedded in the No Child Left Behind Act (NCLB). In the 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA, 2004), limited response to evidence based instruction, often referred to as Response to Intervention (RTI), was introduced as a preventative measure for reducing the number of students identified as having learning disabilities by providing intensive, research-based instruction.

All children can benefit from explicit, systematic, and sequential instruction in the following five essential components: phonemic awareness, phonics, fluency, vocabulary, and comprehension strategies (NRP, 2000). In addition, the Common Core standards explicitly require k-fifth grade instruction in print awareness, phonological awareness, phonics, and word knowledge in the general education classroom. Clearly, federally mandated changes in instructional practices substantiate that prevention and amelioration of reading problems is a national concern and a school-wide responsibility (Moats, 2009). The burden of teaching struggling students to read can no longer be the sole responsibility of the special educator or reading specialists; therefore, those in both general and special education, must have a shared knowledge base and a shared vision of responsibility (Moats, 2009). However, this is not always the case. In a recent study, McCombes-Tolis and Feinn (2008), more than 70% of the elementary teachers surveyed identified themselves as being responsible for deciding how to teach children how to read, yet 16% did not perceive the general education classroom teachers as responsible for teaching students how to use "sound–symbol relationships and the alphabetic principle to decode" and more than 30% believed someone other than the kindergarten through third grade classroom teacher was responsible for teaching students to use "strategies for

syllabicating long vowels as an aid to decoding." Without a clear vision of which essential decoding skills need to be taught and who is responsible for teaching them, some children in the general education classrooms are likely not receiving appropriate reading instruction (McCombes-Tolis & Feinn, 2008). In another study, 97% of preservice teachers and 100% of inservice teachers believed kindergarten to second-grade teachers should know how to teach phonological awareness and 97% percent preservice and 98% of inservice teachers thought kindergarten through second-grade teachers should know how to teach phonics (Mather et al., 2001).

Benefits of Explicit Code-based Reading Instruction

Whereas some students learn to read using any method or no method at all, other students do not intuitively understand the alphabetic principle and therefore require explicit instruction in letter-sound relationships (Mather, 1992). Students who struggle to obtain this knowledge are at a direct disadvantage because the ability to recognize words accurately and easily is essential for rapid decoding and the development of successful word reading skills (Lyon, 1999; Stanovich, 1986). Automatic word recognition also helps students to acquire vocabulary, read multisyllabic words, and spell (Keiffer & Lesaux, 2007). Comprehension of text is also dependent on acquiring proficient knowledge of the alphabetic principle--the understanding that letters of the alphabet and the phonemes to which they correspond can be used to read and spell words (Foorman, Francis, Shaywitz, Shaywitz, & Fletcher, 1997; Torgesen, 2000). Therefore, non-proficient readers who do not possess efficient word recognition skills often read slowly, inaccurately, or both, which can result in poor comprehension (Lyon, Shaywitz & Shaywitz, 2003; Torgesen et al., 1999). Students who have difficulty learning to read must receive

instruction that is more explicit, comprehensive, and intensive than what is typically required by most children (Foorman & Torgesen, 2001).

Teacher Knowledge

Importance

To be effective at teaching reading, teachers must be able to demonstrate their own understanding of phonemic awareness by having knowledge about speech sounds, orthography and word structure (Brady & Moats, 1997; McCutchen & Berninger, 1999; Moats, 1994, 2000; Spear-Swerling & Brucker, 2004). For example, for effective decoding instruction, teachers must be able to distinguish phonemes from speech sounds. They must also be able to count, produce, blend, segment, and manipulate speech sounds. Teachers must also be able to differentiate syllables from onset and rimes (Moats, 2009; Moats & Foorman, 2003). A responsive teacher must use programs effectively, make decisions, interpret and respond to student errors (Moats 1994, 1999, 2009), provide the best examples (Moats, 1994; Moats & Lyon, 1996), provide corrective feedback, explain new ideas in different ways (Moats, 1999), and critique instructional materials (Brady & Moats, 1997). Teachers who possess these skills provide more accurate instruction than teachers with limited phonological awareness skills (Spencer et al., 2008). Without knowledge of common grapheme-phoneme correspondences, syllable types, and word irregularities teachers would have great difficulty providing effective decoding or spelling instruction to any readers, though especially to struggling readers (Spear-Swerling and Brucker, 2004). For example, when they observed teachers working with struggling readers, the teachers often used irregular words as incorrect examples of regular word rules (e.g., *was* or *smart* as examples of closed syllable, short-vowel words).

Teachers must also know what kinds of activities foster development of phonemic awareness, which speech sounds are easier for students to segment, which are harder and why, what level of phonemic awareness proficiency is necessary for effective reading, and how difficulties in phonemic awareness are present in reading and spelling (Brady et al., 2009). If teachers do not possess this knowledge, their students will also likely not develop these critical skills. In addition, teachers are at risk of inadvertently misleading or confusing students by either instructing them to sound out phonetically irregular words or failing to point out relevant features of words that would help students predict the sound of a word (McCombes-Tolis & Spear-Swerling, 2011).

Assessment

In a landmark study, Moats (1994) designed The *Informal Survey of Linguistic Knowledge* (Moats, 1994; Moats & Lyon, 1996) and assessed teacher knowledge of basic language concepts needed to provide effective reading instruction such as defining phonological awareness and phonemic awareness; identifying blends, syllable types, and spelling rules; and counting morphemes and phonemes. With proficiency scores on individual questions generally ranging from 10-45%, Moats (1994) concluded the participants did not have a well-developed understanding of spoken or written language and would therefore, be unable to teach these skills and concepts explicitly to emergent or struggling readers or those with a reading or spelling disability.

Unfortunately, over the years, teacher knowledge has not significantly increased. Low, scores have been reported in many subsequent teacher knowledge survey results and the same specific language concepts continue to be elusive (See Table 1)

Table 1

Assessment of Teacher Knowledge

Author & Year	Participants	Instrument Used	Skills Measured	Results
Moats (1994)	89 Teachers	*Informal Survey of Linguistic Knowledge* (Moats, 1994; Moats & Lyon, 1996)	Basic language concepts needed in reading such as parts of speech, syllables, morphemes, speech sounds, blends, digraphs, and spelling patterns	Participants had difficulty identifying the number of morphemes, the six syllable types, consonant blends, consonant digraphs, spelling rules, the schwa, and syllable types; counting phonemes (x was the most difficult)
Bos et al. (2001)	252 preservice and 286 k-third grade general and special education inservice teachers	*The Teacher Knowledge Assessment: Structure of Language.*	Knowledge of the structure of the English Language	Participants had difficulty identifying digraphs and voiced and unvoiced consonants, defining phonics, segmenting complex words; confused teaching phonological awareness with teaching letter/sound correspondences
Mather et al. (2001)	293 k-third grade preservice and 131 inservice teachers	*The Teacher Knowledge Assessment: Structure of Language* (TKA:SL)	Knowledge of the structure of the English Language	Participants had difficulty counting speech sounds, particularly with words containing the letter x and blends; defining phonological awareness and phonics; identifying diphthongs, voiced consonants, digraphs,

and schwa

Author & Year	Participants	Instrument Used	Skills Measured	Results
McCutchen, Harry, et al. (2002)	59 k-second grade general and special education inservice teachers	*Informal Survey of Linguistic Knowledge* (Moats, 1994; Moats & Lyon, 1996)	Basic language concepts needed in reading such as parts of speech, syllables, morphemes, speech sounds, blends, digraphs, and spelling patterns	No significant difference in scores between the various types of teachers
Moats and Foorman (2003)	194 k-fourth grade teachers	*Teacher Knowledge Survey*	Orthography, phonology, and morphology	Participants had difficulty discriminating speech sounds from letters; detecting phonemes in words; identifying digraphs, blends, spelling rules, and the relationship between graphemes and phonemes (specifically which graphemes represent which phonemes); dividing syllables
Cunningham et al. (2004)	722 k-third grade teachers	Survey	Phonological awareness and phonics	Participants had difficulty counting phonemes; identifying blends, consonant-vowel-consonant words, diphthongs, schwa, and open and closed syllables; recognizing irregular words
Spear-Swerling et al. (2005)	132 graduate students	Survey	Reading and reading development, counting morphemes, graphophonic segmentation, syllable	Participants had difficulty counting morphemes (esp. irregular, past tense

			types, and irregular words	verbs; providing accurate examples of phonemes and morphemes.

Author & Year	Participants	Instrument Used	Skills Measured	Results
Spencer et al. (2008)	541 participants; speech & language pathologists, k-first grade general and special education teachers, and reading specialists	Survey	Phoneme segmentation, identification, and isolation	Participants had difficulty segmenting phonemes in complex words; Speech and language pathologists performed better (M= 37.34) than reading specialists (M=30.62), kindergarten (M=29.47), First grade (M=31.29), and special education teachers (M=29.05); Neither group scored at a proficient level
Piasta et al. (2009)	42 first grade teachers	*Teacher Knowledge Assessment: Language and Print*	Phonology, orthography, and morphology.	Participants had difficulty with tasks involving phonics, onsets and rimes, phonological awareness, morphology, and syllable types
Washburn et al. (2010)	91 Preservice teachers	Survey	Skills and knowledge of basic language constructs.	Participants had difficulty defining the terms phonemic awareness, phonological awareness, and blends; identifying syllable types, suffixes, prefixes, and roots;

counting morphemes

Author & Year	Participants	Instrument Used	Skills Measured	Results
Washburn et al. (2011)	185 k-fifth grade general education teachers, and a few special education and reading specialists	Survey	Skills and knowledge of basic language constructs.	Participants had difficulty counting phonemes (especially words with complex structures); identifying closed, final and open syllables; defining phonological awareness, phonemic awareness, and blends; demonstrating applied knowledge

In 2002, McCutchen, Harry, et al. used the same survey as Moats (1994) and administered it to kindergarten to second grade general and special education teachers. Mean scores were between 30 and 35% and surprisingly, the difference between the various types of teachers was not significant. The authors wondered whether the special education teachers had the ability to help struggling readers and the general education teachers had the ability to work effectively with beginning readers. Piasta, Connor, Fishman, and Morrison (2009) also assessed first grade teachers about their understanding of phonology, orthography, and morphology. With a mean score of 23.45 out of 45, teachers averaged only 52% correct. Individual scores ranged from 9 to 36. Many of the teachers lacked the specialized content knowledge required to inform their classroom reading practices and provide first-grade students with effective, explicit reading instruction (Piasta et al., 2009). Similarly, Washburn et al. (2010) surveyed preservice general education elementary teachers and most of the scores fell within the 25-50% range.

When Cunningham et al. (2004) examined teacher knowledge of phonological awareness concepts and phonics, only 30% of the teachers could correctly distinguish the number of

phonemes in half of the survey questions and only 28% could correctly identify regular from irregular words. The authors were concerned about the impact these missing skills could have on students learning to read and spell. Kindergarten through third grade teachers might not be knowledgeable enough to discern which words should be taught by sight and which words could be taught by using decoding skills and subsequently might not be able to convey this very basic and important knowledge to students.

Even when highly trained professionals such as speech and language pathologists, reading specialists, and special education teachers as well as kindergarten and first grade teachers were surveyed to determine their ability to segment phonemes (count the number of sounds), identify sounds represented by underlined letters, and isolate sounds, scores from special educators, kindergarten, first grade, and reading specialists were nearly identical (Spencer et al., 2008). The speech and language pathologists far exceeded the performance of the other educators. However, their mean score 37.34 out of a possible 47 points (78%) was not indicative of "expert skill in explicit phonemic awareness" (Spencer et al., 2008 p. 516). Despite their specialized training, reading specialists and special education teachers did not perform any better than general education classroom teachers, and likely would not be able to provide appropriate and accurate phonemic awareness interventions (Spencer et al., 2008). In contrast, results from Bos, Mather, Dickson, Podhajski, and Chard (2001) indicated that special educators demonstrated significantly more knowledge than general educators.

Of particular interest in the Spencer et al. (2008) study were the strategies used for determining speech sounds. All participants had difficulty counting speech sounds independent of print. However, the speech and language pathologists were better able to look beyond the printed word and actually count the speech sounds (Moats & Lyon, 1996). The other educators

appeared to be deliberately using what they knew about print to guide their attempts to count the sounds (Spencer et al., 2008) thus resulting in many incorrect responses.

In the most recent teacher knowledge study to date, Washburn et al. (2011) concluded that the k-fifth grade teachers also relied on their orthographic knowledge and counted letters rather than sounds. For most literate adults, confusing sounds and spelling is not uncommon. However, during times of instruction, the inability to separate spelling patterns and word sounds could result in student confusion (McCutchen, Harry, et al., 2002). Although using their knowledge of reading to complete some items benefited the participants, ultimately this knowledge inhibited their ability to analyze more complex word structures beyond their own literary abilities (Moats, 1994; Spear-Swerling et.al., 2005; Spencer et al., 2008). Their own literacy did not guarantee them an understanding of the structural aspects of language (McCutchen, Harry, et al., 2002). Thus, being literate did not correlate with explicit awareness of spoken language structure and its relationship to reading (Cunningham et al., 2004; McCutchen & Berninger, 1999; Moats, 1994; Spear-Swerling & Brucker 2003; Washburn et al., 2011).

Prior Experience and Preparation

In some studies, participants' prior experience and preparation were examined to discern the effect these variables had on their knowledge base (See Table 2).

Table 2

Comparisons of Teacher Knowledge between Teachers With and Without Prior Preparation and Experience

Author & Year	Participants	Instrument Used	Skills Measured	Results
Troyer and Yopp (1990)	165 kindergarten teachers	*Teacher Knowledge Survey*	Knowledge about phonemic awareness	Master's degree- M= 44%; Bachelor's degree- M=27%; Less experienced teachers (1-5 years) were the most knowledgeable about the term phonemic awareness. Neither group scored at a proficient level
Bos et al. (2001)	252 preservice and 286 k-third grade general and special education inservice teachers	*The Teacher Knowledge Assessment: Structure of Language (TKA:SL)*	Knowledge about the structure of the English Language	Preservice teachers- M=11.4; Inservice teachers- M=12.6*; Neither group scored at a proficient level
Mather et al. (2001)	293 preservice and 131 inservice teachers	*The Teacher Knowledge Assessment: Structure of Language (TKA:SL)*	Knowledge about the structure of the English Language at the word and sound levels	Preservice teachers- M=11.2; Inservice teachers- M=14.5; Neither group scored at a proficient level
Spear-Swerling and Brucker (2003)	90 Preservice teachers	*Test of Word-structure Knowledge*	Segmenting phonemes; classifying words by syllable type; detecting irregular words	No significant difference between pre/post test scores based on prior experience; neither grouped scored at a

proficient level

Author & Year	Participants	Instrument Used	Skills Measured	Results
Cunningham et al. (2004)	722 k-third grade teachers	*Teacher Knowledge Assessment Survey* (Moats, 1994)	Knowledge about phonological awareness and phonics	Teachers with the least experience knew the most about phoneme awareness and explicit phonics
Spear-Swerling, Alfano and Brucker (2005)	132 teachers	Survey	Knowledge about reading and reading development; counting morphemes; segmenting phonemes; identifying syllable types and irregular words	Mean knowledge scores were consistently higher for participants with more preparation and experience; neither group scored at a proficient level; participants better understood the importance of reading fluency in reading development or risk factors for early reading difficulties than phonemic awareness or the morphemic structure of written English
Piasta et al. (2009)	42 first grade teachers	*Teacher Knowledge Assessment: Language and Print*	Knowledge about phonology, orthography, and morphology	Teacher knowledge was unrelated to level of education or experience
Washburn et al. (2010)	91 preservice teachers	Survey	Knowledge and application of basic language skills and constructs	Prior preparation (number of reading courses) did not significantly affect knowledge scores

Note. * Indicates score was statistically significant p<.01

For example, Mather et al. (2001) reported significant differences in knowledge scores between preservice (50%) and kindergarten through third grade general education teachers general and special education inservice teachers (68%). Bos et al. (2001) also found inservice teachers demonstrated more knowledge (12/20) than the inservice teachers (10.6/20). In addition, inservice teachers with more than 11 years of experience had significantly higher scores than preservice teachers with 1-5 years of teaching experience (Bos et al. 2001). Participants with an average of 7 years of teaching experience out-performed teachers with an average of 3 years and preservice teachers (Spear-Swerling et al., 2005). Washburn et al. (2011) also found years of teaching had some effect on knowledge. First-year teachers had lower phonemic awareness scores than teachers who had 6-19 years of experience. Teachers with more than five years of teaching experience scored, on average, above 70% on phonemic awareness items.

When teacher knowledge scores were compared to their levels of preparation such as taking classes or attending professional development workshops, participants with some prior preparation for teaching reading out-performed those with no prior preparation (Spear-Swerling & Brucker, 2003). In a follow up study conducted by the same authors in 2004, course instruction was a more important influence on posttest performance than prior background. Additionally, Mather et al. (2001) reported a significant relationship between the number of literacy courses taken by the participants and their knowledge. The more literacy classes the participants took, the higher their knowledge scores. Washburn et al. (2011) similarly concluded that experience in the classroom significantly added to one's knowledge base and particularly because some language skills or concepts develop with authentic classroom experiences, teaching can provide the time and opportunity to reflect, analyze, and incorporate new

information; an opportunity typically not available during a fast paced preparatory program or even during the first year of teaching (Washburn et al., 2011).

While higher inservice teacher scores may indicate on the job experience or prior preparation as having a positive effect on teacher knowledge (Mather et al., 2001), Piasta et al. (2009) and Spear-Swerling and Brucker (2003) did not find a correlation between performance on the knowledge test and years of experience. In addition, even participants with prior background for teaching reading (including some certified elementary and special educators) performed at relatively low levels on word-structure measures (Spear-Swerling & Brucker, 2004). Neither time spent practicing with the students (Spear-Swerling & Brucker, 2004; Washburn et al., 2010), nor number of reading courses significantly affected the knowledge scores of the preservice teachers (Washburn et al., 2010).

Interestingly, Cunningham et al. (2004) found the least experienced teachers knew more about phoneme awareness and explicit phonics. Similarly, teachers with the least teaching experience (1-5 years) rated themselves as being more familiar with the term phonemic awareness than teachers with 16 -30 years of teaching experience and those with graduate degrees rated themselves as being more familiar than those with undergraduate degrees (Troyer & Yopp, 1990). Cunningham et al. (2004) speculated this was due to better training in recent years on these topics.

Trainings, Seminars, Professional Development, University Classes

Providing teachers lacking in knowledge with course work, additional instruction, or professional development workshops can be effective methods for increasing knowledge (See Table 3).

Table 3

Assessment of Teacher Knowledge Before and After Seminars or Workshops

Author Year	Participants	Setting	Instrument Used	Skills Measured	Results After Seminar or Workshop
McCutchen and Berninger (1999)	three teachers	2 week inservice on improving literacy instruction for students with disabilities	*Informal Survey of Linguistic Knowledge* (Moats, 1994; Moats & Lyon, 1996)	Basic language concepts needed in reading; parts of speech, syllables, morphemes, speech sounds, blends, digraphs, and spelling patterns	Teachers significantly deepened their linguistic knowledge
McCutchen, Abbott, et al. (2002)	44 K and first grade teachers	2 week summer institute on phonology, phonemic awareness, and balanced literacy.	*Informal Survey of Linguistic Knowledge* (Moats, 1994; Moats & Lyon, 1996)	Basic language concepts needed in reading; parts of speech, syllables, morphemes, speech sounds, blends, digraphs, and spelling patterns	Posttest mean scores increased (pretest-M=54.6- posttest M=61.8*)
Spear-Swerling and Brucker (2003)	90 Preservice teachers	An upper level course on teaching language arts to individuals with special needs with an emphasis on instruction for developing their understanding of English word structure	*Test of Word-structure Knowledge*	Graphophonemic segmentation, classifying words by syllable type, and detecting irregular words	Approximately half of the participants' received a score of 80% or higher; all participants performed better on word knowledge tasks

Author Year	Participants	Setting	Instrument Used	Skills Measured	Results After Seminar or Workshop
Moats and Foorman (2003)	194 k-fourth grade teachers	Professional development, classroom observations, and consultant visits	*Teacher Knowledge Survey*	Knowledge about orthography, phonology, and morphology	Teachers who attended the professional development achieved higher scores (M=17.1) than teachers with little or no attendance (M= 14.63)
Spear-Swerling and Brucker (2004)	147 novice special education teachers	2-day summer institute, monthly workshops, and in-class mentors to learn about phonological awareness and phonics	*Test of Word-structure Knowledge*	Graphophonemic segmentation, classifying words by syllable type, and detecting irregular words	Highly significant increase in ability to segment words, count phonemes, and recognize syllable types; all scores still well below proficient.
Brady et al. (2009)	65 teachers	Summer institute, monthly workshops, and classroom mentor	*Teacher Knowledge Survey*	Knowledge about phonemic awareness and code concepts	Posttest mean scores increased (pretest-M= 25.26/60, posttest M= 34.07/60)
McCutchen, Green et al. (2009)	16 teachers	10 day summer institute and 3, 1 day follow up sessions about phonology, phonemic awareness, and balanced reading instruction	*Informal Survey of Linguistic Knowledge* (Moats, 1994; Moats & Lyon, 1996)	Basic language concepts needed in reading such as parts of speech, syllables, morphemes, speech sounds, blends, digraphs, and spelling patterns	Posttest mean scores increased (pretest-54.6% correct, posttest 61.8% correct)

Author Year	Participants	Setting	Instrument Used	Skills Measured	Results After Seminar or Workshop
Podhajski et al. (2009)	five, first and second grade teachers	35 hour *TIME for Teachers* course; 10 mentor classroom visits	*Survey of Teaching Knowledge*	How the English language is constructed and works; how speech maps to print	Posttest mean scores increased (pretest-45% correct, posttest 81% correct)

Note. * Indicates score was statistically significant p<.05

For example, when pre and posttest scores from students enrolled in a special education course for teaching language arts to individuals with special needs were compared, a very significant increase between the two sets of scores existed (Spear-Swerling & Brucker, 2003; 2004). Podhajski, Mather, Nathan and Sammons (2009) also reported an increase in test scores of almost 40% after attendance at a seminar on effective, code-based reading instruction. Moats and Foorman (2003) also noted higher knowledge scores for teachers who attended a professional development reading course. Similarly, when pretest and posttest scores were compared after a 2-week seminar on phonological, orthographical, and morphological awareness, McCutchen and Berninger (1999) concluded the seminar helped general and special education teachers "deepen their linguistic knowledge" (p. 217).

In similar studies, McCutchen, Abbott, et al. (2002) and McCutchen et al. (2009) both reported significant increases in teachers' posttest scores after a 2-week seminar, indicating a deepening of phonological and linguistic knowledge after receiving instruction. Brady et al. (2009) also reported a significant increase in scores on phonemic awareness tasks and code concepts after participants completed a training program. The authors concluded the increase in knowledge was a result of instruction.

Though teaching experience, coursework, and professional development workshops and seminars tended to have a positive effect on teacher knowledge and remediated some of the deficiencies in most of the studies, the scores were not at an acceptable level. Although the authors did not establish a requisite knowledge score for effective instruction, many students still scored well below the highest possible score on the posttests (Spear-Swerling and Brucker, 2003; 2004). Scores falling within the 50-60% proficiency range indicated a significant weakness in language-based reading concepts (Bos, et al., 2001; Mather et al., 2001; Spear-Swerling & Brucker, 2003; Spear-Swerling et al., 2005; Washburn et al., 2011). The majority of teachers lacked sufficient knowledge about many important constructs needed to teach struggling readers (Washburn et al., 2011) and therefore would have difficulty in successfully implementing research-based recommendations created by researchers at organizations such as the International Dyslexia Association and the Tremaine Foundation. Teacher knowledge of specific language-based constructs needed to teach struggling students how to read has not improved over the past 20 years and had largely remained low and far from proficient.

Though many researchers have delineated the concepts needed for people to become good readers, the majority of teachers have not been adequately prepared. The depth of linguistic knowledge needed for teachers to help students struggling to learn to read effectively is extensive, complex, and often underestimated (Cunningham, Zibulsky, & Callahan, 2009; McCutchen et al. 2009). The knowledge base needed to teach speech to print relationship is not easy to obtain and not acquired through class experience alone (Moats, 2012). The optimal amount of time required to increase teacher knowledge and master the skill of teaching reading has not been established. More time than one would imagine must be devoted to learning how to teach students to read (Moats & Foorman, 2003). All teachers, including experienced teachers

(Brady & Moats, 1997), need intensive instruction and time to learn the material (Moats, 1995; Moats, 2012; Moats & Foorman, 2003; Spear Swerling & Brucker, 2004). They also require sufficient time to practice and apply this knowledge with struggling readers during supervised field experiences so their knowledge is high enough to affect student outcomes (Moats, 1994; Moats, 2012; Moats & Foorman, 2003). Therefore, instructors at colleges of education must make a concerted effort to develop courses that provide both preservice and inservice teachers the necessary skills and pedagogy to become experts in reading (Lyon, 1999), as well as provide them with multiple opportunities to apply this knowledge under consistent supervision (Brady & Moats, 1997). Brady and Moats (1997) explained, "teaching children to read is a task for an expert and teacher preparation needs to be comprehensive enough to create such experts" (p.11).

The Classroom

Teachers must also be able to transfer knowledge of the structure of spoken and written language into actual classroom practice. Attendance at reading seminars appeared to have a significant effect on how long or often teachers used code-based reading practices in their classroom. (See Table 4).

Table 4

Effects of Teacher Knowledge in the Classroom

Author & Year	Participants	Method of Assessment	Skills Measured	Results in the Classroom
Bos et al. (1999)	k-second grade students	WJ III-Achievement	Letter-sound knowledge, spelling, spelling of sound, and reading fluency	All students made gains in spelling and reading as compared to control group.
McCutchen and Berninger (1999)	k-first grade students and teachers	Field notes from classroom observations	Time spent teaching alphabetic principle and letter-sound relationships	Experimental teachers spent more time teaching activities directed toward the alphabetic principle than control teachers (6.9 min vs. 3.9 min) and letter-sound relationships (3.9 min vs. 2.6); kindergarteners taught by teachers involved in the study showed more growth in the areas of phonological awareness, orthographic fluency, and word reading; first graders showed growth in phonological awareness, word reading, comprehension, spelling, and composition fluency;

Author & Year	Participants	Method of Assessment	Skills Measured	Results in the Classroom
McCutchen, Harry, et al. (2002)	59 k-second grade teachers	Field notes from classroom observations	Time spent teaching phonological and orthographical activities	Significant correlation between the teachers' phonological knowledge and amount of time spent engaging students in explicit phonological activities
McCutchen, Abbott, et al. (2002)	44 k-first grade teachers	Field notes from classroom observations	Time spent teaching phonological and orthographical instructional activities.	Experimental participants spent more time on phonological awareness activities (M=7.8) than participants in the control group (M=3.3); experimental participants also used many instructional methods taught to them during the summer institute they attended
Moats and Foorman (2003)	Third-fourth grade teachers	*Texas Teacher Appraisal System* and *WJ-R Basic and Broad Reading Scales*	Routines, instruction, and management procedures	Teachers rated as more effective in their classroom teaching techniques had students with higher reading outcomes
Piasta et al. (2009)	42 first grade teachers	Classroom observation	Frequency of explicit decoding instruction	Teachers with low knowledge scores provided inaccurate examples and were generally less able to correct student

decoding errors
correctly and
appropriately

For example, after attending a two-week seminar on instruction in phonology and phonological awareness, McCutchen, Harry, et al. (2002) found a significant correlation between a teacher's phonological knowledge at the beginning of the school year and the amount of time spent engaging students in explicit phonological activities throughout the year. Teachers who attended workshops used many instructional methods taught to them during the summer institute (McCutchen, Abbott, et al., 2002). The participants spent more time engaging students in activities that taught the alphabetic principle than those who did not attend the workshop (M=6.9 minutes vs. M=3.9 minutes). Similarly, McCutchen & Berninger (1999) also observed that teachers spent significantly more time (M=7.8 minutes) on phonological awareness activities than teachers in the control group (M=3.3 minutes). Throughout the year, some teachers significantly decreased the amount of time they spent on phonological awareness activities (McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002). Therefore, specific procedures must be in place to ensure teachers continue to devote sufficient time to teaching code-based reading strategies.

Time spent on these critical tasks also had an effect on student achievement. Piasta et al. (2009) concluded that the more decoding instruction teachers provided, the higher their students scored. On average, students who received the greatest amount of decoding instruction from teachers with the least amount of knowledge showed the weakest word identification score growth (Piasta et al., 2009). McCutchen et al. (2009) also observed that student gains were predicted by teachers' knowledge and the amount of explicit decoding instruction they received. The more time high-knowledge level teachers spent teaching explicit decoding skills, the greater

their students' word reading growth. All students benefited from being in a classroom with a teacher who had a deeper linguistic knowledge. Even lower performing students, whose teachers had a higher knowledge level, performed better than their peers in vocabulary, composition, spelling, and nonsense word reading (McCutchen et al., 2009).

While teachers must be able to provide, teach, and discuss code-based reading instruction, students must benefit from their teacher's knowledge as demonstrated through gains in reading performance. McCutchen, Abbott, et al. (2002) and McCutchen, Harry, et al. (2002) reported significant correlations between the students' end of the year reading scores and their teacher's knowledge about phonological concepts and their use of explicit phonological instruction. Students significantly increased their phonological awareness, spelling, and writing abilities, as well as their reading comprehension, vocabulary, and orthographic fluency (McCutchen, Abbott, et al., 2002). Similar results were obtained by others (Bos et al., 1999; McCutchen & Berninger, 1999; McCutchen, Harry, et al., 2002; Moats and Foorman, 2003; Podhajski et al., 2009; Spear-Swerling & Brucker, 2004). In general, teachers who were rated as more effective in their classroom teaching techniques had students with higher reading outcomes, and teachers who knew more tended to have higher student scores on reading achievement tests (Moats & Foorman, 2003).

Even the use of highly scripted materials did not compensate for less effective instruction from teachers who scored low on knowledge assessments (Piasta et al., 2009). Scripted material can serve as a useful base of instruction but cannot replace the "expert teaching of highly knowledgeable teachers" (Piasta et al., 2009, p. 244). When teacher use of explicit decoding instruction such as phoneme-grapheme correspondence, sounding out strategies, using word families, syllable types, and spelling rules was compared to their knowledge scores on the

Teacher Knowledge Assessment, teachers with low scores on the knowledge test provided inaccurate examples to students and were generally less able to correct student decoding errors correctly and appropriately (Piasta et al., 2009). In addition, teachers with lower scores tended to focus primarily on using phoneme-grapheme correspondence as a strategy for sounding out words while teachers with higher scores provided students with a wider variety of strategies (a more favored approach) such as using word families, analogies, and syllables (Piasta et al., 2009). When Moats and Foorman (2003) assessed third and fourth grade teachers on their general instruction methods, they taught students to blend words letter by letter instead of teaching them to blend words sound by sound even though the instructions in the teacher manuals explicitly instructed teachers to use sounds. Many teachers also neglected to teach orthographic patterns, rules of grammar, and syntax.

Relying on teaching experience or scripted reading programs is not enough for effective reading instruction to take place (Moats, 1994, 1999, 2000; Moats & Foorman, 2003). Scripted programs cannot provide instruction on how to tailor instruction based on individual needs and abilities. Determining the speed at which an individual should progress or deciding when to introduce supplementary materials are tasks requiring the expertise of a highly trained teacher. Clear and accurate presentation of information requires teachers to have knowledge of phonology, phoneme-grapheme correspondences, and organization of the spelling system (Moats 1994; Moats & Lyon 1996). Deeper teacher knowledge allows for better instruction, more effective intervention strategies, and better corrective feedback to students (McCutchen et al., 2009). Without adequate knowledge, teachers are unable to interpret and respond to student errors and questions correctly (Moats, 1999). They must be able to supply appropriate and

corrective feedback by choosing examples to illustrate specific concepts and explain these concepts in multiple ways (Moats, 1999).

While a plethora of evidence exists to substantiate the claim that student achievement is positively correlated with teacher training (Podhajski et al., 2009), Cunningham et al.'s results (2009) did not support a strong relationship between teacher knowledge and student achievement. Though teacher knowledge did marginally increase over the year, unlike McCutchen, Abbott, et al. (2002) and McCutchen, Harry, et al., (2002), Cunningham et al. (2009) found minimal gains on student reading scores even with increased teacher knowledge.

Teacher Belief

Beliefs often fuel action. Therefore, a teacher's beliefs about the reading process can possibly influence their use of explicit code-based instructional techniques. Bos et al. (1999) administered the *Teacher Attitudes of Early Reading and Spelling Test* (adapted from Deford, 1985) to a group of teachers after they completed a professional development program on explicit techniques and instructional strategies for teaching reading to children at risk for reading failure. Teachers' attitudes toward using a structured language approach to teach early reading and spelling were more positive than before taking the class, and the participants rated the course as "very valuable" to "extremely valuable." However, the teachers still retained positive attitudes toward whole-language oriented reading procedures. Though the intent of the study was not to change the beliefs of the participants, and most participants acknowledged the need for individualized instruction, positive attitudes toward whole language instruction may impede the use of structured language reading approach.

 Brady et al. (2009) also surveyed teachers' attitudes both before and after attending a professional development seminar and received similar results. Belief scores about the efficacy

of whole language techniques were significantly lower after the training. The researchers also noted a positive correlation between the teachers' attitudes and their increase of knowledge. Teachers who did not have a positive attitude about attending the professional development had the least increase in knowledge. However, when McCutchen, Harry, et al. (2002) administered the *DeFord Theoretical Orientating to Reading Profile* (Deford, 1985) to general and special education teachers, they showed no real preference for either "skills," "whole language," or "phonics based" theories of reading instruction.

When inservice and preservice teachers completed The *Teacher Perceptions Toward Early Reading and Spelling* (TPERS) survey to determine if classroom experience influenced teacher perceptions about the importance of explicit language-based instruction, the inservice teachers were more positive toward code-based instruction than were preservice participants, and all participants were more positive toward code-based instruction than holistic instruction (Mather et al., 2001). However, neither experienced nor inexperienced teachers believed in the importance of understanding the alphabetic principle or the effective use of various word identification strategies. In addition, they also were not concerned if student miscues altered the meaning of a text.

Similarly, teachers surveyed by Troyer and Yopp (1990) also did not perceive code-based tasks to be integral to the reading process. For example, on a scale of one to six, commanding a large vocabulary was rated as the most important literacy skill necessary for a student to become an independent reader (5.33). The ability to rhyme was rated as second most important (4.69) and the ability to blend (4.07), third. Determining the number of syllables (2.82) and segmenting sounds (3.36), two skills vital to becoming a proficient reader, were rated as being the least important skills.

Perceived Knowledge, Ability and Preparedness

To answer the question of whether or not teachers believed their certifying institutions had properly prepared them to teach struggling readers, researchers investigated teachers' perceived level of preparedness. Self-assessment data can be useful for creating effective and appropriate professional development and training opportunities because they shed light on the areas where teachers need to receive more instruction. However, a teacher's perception of how well they are able to teach a concept does not always correlate with their actual knowledge of that subject (Bos et al., 2001; Cunningham et al., 2004). Therefore, comparing perceived knowledge with actual knowledge is important.   Knowing whether teachers are aware of the depth of their code-based reading instruction and if they believe in the importance of teaching these concepts can help to remediate any gaps in their knowledge (Brady et al., 2009). Teachers who overestimate their knowledge may not be open to more learning which could cause them to inflate or create a false sense of their teaching competence (Cunningham et al., 2004; Spear-Swerling et al., 2005).

When Lyon, Vaassen, and Toomey (1989) asked 440 first through seventh-grade general and special education teachers how prepared they were to address individual differences within the classroom, the majority (94%) believed their classroom experience provided the most skills to meet the needs of students. However, only a little more than half of the participants believed the coursework from their graduate education programs provided adequate training. A large number of participants reported the theory they were taught was not related to actual practice. In addition, teaching experiences with diverse students, as well as adequate opportunities to observe master teachers, were not provided, and their teaching performance was not consistently supervised or critiqued in practicum settings. The disparity between these two findings is most

concerning because if teachers did not receive quality instruction, then their personal teaching experiences were built upon faulty and misinformed pedagogical ground (Lyon et al., 1989). In addition, inservice trainings did very little to fill the preparation void. Only 2-3% of the teachers believed inservices provided them with adequate reading skills to meet the needs of individual students (Lyon et al., 1989).   Bos et al. (2001) also reported that the majority of general and special education teachers rated themselves as only somewhat prepared (2.26-2.32 on a scale of 1 to 4) to teach reading to emergent and struggling readers. In addition, on average, inservice teachers perceived their ability to teach developing readers, struggling readers, phonemic awareness, and phonics as moderate (Washburn et al., 2011). The majority of preservice teachers were not provided with hands-on experience or knowledge about the structure of spoken written language, all of which are necessary to meet the needs of children learning to read (Brady & Moats, 1997).

Findings such as those provided by Lyon et al. (1989) and Bos et al. (2001) are even more alarming when teachers, self-identified as being responsible for deciding how to teach children in their classroom to read, indicated they needed to learn more about how best to teach children to read and how to administer informal reading assessments to correctly identify the specific skills that their students needed to improve upon (McCombes-Tolis & Feinn, 2008).   On the contrary, and more assuring, knowledge of the structure of the English language significantly and positively correlated with preservice and inservice teachers' perceptions of how well prepared they were to teach children and struggling readers phonological awareness and phonics (Bos et al., 2001).

According to Cunningham et al. (2009), teachers tended to overestimate their reading knowledge; therefore, they were often unaware of what they knew and did not know. When the

perceptions of teachers' literacy-related knowledge and skill competencies were investigated, they indicated overall confidence in their knowledge and skills related to teaching reading, yet between 30 and 40% either disagreed or were uncertain if they agreed on fundamental understandings of reading success such as knowing that speech-sound confusions may affect reading and spelling; the stages of children's oral language, reading, writing and spelling development; the role of morphology in written English; the common characteristics of children who experience reading difficulties; and specific indicators for teacher intervention (McCombes-Tolis & Feinn, 2008). Overall, the teachers were not able to estimate their knowledge of phonological awareness accurately. Brady et al. (2009) also surveyed perceived abilities. While initial knowledge scores did not significantly correspond with teachers' ratings of their ability to teach beginning reading concepts, after attending a reading workshop, teachers' ratings of their ability to teach beginning reading concepts correlated significantly with their ability to complete phonemic awareness tasks. Teachers who had learned more were more likely to have increased their confidence to teach students how to read.

Similarly, Cunningham et al. (2004) also reported inconsistencies between perceived and actual knowledge. Participants who perceived themselves as having greater knowledge of phonological awareness actually achieved lower mean scores on these tasks. Those who perceived their knowledge to be low performed significantly better than the teachers who perceived their knowledge to be high. Only 9% of the participants' perceived knowledge score on phoneme awareness accurately reflected their actual scores on phoneme awareness tasks.

Preservice teacher participants also had difficulty calibrating their perceived and actual abilities. On average, perceived teaching ability for most code-based subskills (phonological and phonemic awareness, morphology) was greater than actual ability. In addition, participants

believed they were most prepared to teach vocabulary, yet their knowledge of word parts such as affixes and roots was low (Washburn et al., 2010).

Years of teaching was also compared to teacher perception. While the least experienced teachers had significantly more positive perceptions of their knowledge (Cunningham et al., 2004), teachers who had more experience tended to rate their ability higher (Washburn et al., 2011). Contrary to the findings of Cunningham et al. (2004), Spear-Swerling et al. (2005) reported that participants with a "high background" (seven years of teaching experience and considerable graduate course work) perceived themselves as more knowledgeable in code-based reading skills than the "low background" participants (those in the process of getting certified with minimal or no graduate course work), and the "high background" participants did, in fact, perform better on the actual knowledge survey. Those who rated themselves as "highly knowledgeable" outperformed those who rated themselves as "not knowledgeable."

University Course Syllabi and Textbooks

Another reason teachers may be underprepared to teach reading is due to lack of exposure to key literacy concepts both in courses at their certifying institutions, as well as, the textbooks chosen for such courses. For example, Steiner and Rozen (2004) reviewed syllabi from language arts, reading, and reading related courses from schools of education. Twenty-eight out of 36 elementary level syllabi purported a balanced approach to teaching literacy. However, further analysis revealed no more than two sessions were devoted to phonics. Only three syllabi from two schools included lessons on direct, explicit, code-based instruction to teach phonics, and a number of the top rated schools still offered a whole language based course. Unfortunately, in the name of balanced reading instruction, many relied on a whole-language philosophy and either did not incorporate systematic decoding instruction or used it incidentally or when

working specifically with someone experiencing problems with reading (Moats, 2000; Vaughn, Moody, & Schumm, 1998; Walsh, Glaser & Dunne-Wilcox, 2006).

In a study by the National Council on Teacher Quality, Walsh et al. (2006) reviewed 72 college and university course syllabi to determine what skills teacher candidates were learning in required reading courses. Only 11 institutions produced syllabi indicating that all five of the reading components--phonics, fluency, phonemic awareness, vocabulary, and comprehension--were taught (NRP, 2000). Even institutions claiming to offer courses teaching "the best research-based instructional practices and strategies for creating a balanced, literature-based program for all children" (p. 23) provided only one lecture on phonics. These results are similar to the findings of Steiner and Rozen (2004).

Similarly, phonemic awareness was not mentioned in almost two-thirds of the syllabi reviewed by McCombes-Tolis and Spear Swerling (2011), and about 45% of the syllabi from required reading methods courses did not mention any of the five components of effective literacy instruction as identified by the NRP. The majority of the course syllabi did not include effective reading instruction assignments related to assessment practices, supervised assessment training with an actual child, or developing or delivering lesson plans--components integral to effective teacher training.

Similar results were obtained when Joshi, Binks, Graham, et al. (2009) reviewed the 17 most widely adopted introductory reading class textbooks. The five components of reading (NRP, 2000) were only addressed in 10% of one book used in 84 university reading courses while phonemic awareness and fluency were absent in another reading textbook used by 91 universities. One-third of the content in nine textbooks was devoted to the five reading components (NRP, 2000).

Phonemic awareness, fluency, and phonics were covered less than vocabulary, and comprehension and information on phonemic awareness and phonics were inaccurate in some textbooks. Only 13 out of the 17 textbooks contained all NRP (2000) recommended components. More than half of the textbooks examined were rated as "unacceptable." Reading comprehension was covered the most (Joshi, Binks, Graham, et al., 2009; McCombes-Tolis & Spear Swerling, 2011).

These studies substantiated the lack of agreement among educators as to what constitutes effective literacy instruction in the early grades. The well-defined necessary knowledge needed for teachers to help students become good readers has yet to translate effectively to teacher training institutions and textbook publishers. The majority of teachers are not provided with adequate information regarding the structure of spoken and written language or with methods and hands on experience (Brady & Moats, 1997). With the lack of science-based reading instruction in the universities and colleges throughout the country, not surprisingly, many teachers lack the knowledge base to provide direct, language-focused reading instruction to struggling readers (Moats, 1994).

Recommendations from researchers at the International Dyslexia Association (2010) indicate that college and university course content should cover topics such as basic concepts about oral and written language, the structure of language, Dyslexia and other learning disorders, and structured language teaching. Similarly, researchers at the Emily Hall Tremaine Foundation (2012) recommend providing more structured, direct instruction of reading skills in the classroom, hiring teachers trained in science-based reading instruction, redesigning teacher training programs to include current, best practices for reading instruction, and aligning teacher

certification tests with current, research-based findings from neuroscience research about how children learn to read.

Teacher-Educator Knowledge

Unfortunately, most teacher educators also do not possess the requisite reading knowledge to instruct their students properly and as Binks-Cantrell et al. (2012) so aptly surmised, teacher educators can't teach what they don't know. Poor student instruction stems from poor classroom teacher knowledge, which stems from poor teacher preparation (Brady & Moats 1997). Teacher educators with high knowledge will have teacher candidates with high knowledge (Binks-Cantrell et al., 2012). Many years of definitive research delineating effective reading instruction strategies has still not filtered down to some schools of education, and the teacher educators currently employed may need to be re trained on how to provide code-based instruction (Brady & Moats, 1997).

When university and college professors from various departments who teach reading to teachers were surveyed, they performed the highest on phonology items (79%), second on phonics items (57%), and the lowest on morphology items (34%). A number of participants lacked knowledge about the linguistic constructs necessary for teaching literacy skills such as common spelling rules, the definition of phonemic awareness, and counting the number of morphemes (Joshi, Binks, Hougen, et al., 2009). The low scores indicate the educators did not have an explicit enough understanding of the concepts to teach others how to apply them (Cunningham et al., 2004; Joshi, Binks, Hougen, et al., 2009; McCutchen, Harry, et al., 2002; McCutchen & Berninger, 1999; Moats, 1994; Spear-Swerling & Brucker, 2003; Washburn et al., 2011).

Joshi, Binks, Hougen, et al. (2009) also surveyed reading instructors on the causes of reading disabilities and their general philosophy of teaching reading. The participants identified socioeconomic status, family background, and English as a second language as the three most common factors associated with high incidence reading disabilities. The preferred answer, "quality of reading instruction," was not provided by any of the instructors. Only 20% of the instructors correctly defined phonological awareness, and 90% cited extensive and repeated readings as effective strategies for improving fluency and vocabulary. Although these are effective strategies, more advanced strategies involving morphemes and word analysis were not mentioned (Joshi, Binks, Hougen, et al., 2009). In addition, 75% of the participants described their philosophy of reading as a balanced reading approach. As Moats (2000) explained, "In the name of 'balance' the worst practices of whole language are persisting, continuing to inflict boundless harm on young children who need to learn to read" (p. 6).

CHAPTER 3: METHOD

A review of the literature substantiated the need to investigate how much preparation k-3 teachers received to teach emergent and struggling readers, how knowledgeable they were in the areas of phonemic awareness and phonics, to what extent they were able to apply their knowledge, and how certain the teachers believed they were regarding their knowledge. This study helped to further substantiate the need for teacher preparation programs to conform to national standards and develop courses in the science of reading.

The purpose of this chapter was to discuss the methods used to answer the following research questions:

Research Questions

The following questions were addressed:

1. How prepared are kindergarten through third grade teachers employed at a school with a school-wide, explicit code-based reading program (CBRP) to teach phonemic awareness, phonics, fluency, vocabulary, and reading comprehension to struggling readers compared with kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

2. What is the total knowledge (definitional knowledge and application knowledge) of kindergarten through third grade teachers employed at a school with an explicit code-based reading program (CBRP) about language structure compared to kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

3. How well do kindergarten through third grade teachers employed at a school with a school-wide, explicit code-based reading program (CBRP) perceive their total knowledge, their

definitional knowledge, and their application knowledge compared with kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

4. What is the relationship between definitional knowledge and application knowledge?

5. What is the relationship between perceived knowledge and actual total knowledge?

6. What is the relationship between preparedness and knowledge?

Research Design

Two groups of teachers were surveyed. One group of teachers was employed by schools currently using *Fundations- Wilson Language Basics K-3*; an explicit, code-based reading program (CBRP) and the other group of teachers was employed by schools that did not use a school-wide, explicit, code-based reading program (NCBRP). Comparisons were made across multiple measures between the CBRP teachers and the NCBRP teachers. Permission to conduct this study was obtained from the school district and the principals. This study did not commence until approval was obtained by the researcher from the University of Arizona's Institutional Review Board from the Office for the Responsible Conduct of Research.

Participants and Setting

The researcher for this study recruited 60 kindergarten through third grade teachers from schools currently using a school-wide, explicit, code-based reading program (CBRP) and 54 kindergarten through third grade teachers from schools not currently using this or any school-wide, explicit, code-based reading program (NCBRP). schools were located in Arizona. All schools received a state rating of "A" and had similar reading scores on the Arizona Instrument to Measure Standards (AIMS). The A-F Letter Grade System uses a combination of students' scores on the AIMS tests (50 percent) and the academic growth of students from one year to the next. "A" schools demonstrate an excellent level of performance. A large majority of their

students passed the AIMS and AIMS A and typical academic growth is in at least the 70th percentile (A.R.S. §15-241).

Instrument

The Survey of Preparedness and Knowledge of Language Structure Related to Teaching Reading to Struggling Students (Appendix D) was a compilation of questions used in past research (Bos et al., 1999; Bos et al., 2001; Mather et al., 2001; Moats, 1994; Moats & Foorman, 2003; Moats & Lyon, 1996; Podhajski et al., 2009; Washburn et al., 2010; Washburn et al., 2011) with special attention to questions geared toward understanding "lower-level language organization" such as phonology, morphology, and sound-symbol correspondences (Moats & Lyon, 1996). For this study, several questions were eliminated, modified or replaced with original questions created by Dr. Nancy Mather and the researcher. Questions were redesigned so that the knowledge and application questions had a one-to-one correspondence. For example, a knowledge question would entail a participant defining the term "schwa" while an application questions would ask them to recognize which word contained a "schwa."

Data Collection

The researcher met with the participants twice during 2 separate staff meetings. During the initial meeting the researcher explained the nature of the study and the potential role of the teachers. During the second meeting, *The Survey of Preparedness and Knowledge of Language Structure Related to Teaching Reading to Struggling Students* was administered to all of the teachers. When the surveys were completed all teachers had the option to consent to participate in the study (A. Encinas, personal communication, August 15, 2013). Therefore, consent from the subjects was obtained freely and without coercion and/or undue influence (Human Subjects Protection Program Investigator Manual, 2012)

Procedural Reliability

Reliability is important for any experimental study, but is also vital for the interpretation of correlational studies. The survey was completed in a group setting during a staff meeting. The survey was completed on paper. All participants received as much time as they needed to complete the survey. The first section of the survey was collected upon completion. When the participants completed the second and third sections of the survey, the survey was again collected and consent was obtained. The surveys were labeled as CBRP-Code-Based Reading Program and NCBRP-No Code-Based Reading Program. The researcher oversaw all of the procedures related to administering and collecting the surveys and followed the same procedures each time the survey was administered. Therefore, experimenter differences were minimized.

Coding Reliability

The results from the survey were initially entered into an Excel spreadsheet by the researcher. A second person reviewed the spreadsheet to verify the original survey results. Any inconsistencies were checked against the actual survey and corrections were made. The data were entered into IBM SPSS Statistical Software (SPSS Inc., Chicago IL).

Measurement Variables

Independent and Dependent Variables

The independent variables were involvement is a school-wide reading program (CBRP) or no involvement in a school-wide reading program (NCBRP). The dependent variables were preparedness, total knowledge, perceived knowledge, definitions, and application. Preparedness was measured with a five point scale; 0-not at all prepared to 5-extremely well prepared. Total knowledge (definitions and application) questions were coded as correct or incorrect. Perceived knowledge was measured on a five point percentage scale: 0%, 25%, 50%, 75% 100%.

Data Analysis

Descriptive statistics

 Descriptive statistics were used to summarize and simplify data in a meaningful manner. Trends in the data were easily identified (Gravetter & Wallnau, 2009). Open ended questions such as "How many years have you taught?" "What is your highest earned degree?" and "What are your biggest challenges with teaching reading?" were recorded as qualitative information. However, whenever applicable, means, standard deviations, and frequencies were also reported.

Mann-Whitney Tests

 Mann Whitney tests were used to compare the two types of teachers for their perceived level of preparation to teach phonemic awareness, phonics, fluency, vocabulary, and reading comprehension to struggling readers and their perceived level of preparation after participating in specific educational experiences such as undergraduate education courses, post-degree or graduate school courses, workshops, or inservices related to specific reading methods programs, student teaching, and on the job experience. For these analyses, Mann-Whitney tests were used instead of the more common *t* tests for independent means due to the ordinal level of the rating scales (1 = *Not prepared at all* to 5 = *Extremely well prepared*). The Mann-Whitney test was also used to compare the mean Arizona Instrument for Measuring Standards (AIMS) reading scores from 2013 of the students from NCBRP schools and students from the CBRP schools.

Independent Measures *t*-test

 Independent-measures *t* tests were used to evaluate the mean difference between the two populations (Gravetter & Wallnau, 2009). Independent-measures *t* tests were used to compare the total knowledge (definitional knowledge and application knowledge of language structure) of kindergarten through third grade teachers employed in schools with an explicit code-based

reading program (CBRP) to kindergarten through third grade teachers employed in schools without such a reading program (NCBRP). It was also used to compare actual definitional knowledge and actual application knowledge.

Pearson Correlation

The Pearson Correlation is the linear relationship between two variables (Gravetter & Wallnau, 2009) and was used to assess whether or not a significant correlation existed between definitional knowledge and application of that knowledge, perceived knowledge and actual knowledge, preparedness and total knowledge, and demographic variables such as type of reading program, highest degree, years of teaching experience, and participation in training workshops with their actual total knowledge and perceived total knowledge.

One-Way ANCOVA

The one-way ANCOVA was used to compare the differences between actual total knowledge and perceived knowledge based on the type of program (CBRP or NCBRP) and controlling for three demographic variables: highest degree, years of teaching experience, and training workshop attendance. This analysis was also used to determine the relationships between the following knowledge scores: definitional actual with application actual, definitional perceived with application perceived, definitional actual with definitional perceived, application actual with application perceived, and total actual with total perceived

CHAPTER 4: RESULTS

The purposes of this study were to investigate the phonemic awareness knowledge, level of preparedness to teach emergent and struggling readers, and levels of knowledge certainty of kindergarten through third grade teachers who used a school-wide, code-based reading program and compare them with teachers that did not use this type of program

Participants

Seven schools were used for this study. Sixty teachers (52.6%) used an explicit code-based reading program (CBRP) and 54 teachers (47.4%) did not use such a program (NCBRP). The most common certifications for the teachers were "only elementary" (55.3%) or "multiple certifications" (28.9%). Teachers were equally divided between having a bachelor's degree or a master's degree as their highest level of education. Years of teaching experience ranged from 1 to 43 years ($M = 10.39$, $SD = 7.68$). Seventy percent of the teachers had attended at least one reading training workshop (Table 5).

Table 5

Frequency Counts for Selected Variables (N = 114)

Variable	Category	n	%
Training Location (School)			
	A	13	11.4
	B	21	18.4
	C	14	12.3
	D	22	19.3
	E	13	11.4
	F	14	12.3
	G	17	14.9
Explicit Code Reading Program			
	No	54	47.4
	Yes	60	52.6
Certification			
	Only Elementary	63	55.3
	Multiple Certifications	33	28.9
	Other Single Certification	14	12.3
	Only Special Education	4	3.5

Table 5 *Continued*

Variable	Category	*n*	%
Highest Degree			
	Bachelor's degree	57	50.0
	Master's degree	57	50.0
Years of Teaching Experience [a]			
	1 to 4 years	30	26.3
	5 to 9 years	25	21.9
	10 to 19 years	47	41.2
	20 to 29 years	9	7.9
	30 to 43 years	3	2.6
Training Workshops			
	No	34	29.8
	Yes	80	70.2

[a] Years: $M = 10.39$, $SD = 7.68$.

Perceived Levels of Preparation after Teacher Preparation

Perceived levels of preparation after participants' teacher preparation programs to teach certain reading topics or skills to struggling readers were obtained and results were sorted by the highest mean ratings. These ratings were given using a 5-point metric: 1 = *Not prepared at all* to 5 = *Extremely well prepared.* Highest reported level of preparation was for reading

comprehension (*M* = 3.27). The lowest reported level of preparation was for overall preparation

(*M* = 2.89) (Table 6).

Table 6

Descriptive Statistics for Level of Preparation to Teach Struggling Readers after Teacher
Preparation Program: Reading Topics Sorted by Highest Mean (N = 114)

Topic	*M*	*SD*
8e. Reading Comprehension	3.27	0.97
8d. Vocabulary	3.12	1.02
8c. Fluency	2.99	1.12
8d. Phonics	2.96	1.21
8a. Phonemic Awareness	2.92	1.19
8f. Overall Preparation	2.89	0.99

Note. Ratings were based on a 5-point scale: 1 = *Not prepared at all* to 5 = *Extremely well*

prepared.

Perceived Levels of Preparation after Educational Experiences

The descriptive statistics for the perceived level of preparation to teach struggling readers

after participating in certain educational experiences were obtained and the results were sorted

by the highest mean rating. These ratings were also given using the 5-point metric: 1 = *Not*

prepared at all to 5 = *Extremely well prepared.* The highest reported level of preparation was

after job experience (*M* = 3.77). The lowest reported level of experience was after their

undergraduate training (*M* = 2.25) (Table 7).

Table 7

Descriptive Statistics for Level of Preparation to Teach Struggling Readers after Participating in Certain Experiences Sorted by Highest Mean (N = 114)

Experience	*M*	*SD*
9d. Job Experience	3.77	0.81
9b. Post-degree or Graduate	3.41	0.85
9c. Student Teaching	2.89	0.90
9a. Undergraduate	2.25	0.90

Note. Ratings were based on a 5-point scale: 1 = *Not prepared at all* to 5 = *Extremely well prepared*

Research Questions

Research Question 1

How prepared are kindergarten through third grade teachers employed at a school with a school-wide, explicit code-based reading program (CBRP) to teach phonemic awareness, phonics, fluency, vocabulary, and reading comprehension to struggling readers compared with kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

Mann-Whitney tests were used to compare the two types of teachers for their perceived level of preparation to teach certain topics (Table 8) and their perceived level of preparation after

participating in specific educational experiences (Table 9). Mann-Whitney tests were used instead of the more common *t* tests for independent means due to the ordinal level of the rating scales (1 = *Not prepared at all* to 5 = *Extremely well prepared*). No significant differences between the two types of teachers for any of the six ratings pertaining to specific preparation to teach were found. For the perceived level of preparation after specific educational experiences (Table 9), teachers from code-based schools reported being more prepared after their undergraduate training (*p* = .03) and *tended* (*p* = .07) to believe they were more prepared after their job experiences (Table 9).

Table 8

Mann-Whitney Tests for Preparation for Reading Topics Based on Type of Program (N = 114)

Topic	Code-based	*n*	*M*	*SD*	*z*	*p*
8a. Phonemic Awareness					1.33	.18
	No	54	2.78	1.19		
	Yes	60	3.05	1.19		
8b. Phonics					1.37	.17
	No	54	2.81	1.18		
	Yes	60	3.08	1.23		
8c. Fluency					0.73	.47
	No	54	2.91	1.12		
	Yes	60	3.07	1.13		
8d. Vocabulary					0.57	.57
	No	54	3.19	1.03		
	Yes	60	3.07	1.02		
8e. Reading Comprehension					0.89	.37
	No	54	3.35	0.97		
	Yes	60	3.20	0.97		
8f. Overall Preparation					1.19	.24
	No	54	2.78	0.98		
	Yes	60	2.98	1.00		

Table 9

Mann-Whitney Tests for Preparation Level after Participating in Certain Experiences Based on

Type of Program N = 114)

Experience	Code-based	n	M	SD	z	p
9a. Undergraduate					2.18	.03
	No	54	2.09	1.00		
	Yes	60	2.38	0.78		
9b. Post-degree or Graduate					0.60	.55
	No	54	3.35	0.87		
	Yes	60	3.47	0.83		
9c. Student Teaching					0.65	.52
	No	54	2.83	0.86		
	Yes	60	2.93	0.94		
9d. Job Experience					1.82	.07
	No	54	3.61	0.88		
	Yes	60	3.92	0.72		

Research Question 2

What is the total knowledge (definitional knowledge and application knowledge) of

kindergarten through third grade teachers employed at a school with an explicit code-based

reading program (CBRP) about language structure compared to kindergarten through third grade

teachers employed at a school without such a reading program (NCBRP)?

Analysis of the relevant *t* tests for independent means found no differences between the two groups of teachers for their total actual knowledge (*p* = .55) (Table 10). In addition, no difference in their definitional actual knowledge (p = .68) or their application actual knowledge (p = .25) existed.

Research Question 3

How well do kindergarten through third grade teachers employed at a school with a school-wide, explicit code-based reading program (CBRP) perceive their total knowledge, their definitional knowledge, and their application knowledge compared with kindergarten through third grade teachers employed at a school without such a reading program (NCBRP)?

Analysis of the relevant *t* tests for independent means found no differences between the two groups of teachers for their definitional perceived knowledge (*p* = .22), but code-based teachers had significantly higher ratings for their application perceived knowledge (*p* = .004) and their total perceived knowledge (*p* = .04) (Table 10).

Table 10

t Tests for Actual and Perceived Knowledge Based on Type of Program N = 114)

Knowledge Type	Code-based	*n*	*M*	*SD*	*t*	*p*
Definitional Actual Knowledge					0.42	.68
	No	54	11.17	2.97		
	Yes	60	10.95	2.55		
Definitional Perceived Knowledge					1.22	.22
	No	54	3.51	0.87		
	Yes	60	3.68	0.61		
Application Actual Knowledge					1.17	.25
	No	54	17.85	4.41		
	Yes	60	18.73	3.64		
Application Perceived Knowledge					2.92	.004
	No	54	3.57	0.81		
	Yes	60	3.94	0.56		
Total Actual Knowledge					0.59	.55
	No	54	29.02	6.57		
	Yes	60	29.68	5.38		
Total Perceived Knowledge					2.07	.04
	No	54	3.54	0.81		
	Yes	60	3.80	0.55		

Research Question 4

What is the relationship between definitional knowledge and application knowledge?

A significant positive correlation existed between definitional knowledge and application knowledge ($r = .53$, $p < .001$) (Table 11).

Research Question 5

What is the relationship between perceived knowledge and total actual knowledge?

Perceived total knowledge and actual total knowledge had a significant positive correlation ($r = .45$, $p < .001$) as well the same between their definitional perceived knowledge and their application perceived knowledge ($r = .83$, $p < .001$) (Table 11).

Table 11

Inter-correlation Matrix of Actual and Perceived Knowledge Variables (N = 114)

Knowledge Type	1	2	3	4	5	6
1. Definitional -Actual	1.00					
2. Definitional -Perceived	.40	1.00				
3. Application -Actual	.53	.33	1.00			
4. Application -Perceived	.36	.83	.43	1.00		
5. Total Actual	.82	.41	.92	.46	1.00	
6. Total Perceived	.40	.97	.39	.95	.45	1.00

Note. All correlations were significant at the $p < .001$ level.

Research Question 6

What is the relationship between preparedness and knowledge?

Table 12 includes the relevant correlations for 10 preparation ratings with both the teachers' actual total knowledge and their perceived total knowledge. Actual total knowledge was significantly lower for teachers with higher preparation ratings for (a) fluency ($r = -.24$, $p < .01$); (b) vocabulary ($r = -.20$, $p < .05$); (c) reading comprehension ($r = -.22$, $p < .05$); and (d) overall preparation ($r = -.21$, $p < .05$). For total perceived knowledge, positive correlations were found between total perceived knowledge and perceived levels of preparation for (a) phonemic awareness ($r = .25$, $p < .01$); (b) phonics ($r = .30$, $p < .001$); (c) post-degree or graduate education preparation ($r = .29$, $p < .005$); and (d) job experience preparation ($r = .31$, $p < .001$) (Table 12).

Table 12

Correlations for Preparation Variables with Actual and Perceived Total Knowledge (N = 114)

Preparation Variable	Actual		Perceived	
8a. Phonemic Awareness	-.14		.25	**
8b. Phonics	-.08		.30	****
8c. Fluency	-.24	**	.14	
8d. Vocabulary	-.20	*	.10	
8e. Reading Comprehension	-.22	*	.06	
8f. Overall Preparation	-.21	*	.14	
9a. Undergraduate	-.15		.08	
9b. Post-degree or Graduate	.09		.29	***
9c. Student Teaching	-.09		.08	
9d. Job Experience	.07		.31	****

* $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

Additional Findings

Table 13 includes the Pearson correlations for the four demographic variables (type of reading program, highest degree, years of teaching experience and participation in training workshops) with actual total knowledge and perceived total knowledge. Actual total knowledge was positively related to the teacher's highest degree ($r = .18$, $p < .05$), the teacher's years of experience ($r = .18$, $p < .05$) and participation in one or more training workshops ($r = .24$, $p < .01$). In addition, perceived total knowledge had significant positive correlations with all four demographic variables (Table 13).

Table 13

Correlations for Demographic Variables with Actual and Perceived Total Knowledge (N = 114)

Demographic Variable	Actual		Perceived	
Explicit Code Reading Program [a]	.06		.19	*
Highest Degree	.18	*	.27	***
Years of Teaching Experience	.18	*	.34	****
Training Workshops [a]	.24	**	.31	****

[a] Coding: 0 = *No* 1 = *Yes*.

* $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

Table 14 includes the results of the one-way ANCOVA model comparing the differences in actual total knowledge based on the type of program controlling for three demographic variables. The overall model was significant ($p = .009$) and accounted for 11.5% of the variance in actual total knowledge. Actual total knowledge was higher for teachers who had attended one or more training workshops ($\beta = .29$, $p = .01$) and *tended* to be higher for teachers who had a master's degree ($\beta = .19$, $p = .06$). The type of program was not related to actual total knowledge ($\beta = -.05$, $p = .68$) (Table 14).

Table 14

ANCOVA Model Comparing the Differences in Actual Total Knowledge Based on Type of Program Controlling for Selected Demographics (N = 114)

Variable	*B*	*SE*	β	*p*
Intercept	30.48	2.89		.001
Highest Degree	2.24	1.17	.19	.06
Years of Teaching Experience	0.06	0.08	.08	.42
Training Workshops [a]	3.72	1.43	.29	.01
Explicit Code Reading Program [a]	-0.55	1.32	-.05	.68

Full Model: $F (4, 109) = 3.54$, $p = .009$. $R^2 = .115$.

[a] Coding: 0 = *No* 1 = *Yes*.

Table 15 includes the results of the one-way ANCOVA model comparing the differences in perceived total knowledge based on the type of program controlling for three demographic variables. The overall model was significant ($p = .001$) and accounted for 23.3% of the variance in perceived total knowledge. Perceived total knowledge was higher for teachers with (a) master's degrees (β = .23, $p = .01$); (b) a higher number of years of teaching experience (β = .27, $p = .004$); and (c) attendance at one or more training workshops (β = .24, $p = .02$). The type of program was not related to perceived total knowledge (β = .16, $p = .12$) (Table 15).

Table 15

ANCOVA Model Comparing the Differences in Perceived Total Knowledge Based on Type of Program Controlling for Selected Demographics (N = 114)

Variable	*B*	*SE*	β	*p*
Intercept	3.30	0.31		.001
Highest Degree	0.32	0.13	.23	.01
Years of Teaching Experience	0.02	0.01	.27	.004
Training Workshops [a]	0.37	0.15	.24	.02
Explicit Code Reading Program [a]	0.22	0.14	.16	.12

Full Model: F (4, 109) = 9.57, p = .001. R^2 = .233.

[a] Coding: 0 = *No* 1 = *Yes*.

Table 16 includes the Pearson product-moment correlations for selected knowledge scores for three samples of teachers. The three samples were full sample (N = 114), NCBRP only (n = 54), and CBRP only (n = 60). The correlations for the NCBRP subsample were equal or greater than for the entire sample. The correlations for the CBRP subsample were lower than both the same correlations for the entire sample and the NCBRP subsample. Of particular note, the correlation between definitional actual knowledge and definitional perceived knowledge in the NCBRP subsample (r = .51, r2 = .260) was almost 4 times the variance of the same correlation in the CBRP subsample (r = .26, r2 = .068) (Table 16).

Table 16

Pearson Correlations for Selected Knowledge Scores for Three Samples of Teachers

| | Full | | NCBRP | | CBRP | |
| | Sample | | Subsample | | Subsample | |
Type of Knowledge Score	$N = 114$		$n = 54$		$n = 60$	
Definitional Actual with Application Actual	.53	****	.57	****	.49	****
Definitional Perceived with Application Perceived	.83	****	.86	****	.79	****
Definitional Actual with Definitional Perceived	.40	****	.51	****	.26	*
Application Actual with Application Perceived	.43	****	.43	****	.39	***
Total Actual with Total Perceived	.45	****	.52	****	.33	**

$* \ p < .05.$ $** \ p < .01.$ $*** \ p < .005.$ $**** \ p < .001.$

Table 17 displays the results of the Mann-Whitney test comparing the four NCBRP schools with the three CBRP schools for their school-wide AIMS reading score from 2013. In addition, a Spearman rank-order correlation was included as a measure of effect size. Mann-Whitney and Spearman tests were chosen due to the small sample size ($N = 7$). NCBRP schools had higher AIMS scores ($M = 511.25$) than did the CBRP schools ($M = 494.67$). This difference just failed to reach significance ($z = 2.12$, $p = .06$). A strong relationship between type of school and the AIMS score ($r_s = .87$) existed (Table 17).

Table 17

Comparison of AIMS Scores Based on Type of School (N = 7)

Dependent Variable	Type of School	n	M	SD	r_s	z	p
AIMS Score					.87	2.12	.06
	NCBRP	4	511.25	3.50			
	CBRP	3	494.67	11.85			

In summary, responses from 114 teachers were collected to investigate how prepared kindergarten through third grade teachers believed they were to teach emergent and struggling readers, how knowledgeable they were in the area of code-based instruction, to what extent they were able to apply this knowledge, and how certain the teachers believed they were regarding their knowledge. The highest reported level of preparation for all teachers was job experience. Teachers at code-based schools did not believe they were any more prepared to teach phonemic awareness, phonics, fluency, vocabulary, reading comprehension, or over-all to struggling readers than teachers at non code-based reading program schools. Regardless of the type of school, no differences were reported between the two groups of teachers for their total actual knowledge. However, the CBRP teachers believed they knew more. In addition, the total knowledge scores for both sets of teachers were considerably low. In the final chapter, these findings will be compared to prior research. Conclusions and implications will be drawn and recommendations will be made.

CHAPTER 5: DISCUSSION

Introduction

The purposes of this study were to investigate the phonemic awareness knowledge, level of preparedness to teach emergent and struggling readers, and levels of knowledge certainty of kindergarten through third grade teachers who used a school-wide, code-based reading program and compare them with teachers that did not use this type of program

Key Findings

Preparedness

All teachers believed their teacher education program prepared them the most to teach reading comprehension (3.20-3.35) and prepared them the least to teach phonemic awareness (2.78-3.05). This is not surprising because in the most widely adopted introductory reading class textbooks, vocabulary and comprehension were covered more extensively than phonemic awareness, fluency, and phonics (Joshi et al., 2009). The majority of teachers rated *on the job experience* as preparing them the most for teaching struggling and emergent readers (3.61-3.92). These findings were similar to those of Lyon et al. (1989). Post-degree or graduate work rated second (3.35-3.47) and student teaching rated third (2.83-2.93). Teachers did not believe their certifying program prepared them adequately to teach struggling readers (2.78-2.98). These findings are similar to those of McCombes-Tolis and Feinn (2008) yet different from those of Troyer and Yopp (1990) whose participants indicated they received substantive information from graduate programs and district inservices.

Preparedness Comparisons

Teachers from schools with code-based reading programs (CBRP) did not believe they were any more prepared from their teacher preparation programs to teach phonemic awareness, phonics, fluency, vocabulary, reading comprehension, or over-all to struggling readers than teachers at non code-based reading program schools (NCBRP). Code-based teachers believed they were more prepared after their undergraduate training (p = .03) and tended to believe they were more prepared after their job experiences (p = .07).

Total Knowledge Scores

CBRP teachers did not perform better on the survey than the NCBRP teachers. In fact, all scores on the survey were low. Out of a possible 46 total knowledge points, the NCBRP teachers had a mean score of 29.02 and the CBRP teachers had a mean score of 29.68. The teachers scored an average of 63%. These low scores are consistent with the scores of all of the teachers in teacher knowledge research conducted thus far. Teachers employed at schools using code-based reading programs did not have any more knowledge about code–based reading instruction than teachers employed at schools that did not have a school-wide, code-based reading program. One may assume the teachers would garner knowledge of language structure concepts from the sheer use of the program as well as the training the teachers received to implement the program. However, even teachers who were using a code-based program did not have more knowledge than teachers not using a code-based reading program and in fact, had very little knowledge. Thus, using a code-based reading program does not guarantee knowledge about the components of structured language that comprise the program. In addition, the training the CBRP teachers received was only one day and focused on teaching them how to use the materials, not the language concepts that were embedded in the program. Therefore, teachers

need intense training regardless of what type of reading program they are using (Moats & Foorman, 2003).

Actual total knowledge was positively related to the teacher's highest degree, years of experience, and participation in one or more trainings or workshops. The more advanced the degree, the more years of experience, and the more workshops a teacher attended, the higher their total actual knowledge score. These findings are consistent with other studies (Bos et al., 2001; Mather et al., 2001; Spear-Swerling & Brucker, 2003, 2004).

Actual total knowledge scores were higher for teachers who had attended one or more training workshops and tended to be higher for teachers who had a master's degree. After other variables associated with being a teacher such as attendance at trainings or workshops, years of teaching and degrees were accounted for, it did not matter whether or not the teachers were from a CBRP school or not. Total knowledge scores were more dependent on trainings and higher degrees than the school at which the teachers taught.

Definition and Application Knowledge

CBRP teachers did not perform any better on the definition or application sections of the survey than the NCBRP teachers. The CBRP teachers were not better able to define language concepts or apply them than were the NCBRP teachers. However, all teachers performed better on the ~~application~~ definitional portion of the survey than the ~~definitional~~ application portion. This is not surprising, ~~yet encouraging~~ because the application of language-based concepts required a deeper knowledge base than the ability to define them. In Washburn et al. (2011), the ~~opposite~~ same proved to be true. Participants in this study had difficulty demonstrating applied knowledge, yet performed better on tasks requiring them to define terminology. In Cunningham

et al. (2004), the participants were equally unable to define phonological awareness and phonics terms and to perform tasks associated with these terms.

In addition, a significant, positive correlation between definitional actual knowledge and application actual knowledge existed. The teachers who scored well on the definitional portion of the survey also scored well on the application section.   While these results are encouraging, those who scored poorly on the definitional portion of the survey also scored poorly on the application section.

Preparedness and Total Knowledge Correlation

Actual total knowledge was significantly lower for teachers with higher preparation ratings for fluency, vocabulary, reading comprehension, and overall preparation. Those who believed they had better training did less well on actual total knowledge. An unexpected finding was teachers who reported being less prepared performed better on the survey. Perhaps the participants who had lower preparation ratings had a better sense of what being prepared entailed. They realized they were not prepared and more remained for them to know. They had a better sense of the skills needed to teach struggling students to read and therefore, understood they did not possess some of these skills. Alternatively, teachers may not have had a clear vision of what skills were needed to actually be prepared to teach struggling readers. They did not have a clear understanding of what constitutes being prepared to teach struggling readers.

Perceived Knowledge Comparisons

CBRP teachers had significantly higher ratings for their total perceived knowledge than NCBRP teachers. They believed they had more knowledge than the NCBRP teachers believed they did. Though the teachers at schools with a code-based reading instruction program thought they performed better on the survey, they did not. These results are contrary to Spear-Swerling

and Brucker (2005) who reported a stronger correlation between what their participants believed they knew and what they actually knew. The use of a commercial program as well as the additional training they received to use the program may have provided the CBRP teachers with an inflated sense of ability (Cunningham et al., 2004; Spear-Swerling et al., 2005). An inaccurate sense of ability can be problematic because it can discourage teachers from obtaining new knowledge or using novel strategies because they may perceive them as unnecessary (Cunningham, 2004).

However, after other variables associated with being a teacher such as attendance at trainings or workshops, years of teaching, and degrees obtained were accounted for, whether the teachers were from a CBRP school or not did not matter. The type of program was not related to perceived total knowledge. As with total knowledge scores, perceived knowledge scores were more dependent on attendance at trainings, teaching experience, and higher degrees than school designation.

The scores for the two groups of teachers' definitional perceived knowledge were not different. CBRP teachers did not perceive their definitional knowledge of code-based reading instruction to be any better than NCBRP teachers. However, CBRP teachers had significantly higher ratings for their application perceived knowledge than the NCBRP teachers. They believed they did better on the application section of the survey than the NCBRP teachers believed they did. However, in actuality, the CBRP teachers did not perform better. They may have believed they performed better because they apply this knowledge to classroom reading tasks on a somewhat regular basis. In addition, definitional perceived and application perceived were positively correlated. Teachers who thought they performed well on the definitional questions also thought they performed well on the application questions.

Perceived total knowledge correlated significantly with additional training or workshops, a higher degree, more years of teaching, and employment at a school that used an explicit code-based reading program. Teachers who attended additional trainings or workshops, had a higher degree, more years of teaching, and taught at a school with a code-based reading program perceived themselves to know more.

Perceived and Actual Total Knowledge

The teachers who believed they scored well on the survey scored well. The teachers who believed they scored poorly, scored poorly. This is contrary to the results obtained by Cunningham et al. (2004) who found the participants who perceived themselves as having a greater knowledge of phonological awareness actually achieved lower mean scores on these tasks. While the CBRP teachers perceived their abilities to be better than the NCBRP teachers did, more congruency existed between the perceived abilities and actual total knowledge indicating the participants had a more realistic view of what they knew and what they did not know. In addition, the teachers who believed they scored well on the definitional portion of the survey also believed they scored well on the application section. Conversely, those who believed they scored poorly on the definitional portion of the survey also believed they scored poorly on the application portion.

One unique aspect of this survey was the inclusion of a scale for participants to rate how sure they were of their answers. All correlations were significant and not a vast amount of difference existed between the scores for both groups. However, the NCBRP teachers' scores were consistently slightly higher than CBRP teachers. In essence, the NCBRP teachers had better meta-knowledge. In other words, they had a more accurate appraisal of their own

knowledge. The NCBRP teachers were better at evaluating their own thinking or predicting their abilities. They knew more about what they knew and did not know.

The correlation between definitional actual knowledge and application actual knowledge was surprisingly low (.53). One would hope the participants would be better able to define the language concepts and apply them. However, as with any type of learning, some people can memorize definitions but not be able to apply the knowledge, whereas others can perform the task but might not be able to connect it to a specific term. For example, while some participants may have found defining the term *schwa* as a difficult task, they may have been able to pick out a word that contained a schwa.

The correlation between definitional perceived knowledge and application perceived knowledge was the highest. The participants were quite consistent about their assessments or perceptions of their ability to define language terms as well as apply them. The participants believed a strong relationship between knowledge and application of that knowledge existed; they believed if they were able to define a concept, they would also be able to apply it. Although these two variables were related, to believe they were related to the extent they believed was a misconception. Having knowledge does not automatically ensure the ability to apply it. Applying information requires a deeper type of knowledge than what is needed to define it.

These findings are most interesting in light of the correlation between the actual scores in the definition and application sections. A disconnect existed between what the participants perceived their definition and application scores to be and the scores they actually achieved. Although the participants believed they should have scored just as well on the definition section as they did on the application section, the correlation score between definition actual and application actual was of medium strength. In reality, the relationship between their actual

performance on these two types of questions was moderate.   In other words, the participants believed if they could define terms they would be able to apply the information. They were, however, only mildly successful at defining and applying code-based knowledge. Therefore, the emphasis for increasing teacher knowledge should not only be placed on providing teachers with knowledge about code-based reading instruction but also upon extensive and intensive opportunities for them to practice and apply this knowledge.

The difference between the correlations for definitional actual and definitional perceived was the largest of the variables. Participants either believed they knew the information and did know it or believed they did not know the information and they actually did not. The correlation for definitional actual knowledge and definitional perceived knowledge in the NCBRP subsample is almost four times the variance of the same correlation in the CBRP subsample. In other words, the scores from the teachers at the NCBRP schools showed they had a more acute awareness of what they did or did not know. The NCBRP teachers either knew their answers and thought they knew their answers or they did not know the answers and knew they did not know. In contrast, the CBRP teachers had more uncertainty. They were not sure of what they knew and what they did not know. One possible explanation for this pattern could be a disconnect between an expected ability due to the training in and use of a school-wide, code-based reading program and the reality of their knowledge. In other words, teachers at the CBRP schools might have believed they should know more than they did or believed they were expected to know more because of their use of a school-wide, code-based reading program. This perception may have influenced these teachers to have more doubt about what they knew and did not know.

Additional Findings

AIMS Scores

Though an in-depth exploration of student performance was outside the scope of this

study, third grade reading scores from the Arizona's Instrument to Measure Standards (AIMS)

from 2013 were obtained. The state average for the percentage of students who meet or exceed

on AIMS is 78%. The students at both the CBRP and NCBRP schools scored above the state

average. Comparisons were made between the mean scores from the NCBRP schools and the

CBRP schools. The NCBRP schools had a higher mean AIMS score (511.25) than the CBRP

schools (494.67). This difference just failed to reach significance ($p = .06$). This is a somewhat

surprising finding because the schools chosen for this study were matched based on state report

card grades; all schools were rated as "A Schools" and the CBRP schools invested quite a large

amount of time and money to purchase the code-based reading program, train all of the teachers,

and maintain the program to increase student reading achievement scores. However, the schools

were not well matched in demographics. The NCBRP schools had a significantly lower

percentage of students receiving free and reduced lunch, a common practice used to measure

SES (McCutchen, Abbott, et al., 2002), than the NCBRP schools (13, 8, 15, and 13 percent vs.

26, 22, and 19 percent) and were among the top rated in the city. Families from low-SES

communities are less likely to have financial resources such as books, computers, tutors, or time

to provide their children with adequate academic support (American Psychological Association,

2014). The instructional decision making at the NCBR schools rested more with individual

teachers which perhaps substantiates the notion that events other than using a school-wide, code-

based reading program such as parental support and socio-economic status can contribute to high

reading achievement scores. Even though the students at the NCBRP schools tended to perform

better on the AIMS test than students at the CBRP schools, great gains have been made at the CBRP schools since the *Fundations- Wilson Language Basics K-3* reading program was implemented in the 2007-2008 school year. The year before the program was implemented at the CBRP schools in 2007, the mean third grade AIMS reading score was 442. When comparing this score to the 2013 mean AIMS score of 494.67, it is clear, significant student gains have been made since implementing the reading program. In light of this data, there is some question as to just how big of a role teacher knowledge plays in increasing student re3ading achievement.

Limitations

Several limitations must be considered when interpreting the data from this study.   First, the small sample size (*N*=114) limited the power and reliability of the study. A larger sample size would have provided more accurate statistical results and generalization effects.

Second, selection bias with the participating schools was present. While many schools not currently using a code-based reading program were contacted, the schools represented in this study were the only ones interested in participating. In addition, the demographics between the two schools were not equally matched. Therefore, differences in student reading achievement must be interpreted with caution.

Third, even though some of the survey questions were taken from previous studies, others were original from the author and therefore were not tested for reliability or validity.

Fourth, when choosing their levels of preparedness, some participants did not mark their choices (put an X) directly in the designated box (instead, they placed the X on the line indicating they were between two choices) and some questions were not answered. These responses were not able to be recorded. In addition, some participants did not feel comfortable

entering information about their college or university because it was viewed as an *identifying characteristic*. As a result, some individuals did not provide consent.

Fifth, the option of *undergraduate degree* as a response to the question "How prepared did you feel to teach reading to struggling readers after the following experiences?" provided confusing information. If participants received their training to teach at the undergraduate level then whether or not they feel their undergraduate coursework prepared them is relevant. However, if they were not prepared at the undergraduate level and they checked "not prepared at all," that answer is ambiguous because either their undergraduate degree did not prepare them because they did not receive effective training or it did not prepare them because they did not receive any teacher training in reading as part of their undergraduate studies.

Sixth, the level of fidelity for teacher use of the *Fundations- Wilson Language Basics K-3* program could not be verified. Though the CBRP teachers are required to use this program on a regular basis, no data were taken on the fidelity of the implementation of this program.

Recommendations and Implications

Clear and specific recommendations about which skills and concepts constitute effective instruction for teaching struggling and emergent students how to read have been created (Brady & Moats, 1997; Emily Hall Tremaine Foundation, 2012; IDA, 2010; Moats, 1999; Moats & Lyon 1996). If these recommendations were followed and implemented with students in intensive one to one and small-group instruction, teachers would be able to meet the needs of many children who are struggling to learn how to read (Foorman & Torgesen, 2001). Clearly, teachers have not been provided with sufficient instruction from college and university courses about the language skills and concepts necessary for teaching reading, and officials at the

Department of Education have not instituted the appropriate recommendations for teacher preparation programs. Therefore, changes must be made to teacher education standards.

For the past few years, researchers at the International Dyslexia Association (IDA) have recommended legislation for specific instruction for students with dyslexia. Unfortunately, only a handful of states have adopted such laws. In addition, IDA has also accredited approximately 10 universities that meet the standards outlined in their Knowledge and Practice Standards for creating coursework and/or programs that specialize in preparing teachers to work with students who have reading difficulties and disabilities. This is the first real step for moving the training of teachers for struggling readers out of the general education arena and into the hands of experts.

Guidelines from The Department of Education must state required coursework specific to code-based reading instruction for certification. Subsequently, colleges and universities must provide students with intensive coursework on code-based reading concepts, multiple opportunities to practice what they have learned with actual students and trained mentors, and guided feedback (Brady & Moats, 1997; Lyon, 1999; Moats, 1995; Moats & Foorman, 2003; Spear-Swerling & Brucker, 2004). Trainings must take place beyond the typical one-semester course. School districts must make code-based reading programs, materials, and training available to all teachers but particularly to those who work with students with specific reading disabilities (dyslexia).

Future Research

Based on my review of the literature, future research should explore, in depth, the relationship between use of a scripted reading program and student outcomes. The administrators at the CBRP schools decided to adopt a school-wide, code-based reading program to increase students reading achievement scores. Therefore, AIMS scores prior to and after implementation

of a code-based reading program could be compared to identify the specific influences a code-based reading program had on AIMS scores. Additional measures such as standardized reading tests could also be administered to document growth.

Though researchers have clearly indicated the need for intensive teacher training and opportunities for application, the research reviewed in this study presented various time lengths for teacher training ranging from 1-day workshops to semester long college and university courses as well as many different configurations of training and practical experience opportunities, none of which produced acceptable increases in teacher knowledge. Therefore, more research needs to be devoted to defining what constitutes intensive instruction. Variables such as how much time is needed to be devoted to teacher training, how many courses are necessary to master the content, how much practical experience do teachers need to be able to effectively teach these skills must be researched. In addition, researchers need to agree upon a knowledge proficiency score. In other words, just how much knowledge do teachers need to deliver effective reading instruction?

Summary

Teacher knowledge about language concepts connected to reading instruction has been studied for the past 20 years. Researchers have clearly established the need for struggling readers to receive explicit and intensive code-based reading instruction, yet from study after study, researchers continue to demonstrate that teachers do not possess the necessary knowledge to teach these readers effectively. When teachers do not know enough about using code-based instruction to teach struggling and emergent readers, their abilities to provide accurate examples, make appropriate instructional decisions, and use commercial programs effectively are significantly limited.

While attendance at summer reading institutes, semester long classes, and multi-day workshops often result in increasing knowledge, these types of inservice trainings are not sufficient for becoming well versed in code-based language concepts. Obtaining this level of knowledge requires intensive training, mentoring opportunities, and supervised teaching experiences with extensive feedback. Therefore, instructors at colleges and universities must create these types of courses, administrative personnel at school districts must provide teachers with research-based programs and appropriate training on how to use them, and certificate requirements from the Department of Education must be revised to reflect a higher standard commensurate with the multiple recommendations and standards established by the leading researchers, foundations, and associations. Educators do not need to keep hoping for more knowledge to address reading difficulties and disabilities. Though the science behind reading disabilities as well as the remedy to address them is known, not enough has been done to bring this knowledge into practice. Instead of a knowledge gap, educators are confronted with "an action gap" that needs to be addressed (Shaywitz & Shaywitz, 2014).

APPENDIX A

SURVEY OF PREPAREDNESS AND KNOWLEDGE OF LANGUAGE STRUCTURE
RELATED TO TEACHING READING TO STRUGGLING STUDENTS

Survey of Preparedness and Knowledge of Language Structure Related To

Teaching Reading to Struggling Students

Thank you for participating in this survey. The survey results are anonymous, and no individuals

or schools will be identified. Some of the items will be more difficult than others. It is not

expected that you will be able to answer every item correctly; however, please complete all of

the items. Please be honest as your responses will have **NO** impact on your job.

Section 1

Please provide the following information:

a. Where did you receive your teacher preparation training? (e.g., University of Texas)

b. What current certificate do you hold? (e.g., general elementary, general secondary,

cross categorical, reading specialist etc.)

c. How prepared did you feel to teach the following to struggling readers after completing your teacher preparation program?

	Not prepared at all	Minimally prepared	Moderately prepared	Well prepared	Extremely well
1. phonemic awareness					
2. phonics					
3. fluency (reading rate and					
4. vocabulary					
5. reading comprehension					
6. Overall, how prepared did you feel to teach reading to struggling					

d. What is the highest degree you have earned (e.g., B.S., B.A., M.A., etc.):_____

e. How many years have you taught?_____

f. Have you attended any literacy-related professional development training sessions or workshops you such as Orton Gillingham, Wilson Reading System, Reading Recovery etc. which significantly enhanced your ability to teach reading?

If yes, please list the training here

_____

g. How prepared did you feel to teach reading to struggling readers after the following

experiences?

	Not prepared	Minimally prepared	Moderately prepared	Well prepared	Extremely well
1. Undergraduate education course					
2. Post-degree or graduate school courses, workshops or					
3. Student teaching					
4. On the job experience					
5. Other –please list					

h. What are your biggest challenges in regard to teaching struggling readers?

_____

_____

i. If you could receive any additional training regarding teaching struggling readers, what

areas would you like the training to cover? _____

_____

Section 2-Definitions

1. The writing system of a language is called:

   a. orthography

   b. phonics

   c. semantics

   d. phonology

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

2. A reading method that teaches the relationship between the sounds of a language and the letters used to represent them is called:

   a. directionality

   b. orthography

   c. miscue analysis

   d. phonics

How sure are you of your answer?

0%   25%   50%   75%   100%

o   o   o   o   o

3. Phonemic awareness is primarily

   a. the ability to derive meaning from a word

   b. the ability to recognize and manipulate the individual sounds in spoken language.

   c. the ability to use sound-symbol (phoneme-grapheme) correspondences to read and

      spell new words.

   d. both b and c

How sure are you of your answer?

0%   25%   50%   75%   100%

o   o   o   o   o

4. A **written** letter or combination of letters that are used to represent a single speech

   sound is called a:

   a. consonant blend

   b. minimal pair

   c. grapheme

   d. syllable

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

5. A phoneme is:

    a. a single letter

    b. a single speech sound

    c. a single unit of meaning

    d. a grapheme

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

6. A pronounceable group of letters that contains a vowel sound is a:

    a. grapheme

    b. syllable

    c. digraph

    d. minimal pair

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

7. A morpheme is:

a. a single letter

b. a single speech sound

c. a single unit of meaning

d. a word that has several different meanings

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

8. What term refers to a combination of 2 or 3 consonants that keep their own sound
identity (makes its own sound) when pronounced?

a. silent consonant

b. consonant digraph

c. diphthong

d. consonant blend

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

9. Two consonant letters that represent a single speech sound are called a:

a. minimal pair

b. consonant digraph

c. silent consonant

d. consonant blend

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

10.   A weak, mid-central vowel sound that occurs in unaccented syllables is a:

a. vowel team

b. schwa

c. glide

d. minimal pair

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

11.   A prefix and a suffix are

      a. morphemes that are added to a root or base word that may change the word's part of

        speech but not its meaning

      b. free morphemes to which other affixes can be added

      c. morphemes that cannot stand alone but are used to form a family of words

      d. morphemes that are added to a root or base word that may change the word's part

        of speech and its meaning

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

12.   The terms *onset* and *rime* refer to

      a. two words that contain different vowel digraphs yet rhyme

      b. the two parts of a syllable; the initial consonant or consonants, and the vowel and

        any final consonants

      c. two consonants joined together in one syllable to produce one sound

      d. the separate syllables in a two syllable word, as well as the two words that comprise

        a compound word

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

13. Sounds in which the vocal cords are used are called:

a. reversals

b. variants

c. miscues

d. voiced

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

Fill in the blank

14. _____primarily helps to support phonics instruction.

a. repeated readings

b. decodable text

c. guided reading

d. independent reading

How sure are you of your answer?

0%   25%   50%   75%   100%

o   o   o   o   o

15.   In a word that contains a closed syllable,

a. there must be more than one syllable

b. there is a "silent e" at the end of the syllable

c. the vowel makes a short sound and is followed by a consonant

d. there can be more than one vowel but it is closed in by one or more consonant

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

16.   A diphthong is:

a. a vowel sound composed of two parts that glide together

b. a vowel sound spelled with two different vowels that make one sound

c. two consonant letters that represent one speech sound

d. a spelling pattern that contains a silent letter

How sure are you of your answer?

0%   25%   50%   75%   100%
o   o   o   o   o

Section 3-Application

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

   a. eight ____

   b. grass ____

   c. box ____

   d. queen ____

   e. brush ____

   f. knee ____

   g. through ____

How sure are you of your answers?

0%   25%   50%   75%   100%
o   o   o   o   o

2. For each of the words determine the number of syllables

   a. disassemble ____

   b. heaven ____

   c. observer ____

   d. frogs ____

   e. teacher ____

How sure are you of your answers?

0%   25%   50%   75%   100%
o   o   o   o   o

3. For each of the words determine the number of morphemes.

a. disassemble   ____

b. heaven
                            ____

c. observer
                         ____

d. frogs
                         ____

e. teacher
                         ____

How sure are you of your answers?

0%   25%   50%   75%   100%
o   o   o   o   o

4. Which word contains a consonant blend?

a. push

b. look

c. straw

d. chip

How sure are you of your answer?

0%   25%   50%   75%   100%

o   o   o   o   o

5.   Which of the following words contains a consonant digraph?

    a. bring

    b. sleep

    c. much

    d. tired

How sure are you of your answer?

0%   25%   50%   75%   100%

o   o   o   o   o

6.   Which word has a schwa (/ə/) sound?

    a. eagerly

    b. problem

    c. formulate

    d. story

How sure are you of your answer?

0%   25%   50%   75%   100%

o   o   o   o   o

7. Which of the following words has a prefix and a suffix? You may mark more than one.

   a. prejudgment

   b. property

   c. teaching

   d. salamander

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

8. Which has correctly separated the word "strand" into the *onset* and the *rime*?

   a. stra….nd

   b. str….and

   c. st….rand

   d. "strand" does not contain an *onset* or *rime*.

How sure are you of your answers?

0%	25%	50%	75%	100%
o	o	o	o	o

9. Identify the pair of voiced and unvoiced consonant sounds

a. /b/, /p/

b. /d/, /g/

c. /f/, /s/

d. /n/, /m/

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

10. Which sentence is an example of decodable text?

a. The bear snatched the meat away from the trainer.

b. She watched the slippery, slimy, slugs slink by.

c. The fat cat sat on the mat.

d. The car was found down the road in the snow.

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

11. An example of a word with a closed syllable would be

    a. keep

    b. clothes

    c. limit

    d. heard

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

12. Which of the following words contains a diphthong?

    a. drip

    b. battle

    c. shut

    d. boy

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

13. Which pair of words contains the same underlined sound?

    a. intend……bake<u>d</u>

    b. w<u>eigh</u>t…..h<u>eigh</u>t

    c. wa<u>s</u>………vote<u>s</u>

    d. p<u>u</u>sh…….p<u>u</u>mp

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

14. Which pair of words begins with the same sound?

    a. joke-goat

    b. chef-shoe

    c. quiet-giant

    d. chip-chemist

How sure are you of your answer?

0%	25%	50%	75%	100%
o	o	o	o	o

Revised from prior surveys by R. Cohen and N. Mather

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