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**LANGUAGE STRUCTURE KNOWLEDGE OF PRESERVICE TEACHERS:
CONNECTING SPEECH TO PRINT**

A Thesis in

Special Education

by

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ABSTRACT

This study investigated the efficacy of an instructional training module focused on the alphabetic principle and more specifically, the speech sounds of English on letter-sound knowledge of preservice teachers enrolled in elementary or special education teacher certification programs. In addition, this study examined preservice teachers' ability to apply and generalize their letter-sound knowledge. The training module consisted of a video tutorial and online study-guide that was completed in 2 to 6 hours over the course of one week. Following instruction, preservice teachers increased their oral and written letter-sound correspondence knowledge as well as their ability to apply their knowledge to tasks requiring letter-sound analysis. Statistically significant increases were not observed on tasks requiring preservice teachers to generalize their knowledge to analyzing child letter-sound production errors. This research suggests that teacher education programs can include relatively efficient and effective training modules targeting English language structure to their preparation programs.

The instructional training module offered in this study provides an efficient and effective model by which to deliver language structure content to preservice teachers.

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Chapter 1

INTRODUCTION

Over six million children qualify for special education services in the United States (NCES, 2002). Of those children identified for services, almost all experience difficulty learning to read and write (Council for Exceptional Children, 1997). Unfortunately, despite current intervention efforts, children with reading problems will most likely remain poor readers into adulthood (e.g., Juel, 1988; Scarborough, 1998a). Students who remain poor readers into adulthood are less likely to graduate from high school and are more likely to be un- or under-employed, live in poverty, be adjudicated, and receive public assistance (Center on Crime, Communities, and Culture, 1997; Learning Disabilities Association; National Adult Literacy Survey, 1992). These issues are of even greater concern when one considers that many of these individuals demonstrate average to above average intelligence (National Institute of Health) and have the potential to be productive members of society. In short, being able to read is the foundation to success in our literacy driven society.

In response to the growing numbers of struggling readers (U.S. Department of Education, Office of Special Education Programs), the United States government has put forth legislation aimed at improving the literacy instruction provided to children across the country. No Child Left Behind (2001) (e.g., Reading First) mandates that schools engage in research based practices in the teaching of reading and use only programs that have empirical bases. Two key aspects of the current legislation specify that an evidence based reading program must include (a) systematic and explicit instruction of critical

skills such as the alphabetic principle (including phonemic awareness and phonics) and (b) be delivered by “highly qualified teachers” (No Child Left Behind).

In the area of reading, the concept of a “highly qualified” teacher leaves room for interpretation. In a broad sense, NCLB and IDEIA of 2004 say that a highly qualified teacher must “demonstrate subject matter competency”. At a minimum, a highly qualified teacher should be one who possesses the extensive range of skills and proficiencies required for success in teaching students with reading difficulties. For example, a highly qualified teacher should possess a thorough knowledge of the content they are teaching as well as the verbal ability to deliver it (Brownell, Sindelar, Bishop, Langley, & Seo, 2002). Specifically, a teacher of reading and writing should have a deep and thorough understanding of the structure of English language (Brady & Moats, 1997). As Adams (2000) points out, reading involves a multitude of skills, many of which are linguistic in nature.

The value of linguistic elements in reading is evident at all stages of reading. The importance of language knowledge in reading is most obviously noted in the ultimate purpose for reading- comprehension. However, before a reader can comprehend, there are numerous subskills related to language knowledge and understanding that must be in place. A reader must then recognize component words, spelling patterns, and phonological translations of a word by processing individual letter-sounds that comprise that word. Once a reader understands individual words, they move to analyzing clauses and phrases. Given this range of language skills embedded in the reading process, the underlying preskill of processing individual letter-sounds that comprise words may be thought of as a base or foundation for all reading instruction.

Ensuring that a teacher understands the structure of the English language (as it relates to reading) at an intimate level is essential for teacher education programs. Indeed, the quality of teacher preparation is a stronger correlate of student achievement than even class size (Darling-Hammond, 2000). In fact, after accounting for student demographics, teacher preparation can account for 40% to 60% of the total variance in student achievement (Darling-Hammond).

Despite the apparent value of focusing on teacher education and language structure knowledge, “the area remains relatively under investigated” (Cunningham, Perry, Stanovich, & Stanovich, 2004, p. 160), particularly at the preservice teacher level. Cunningham and colleagues assert that despite current legislative initiatives to improve teacher education, there must first be an examination of how practicing teachers best acquire the requisite knowledge base for teaching reading and writing (i.e., language structure knowledge). Researchers (e.g., McCutchen & Berninger, 1999; McCutchen, Harry, Cunningham, Cox, Sidman, & Covill, 2002) have only just begun to investigate this issue with inservice teachers and only a small number of studies (Spear-Swerling & Brucker, 2003) have targeted the preservice teacher level. Instruction at the preservice teacher level must be further examined as previous trainings involving inservice teachers (i.e., Bos, Mather, & Dickson, et al., 2001; McCutchen, Harry, et al., 2002) incorporate training methods not readily available to preservice teachers (e.g., school wide yearlong mentorship, access to students with range of reading abilities).

According to Moats (2000), the study of language is “indispensable” for teachers of reading, writing, speaking, and listening, in that literacy is a skill that “rests on all levels of linguistic processing, from the elemental sounds to the most overarching

structures of text” (p. 1). Indeed, reading is described as a language based activity, to the degree that even medical science is able to demonstrate reading activity occurs in the language centers of the brain (e.g., Shaywitz, et al., 1998). Despite being *language based*, learning to read is “not a natural process” (Lyon, 2000). Unlike oral language, which develops innately (given certain key supports and opportunities in the environment), learning to read typically requires well-organized systematic instruction.

The inclusion of phonemic awareness and phonics in reading instruction has produced powerful results for both beginning and struggling readers (e.g., Coyne, Kameenui, Simmons, & Harn, 2004; Torgesen, et al., 2001). Phonemic awareness instruction produces significant changes in students’ reading and spelling skills, clearly indicating the power of the right kind of instruction by a qualified individual and its ability to facilitate important changes for struggling readers.

The “right kind of instruction”, however, must be delivered with fidelity from a well-informed teacher in order to achieve student success. Unfortunately, research indicates that when it comes to language structure knowledge (i.e., phonemic awareness and phonics knowledge), teachers repeatedly fall short. Numerous studies (Bos, Mather, & Dickson, et al., 2001; Cunningham, Perry, Stanovich, & Stanovich, 2004; Mather, Bos, & Babur, 2001; McCutchen, Harry, et al.; Moats & Foorman, 2003; Morris, 1985; Spear-Swerling & Brucker, 2003; Troyer & Yopp, 1990) show that despite being proficient readers with good general intelligence themselves, many teachers (both preservice and inservice) are unable to teach effectively because they lack the necessary knowledge of English language structure. This lack of knowledge affects their ability to provide instruction, and influences student reading outcomes (McCutchen, Abbott, et al., 2002;

McCutchen, Harry, et al., 2002). Of equal concern is that teachers are often unaware of this gap in their content knowledge (Cunningham, Perry, Stanovich, & Stanovich, 2004).

Mastery of language basics, such as phoneme-grapheme correspondence, is a necessary subskill that must be fluent and automatic for not only the young reader, but also his or her teacher. Early and remedial reading instruction typically begins at the isolated sound level of language. Without a deep understanding of this aspect of language structure, errors in instruction can easily take place. For example, a struggling reader is often told, “sound it out”. This oft-used decoding strategy may produce success if a child encounters the word *run*, however, a teacher who offers the same advice on a word such as *city* may observe a child who starts out reading /k/ and ends the word with /yuh/ (reasonable errors without specific and explicit instruction to the contrary). Similarly, “sounding out” the word *choice* is not difficult, but requires specific phoneme-grapheme knowledge about digraphs /ch/ and diphthongs /oi/.

Unless a preservice teacher is well versed in language structure content and is able to make such phoneme-grapheme production decisions themselves, they should not be considered an “expert” when instructing novice readers. Their lack of language knowledge may lead to providing children with inaccurate instructional strategies (e.g., “sound out the word *nation*”) and result in beginning or struggling readers who practice errors during their initial learning experiences and beyond.

One could assume that most teachers receive training about the structure of English language and other related reading skills during the process of their teaching certification (i.e., during undergraduate or graduate teacher education courses) or at the least, as they themselves learned to read. At present, there are no federal certification

requirements; rather individual states often defer to college and/or universities to make decisions about required reading courses. In Pennsylvania, for example, there are no guidelines put forth by the department of education for the number of credit hours a preservice teacher must take in the area of reading, rather it is up to individual universities (Pennsylvania Department of Education, personal communication, December 9, 2003). In a national survey of 48 state departments of education, only 29 states reported requiring any coursework in reading for elementary certification and the requirements ranged from as low as 1 semester hour up to 12 semester hours (Nolan, McCutchin, & Berninger, 1990). Many teacher education programs in turn defer to standards put forth by accreditation organizations such as National Council for Accreditation of Teacher Education (NCATE) or Council for Exceptional Children (CEC). Although organizations such as CEC offer knowledge and skill standards for teachers, it is ultimately up to the teacher education programs to see that such information is disseminated to and assessed in preservice teachers.

To date, only one published study (Spear-Swerling & Brucker, 2003) has attempted to address the content of college or university reading methods courses as it relates to language structure knowledge in preservice teachers. However, this study did not provide precise detail regarding the specific content covered nor amount of time or depth spent on particular topics. Brady and Moats (1997) proposed a detailed course content scope and sequence at the preservice teacher level that would ostensibly ensure informed (linguistically aware) instruction, leading to increased student success (i.e., McCutchen, Abbott, et al., 2002). This scope and sequence has been adopted by organizations such as the International Dyslexia Association and American Federation of

Teachers and acts as a basis for current legislation (i.e., “Reading First” initiative) for what qualifies as a necessary foundation in teacher education.

Using Brady and Moats’ scope and sequence as a guide, a survey targeting instructors of reading methods courses was conducted to further investigate issues related to instruction of preservice teachers (Gormley, 2004). Very few of the surveyed general and special education college instructors, report conducting formal assessment of phonemic awareness or letter-sound knowledge of preservice teachers enrolled in their course; nor do many engage in viable intervention procedures for preservice teachers with poor language structure knowledge. In many cases, instructors require preservice teachers to assess the language skills (i.e., phonemic awareness, letter-sound knowledge) of beginning or struggling readers without knowing if the preservice teachers themselves are proficient in the production or analysis of these skills. Without opportunities to demonstrate their own proficiency, preservice teachers cannot receive the corrective feedback to ensure mastery necessary to learn new or un-mastered skills before they instruct beginning or struggling readers. Because of these issues of limited feedback and assessment, there is a strong chance that preservice teachers will enter the teaching field underprepared to meet the challenges they will most certainly face. The results from this unpublished survey of Pennsylvania college/university teacher education programs indicate a need for further study in the area of improving language structure knowledge of preservice teachers.

The results presented here can be summarized as follows: 1) language structure knowledge is not an “innate” skill and must be explicitly taught to students *and* their

teachers and 2) language structure knowledge is not presently being explicitly taught at an explicit level in most teacher education programs.

Learners of all ages and abilities, including preservice teachers, acquire new skills and knowledge best when instruction is based upon principles of effective instruction (Rosenshine & Stevens, 1986). Providing learners with explicit and systematic instruction, giving appropriate models, and ongoing assessment or evaluation are important instructional components to ensure learning. Instructing preservice teachers in language structure content is no exception. However, based upon preservice teacher performance on these skills (Bos, Mather, et al., 2001; Mather, Bos, & Babur, 2001; Morris, 1986; Spear-Swerling & Brucker, 2003), this type of instruction may be absent in many college and university teacher education programs.

There are two ways to address the language knowledge gap observed in teachers. One method is to provide in-service training or continuing education opportunities to inservice teachers. A second method is to provide the relevant content at the preservice level in teacher education programs. Certainly, the most proactive method is to provide this information at the preservice level; however, a small number of barriers influence inclusion of such content. First, many college/university teacher education programs are already hard pressed to include the many certification requirements put forth by their states or accrediting agencies (e.g., NCATE, CEC). Therefore, adding content to already existing courses or requiring additional credits in the area of language structure may not be a viable solution for many programs. Second, it is still unknown at what level of intensity or depth such content must be delivered to adequately prepare preservice teachers to demonstrate satisfactory “language structure knowledge”.

In an effort to address the teacher language knowledge gap in a proactive manner, this study will evaluate the impact of a targeted intervention to a teacher education program for special education and general education preservice teachers. The additions are considered “targeted” in an attempt to find an efficient and effective means to add specific and necessary content to already overfilled requirements and at minimal cost to the universities (i.e., additional faculty, course offerings, etc.). While commending the rigorous delivery methods previously cited, this study attempts to evaluate two reasonable additions to existing programs. The instructional components evaluated in the present study offer a ready-made “package”. This package protects against issues of treatment fidelity in that university faculty do not need to be fluent on language structure content themselves, as preservice teachers engage in self-study. In addition, this format provides self-pacing and opportunities for repetition and practice not afforded to students in most content laden, fast-paced teacher education courses.

The targeted additions include an instructional package made up of a self-study guide and video targeting the alphabetic principle. The self-study guide contains information about phoneme-grapheme correspondence as it relates to English language structure presented in a systematic and explicit format. The video provides a systematic tutorial of the speech sounds of English, providing live visual and auditory production models.

The present study seeks to answer the following questions:

1. What is the effect of a self-study guide and videotaped tutorial on preservice teachers’ language structure and letter-sound knowledge as measured by Teacher

Knowledge Assessment: Structure of Language and See-Say and Hear-Write phoneme-grapheme probes?

2. What is the effect of a self-study guide and videotaped tutorial on preservice teachers' application and generalization of letter-sound knowledge as measured by Irregular Word Identification and Child Error Identification tasks?
3. What is the effect of a self-study guide and videotaped tutorial on preservice teachers' feelings of preparedness to teach and perceptions about early reading and spelling as measured by Teacher Perception Survey of Early Reading and Spelling?

Chapter 2

REVIEW OF RELATED LITERATURE

This chapter presents a comprehensive review of the current research on the importance of language structure knowledge to beginning or struggling readers and their teachers. Three areas of research are relevant to this dissertation: (a) language structure knowledge of preservice teachers, (b) language structure knowledge of inservice teachers, and (c) relevant instructional design and delivery concepts.

Introduction

Throughout the history of American education, there have been recurrent attempts to determine how best to create a “nation of readers” and “prevent reading difficulties in young children” (i.e., Chall, 1967; Adams, 2000; National Research Council, 1998; National Reading Panel [NRP], 2000). Today, educators, researchers, and government officials agree that too many of our nation’s children struggle in learning to read and write despite the clearly documented interventions that describe how we might best accomplish this goal. In fact, children with reading difficulties make up more than half the population served under IDEA (U.S. Department of Education, 2002). The importance of effective intervention is clear, as children who struggle with reading at an early age will most probably struggle throughout their lives (e.g., Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996). As these individuals leave public education, many

will have difficulty obtaining employment and face serious obstacles in leading independent lives (Lyon, 2000).

Reading and Language Connection

Children in need of specialized reading instruction should be at an advantage now more than ever as researchers have precisely identified five skill areas essential to effective reading instruction. These components include phonemic awareness, phonics, vocabulary, reading fluency, and reading comprehension.

Two of these components are clearly connected to decoding text, the first step of reading comprehension: phonemic awareness and phonics. Decoding is vital to reading success in that to be a skillful reader of English, one must thoroughly process individual letters of words (Adams, 2000). In fact, success in decoding is highly correlated to the ultimate goal of reading- comprehension (Foorman, 1997). Essential to being able to decode is knowledge and understanding of the alphabetic principle, a key to unlocking the door to reading. The alphabetic principle is the concept that speech can be represented in print and alternatively, that print can be converted to speech. The alphabetic principle teaches people that letters represent sounds in the language. The ability to associate sounds with letters allows readers to use these sounds to form words. This is important in that a primary difference between good and poor readers is the ability to automatically use letter-sound correspondence to identify words (Juel, 1991).

Reading is essentially a language-based activity. Good readers automatically process language at the level of sound, syllable, and word when decoding text (Moats,

2000). Simply put, the alphabetic principle is based on the idea that print represents speech; words are made up of sounds (phonemes) which are the smallest meaningful unit in a language that makes a difference to its meaning (Torgesen & Mathes, 2000).

Although some readers experience immediate success and flourish, even without the explicit knowledge of the English language, knowledge of the structure of one's language is strongly linked to reading success.

Phonemic and phonics knowledge are foundational for the teacher of reading, not just his or her student. Indeed, a relationship exists between teachers' proficiency with such content and their students' reading achievement (McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002). Teachers must have this knowledge base to effectively teach struggling readers and writers (Moats, 1994). Ineffective and inefficient instruction is often cited as a contributor to many children's reading difficulties (Carnine, Silbert, Kameenui, & Tarver, 2003). However, it is no longer possible to justify uninformed reading instruction, given the thirty-plus years of convergent research findings on effective methods (i.e., NRP, 2000).

Teacher Competence

Once children enter school, teachers assume the responsibility to teach the skills needed to become good readers and writers (US Department of Education, <http://www.ed.gov/programs/readingfirst/faq.html>). In most cases, teachers are the primary means by which beginning or struggling readers learn skills, such as the alphabetic principle, to be successful. Teachers who provide such instruction must be able to explicitly communicate their own phonological or other language structure knowledge; else, their instruction is likely to be ineffective.

The current focus of instruction in the field of education is heavily rooted in “research based practices”. In addition, the field of learning disabilities is exploring use of a “response to intervention” model (see special issue *Learning Disability Research and Practice*, 18, 2003). Given these issues, there is a critical need for teachers who are not only informed about empirically validated instructional practices but have the skills to carry them out. The goal of response to instruction models in education help ensure that teachers are well informed and are carrying out scientifically based reading research practices; included in this is knowledge of language structure. Moats (1994) compares the importance of teacher’s lower level language mastery to the knowledge of anatomy for a physician. Unfortunately, unlike physicians well trained in anatomy, many teachers do not receive explicit training in the structure of language (Mather, Bos, & Babur, 2001; McCutchen, Harry, et al., 2002; Moats, 1994). In fact, the structure of the English language is not widely understood by most teachers: inservice (Cunningham, Perry, Stanovich, & Stanovich, 2004; Mather, Bos, & Babur; McCutchen, Harry, et al.; Moats & Foorman, 2003; Spear-Swerling & Brucker, 2003; Troyer & Yopp, 1990) as well as preservice teachers (Bos, Mather, Dickson, Podhajski, & Chard., 2001; Mather, Bos & Babur, 2001; Morris, 1985; Spear-Swerling & Brucker, 2003). Although they can read and write, many fail to understand the process well enough to explain it to someone else and often perform poorly on measures of English language structure.

Certainly, few would argue against the importance of “word sound” knowledge for the beginning or struggling reader, yet many teachers lack such knowledge themselves, or at the least cannot explicitly describe their knowledge. Researchers have studied teachers’ knowledge and skill level on tests of English language structure (e.g.,

phonology and orthography) (Mather, Bos, & Babur, 2001; McCutchen, Harry, et al., 2002; Moats, 1994) and have found that teachers' knowledge of word *spelling* frequently interferes with their ability to identify word *sounds*. For example, in recent studies, only 2% of preservice and 19% of inservice teachers knew that the word *box* is composed of four speech sounds (/b/ /o/ /k/ /s/) (Mather, et al., 2001). In addition, 80 to 90% of teachers did not know that "str" was a consonant blend, and that "tch" (*stretch*) or "bt" (*doubt*) were *not* consonant blends (Moats, 1994). Researchers have also noted great knowledge deficiencies in basic areas such as how the English language system represents consonant speech sounds as well as other explicit phonics knowledge (Cunningham, Perry, Stanovich, & Stanovich, 2004). Interestingly, Cunningham and colleagues found that teachers were somewhat better in their "implicit" understanding of phonics rules but this would not transfer to explicitly teaching such content to students. This proves concerning when a teacher tells a student to sound out the word "was" or "gone" based on their "implicit" understanding of phonics.

The results reported here illustrate that a large percentage of teachers are unable to complete tasks typically asked of kindergarten children as part of normal beginning or remedial reading instruction. And, while teachers are successful readers, they cannot help make the underlying structure of language clear for novices because they themselves have not been explicitly taught the underlying structure. In cases where they have been explicitly taught this content, it is possible that the reading process has become so automatic they are no longer able to express the details to a novice reader. Even making decisions about children's instructional needs based on assessment data (e.g., writing

samples, oral reading performance) becomes a troubling task for such teachers (Moats & Foorman, 2003).

Role of Teacher Education Programs

Knowing that there are teachers who lack the requisite knowledge base to teach basic reading tasks is troubling for several reasons. First, there is a great potential for providing misleading information to developing readers (Cunningham, et al., 2004). Teachers must provide learners with accurate information from the start, lest they practice errors that become more difficult to change over time. Second, special education teachers are likely to leave the field if they feel unprepared to meet the challenges they face in the classroom (McLeskey, Tyler, & Flippen, 2004). It is with great certainty that they will encounter a struggling reader; therefore, providing them with the knowledge to teach these individuals is essential. In a world where special education teachers are already in short supply, it would be counterproductive if teacher education programs did not include instruction in the structure of English language.

In the past, researchers have attributed inadequate teacher knowledge in reading instruction to two factors (McCutchen & Berninger, 1999). One factor is that teacher education programs do not provide sufficient coursework in teaching reading and writing. A second (and now defunct) factor is that there is an insufficient body of research about the process of learning to read and write or about the most effective ways of teaching it. McCutchen and Berninger suggest progress in both arenas and the National Reading Panel report (2000) results appear to agree, in part.

While the body of research targeting the process of learning to read is no longer “insufficient”, research suggests that teacher preparation for the teaching of reading still

needs to be addressed (i.e., Anders, Hoffman, & Duffy, 2000; NRP, 2000). Historically, teacher education programs have given little priority to explicit linguistic knowledge in the form of systematic study of language (Morris, 1985). In a national survey of 48 state departments of education, only 29 reported requiring any coursework in reading for elementary certification and the requirements ranged from as low as one semester hour up to twelve semester hours (Nolan, McCutchin, & Berninger, 1990). One might assume that this decade old statistic would not necessarily reflect the quality of preparation occurring in our nation's teacher education programs today, but current data suggest otherwise (i.e., Bos, Mather, Dickson, et al., 2001; Moats, 1994; Spear-Swerling & Brucker, 2003).

Teachers face a serious responsibility to help children become successful readers, but they are not taught an important body of knowledge that would help them accomplish the task (Brady & Moats, 1997). If teachers are continuing to struggle with a knowledge base vital to teaching reading, perhaps additional research in this area is necessary to determine the best combinations of inservice and preservice training to support delivery of effective reading instruction methods (Denton, Vaughn, & Fletcher, 2003).

Course Content. To meet the current challenge, coursework needs to focus on the relationship between oral and written language (Moats, 1994). Coursework aimed at deepening teacher's knowledge in phonological and orthographical awareness as well as knowledge of English phonology and spelling (McCutchen, Abbott, Green, et al., 2002) is necessary to help change practice and improve student learning, particularly for those most affected (e.g., students with reading disabilities). See Appendix A for detailed list of suggested content.

In 1997, Brady and Moats prepared an in depth paper recommending fundamental components that should make up a complete teacher education course in language structure and conceptual foundations of reading. They prepared this paper with contributions from many accomplished researchers in the field of reading disabilities (i.e., Marilyn Adams, Marcia Henry, Benita Blachman, Alvin Liberman, Joanne Carlisle, and Barbara Wise). Three elements constitute the core of information and experience needed for skillful reading instruction (a) conceptual foundations, (b) knowledge of structure of language, and (c) supervised practice in teaching reading. These additions to teacher education programs help prepare teachers to meet the needs of struggling readers while providing a feeling of greater confidence in their knowledge and skill as they enter the workforce (Bos, Mather, Dickson, et al., 2001).

Structure of Language. Of the three areas outlined by Brady and Moats (1997), knowledge of structure of language makes up the actual content of instruction delivered to children. The structure of language involves information about linguistic units of speech and print. Specifically, it includes concepts of phonetics, phonology, phonics, morphology, syntax, text structure, and pragmatics. These concepts comprise three components of a proposed Language Study course: 1) knowledge of English speech sound system and its production (phonetics and phonology), 2) knowledge of structure of English orthography and its relationship to sounds and meaning (phonics and morphology) and 3) knowledge of grammatical structure (syntax and text structure).

Delivery of instruction: Inservice. Several researchers have demonstrated success delivering this content to inservice teachers via staff development training combined with yearlong follow-up and consultation. Changes in teacher knowledge, practice and student

outcomes resulted from instruction delivered through two-week intensive training courses and extensive yearlong follow-up (Bos, Mather, Friedman-Narr, & Babur, 1999; McCutchen, Abbott, et al. 2002; McCutchen & Berninger, 1999). Moats and Foorman (2003) recently reported an increase in teachers' language skills following professional development training; however, they did not provide details about the training.

Delivery of instruction: Preservice. To date, little research has focused on a training model for preservice teachers enrolled in teacher education programs. Only two studies (Bos, Mather, Dickson, Podhajski, & Chard, 2001; Spear-Swerling & Brucker, 2003) have specifically targeted preservice teachers' language structure knowledge. Bos and colleagues assessed preservice teachers after they took a reading methods course, but they did not provide information regarding course content, class size, or if a supervised practicum experience was associated with the methods course. More recently, Spear-Swerling and Brucker reported results for a special education preservice teacher population (a small group of graduate student inservice teachers participated as well) following instruction in language structure content. Spear-Swerling and Brucker found that special education majors enrolled in a teacher education program improved their language knowledge when instructed on word structure content over a two-week period (equaling six classroom hours of instruction). This course included a supervised teaching practicum for 1 of the 2 intervention groups. Of the two intervention groups, the group with a smaller university class size and concurrent supervised teaching practicum performed better on posttest than a similar group with larger class size and no supervised teaching. Impact of these gains on child reading outcomes was not measured.

Spear-Swerling and Brucker (2003) describe the instruction provided preservice and inservice teachers as “less intense” than that given teachers from other studies (i.e., McCutchen, Abbott, Green, et al., 2002). However, topics covered were similar in content as previous trainings on English language structure knowledge. In addition, the authors employed use of a take-home practice guide involving graphophonemic segmentation, classifying words by syllable type, and classifying words as regular or irregular.

All of the previously mentioned trainings and coursework are based specifically on the Brady and Moats’ (1997) fundamental language mastery ideas. These trainings and courses include instruction on explicit techniques and instructional strategies for teaching phonological awareness, word recognition, spelling skills, and fluency to children at risk for reading failure. Specifically, they target conceptual knowledge related to how the English language is constructed and how speech sounds related to print.

Because of limited research in this area of teacher education, a closer examination of college and university practices was warranted. In a recent investigation of teacher education programs in Pennsylvania (Gormley, 2004) it appears that few reading methods course instructors include a systematic, sequential delivery of many language structure components. Topics such as phonetics and phonics were often included but not in their entirety. For example, instructors teach preservice teachers about letter-sound correspondences for consonants but not for vowels or they teach some vowels and not others (e.g., short vowels /a/ and /e/ but not vowel diphthongs /oi/ and /ou/).

Evaluating Language Structure Knowledge

Language structure content is not being taught effectively or thoroughly, but of equal concern is the influx of teachers entering the workforce whose skills in these areas have never been evaluated. Even instructors who purport including these topics in their instruction, rarely evaluate the preservice teachers' proficiency in these areas. An unpublished survey targeting reading methods course instructors across Pennsylvania (Gormley, 2004) indicated that almost no instructor engaged in thorough evaluation of preservice teachers' abilities to segment or blend sounds in words, identify syllables, produce or match correct letters with their corresponding sounds (phoneme-grapheme correspondence). As indicated by research in the area of effective instruction, learners need opportunities for practice, evaluation, and immediate feedback when learning new skills (e.g., Rosenshine, 1997). The instructors surveyed did not appear to offer any systematic or feasible method of practice, evaluation, or feedback for preservice teachers enrolled in their courses. Researchers, however, have effectively conducted evaluation of the language structure knowledge of preservice and inservice teachers (Bos, Mather, et al., 2001; Mather, Bos, & Babur, 2001; McCutchen, Harry, et al., 2002; Moats, 1994; Morris, 1986; Troyer & Yopp, 1990).

The primary method of evaluation in the aforementioned studies was via a written language structure knowledge assessment. The assessments are typically modeled after those designed by Lerner (2003) and Moats (2000). These assessments appear to touch on many areas of language structure knowledge (i.e., phonemic awareness, syllable knowledge, sound spellings, etc.), but none provides a complete or thorough evaluation of one area explicitly linked to decoding success: phoneme-grapheme correspondence. In

addition, a written test does not provide an opportunity for oral sound production: a key component to the speech to print connection.

Evaluating Phoneme-Grapheme Knowledge. The present study seeks to provide a method of evaluating the language structure knowledge of preservice teachers, including their ability to accurately produce and match phonemes to their corresponding graphemes. Given the nature of the task, a method of evaluation must be identified that will allow examinees to demonstrate proficiency via oral and written production. One commonly used method to assess phoneme-grapheme correspondence knowledge is via see-say letter sound probes (e.g., Carnine, et al., 2004). The evaluator presents students (in this case preservice teachers) with a series of letters and asks them to orally produce the corresponding phoneme. Alternatively, the evaluator can present students with an auditory stimulus (phoneme) and ask them to write the corresponding grapheme (hear-write probe). By using both see-say and hear-write probes, oral as well as written production skills are assessed and judgments can be made about one (but very vital) aspect of preservice teachers' language structure knowledge.

Accurate knowledge of phoneme-grapheme correspondences is vital to the teacher of reading in that letter-sound knowledge is the cornerstone to being able to decode text. In addition, letter-sound knowledge is one of the most frequently assessed skills for beginning and struggling readers as it is an excellent predictor of later reading success (Compton, 2000; McCormick, Stoner, & Duncan, 1994; Scarborough, 1998b; Speece & Case, 2001). Given the frequency of use of this type of assessment, as well as the importance of obtaining accurate assessment information, it is necessary to examine preservice teachers' ability to evaluate children's phoneme-grapheme production errors.

Therefore, in addition to evaluating preservice teachers on see-say and hear-write letter-sound tasks, one should also evaluate their ability to observe and assess struggling readers engaged in similar tasks. To date, no study has reported evaluation in these areas.

Models of Instructional Delivery

In recent years, colleges and universities have begun to supplement traditional methods of instructional delivery (e.g., face-to-face classroom instruction) with new approaches such as computer-based training and other technological advances. For example, distance learning has increased in popularity and use for preparing special educators (i.e., Beattie, Spooner, Jordan, Algozzine, & Spooner, 2002; Collins, Schuster, Ludlow, & Duff, 2002). Alternative methods of delivery have appeal in their ability to reach more students in less time, particularly for teacher education programs that are caught between the need for increased content instruction and evaluation and finding the time, money, and personnel to fulfill it. Alternative methods to in-class lecture formats are promising in that researchers have demonstrated success with these methods when teaching new content to preservice teachers (e.g., Beattie, et al.; Paulsen, Higgins, Miller, Strawser, & Boone, 1998).

Spear-Swerling and Brucker (2003) verified the value of using an alternative method of content delivery as part of a reading methods course for preservice teachers in special education. In addition to face-to-face instruction in a college classroom, students in their study completed take home study guides on language structure content. Those enrolled in the course improved their language structure knowledge; however, the independent value of the take home guides was not evaluated.

Incorporating components of effective yet relatively self-directed instructional and evaluative devices has potential to increase the knowledge base of preservice teachers in an efficient and cost effective manner. Other than material preparation and scheduling, valuable instruction time in the college classroom is not affected nor is there a need to hire additional personnel to carryout such instruction or evaluation.

Effective Instructional Practices

There is a thorough and long-standing research base for what constitutes effective instructional practices (e.g., Brophy & Good, 1986; Carnine, Silbert, Kameenui, & Tarver, 2004; Gersten, 1998; Rosenshine & Stevens, 1986). Certainly, one can apply these practices to all learners, including those in a college classroom (i.e., preservice teachers). The present study seeks to incorporate effective instructional practices with methods of content delivery already shown to be effective for preservice teachers (e.g., Spear-Swerling & Brucker, 2003) using portions of Brady and Moats' (1997) suggested scope and sequence. The effective instructional practices employed in the present study include systematic presentation of material via a modified programmed instruction model and modeling.

Programmed Instruction. Programmed instruction is a concept dating back several decades (e.g., Skinner, 1961). It is based on principles of operant conditioning; in that a learner's correct response is positively reinforced following small, sequential segments of learning material. This type of instruction has been effective for teaching fact-based content to college students (Tudor, 1995; Tudor & Bostow, 1991), even when compared to classroom lecture (Aberson, C.L., Berger, D.E., Healy, M.R., Kyle, D.J., & Romero, V.L., 2000). Research has also shown that computer-programmed instruction

requiring “overt” vs. “covert” responding is more effective (e.g., actually typing response into blank vs. “thinking about” response) (Tudor & Bostow, 1991).

In the area of language structure, few researchers have studied the effects of programmed instruction on teachers’ language structure knowledge. Only one known study incorporated an independent study guide for this material (Spear-Swerling & Brucker, 2003). An interactive tutorial for phonics, phonemic awareness, and word analysis for teachers has been available for many years (Wilson, Hall, Leu, & Kinzer, 2000). Although no empirical evidence of its effectiveness with preservice teachers is available, its demonstrated popularity among teachers is suggested, given its multiple revisions (currently in its seventh edition).

Given the behavioral principles upon which programmed instruction, or in this case, a self-study guide, is based, its potential as an effective method of content delivery to preservice teachers is strong. Preservice teachers receive subject matter in small steps and are able to work at an independent pace while receiving immediate reinforcement for correct responses. Based on the structure of the guide, incorrect responses are rare, promoting errorless learning. In addition, a self-study guide decreases the resource strain for teacher education programs in time, money, and personnel. One important limit of programmed instruction using this format (e.g., paper/pencil) in language structure content is that there is no auditory model.

Feedback. Providing learners with feedback and checking for understanding are key functions for teaching well-structured tasks (Rosenshine & Stevens, 1986). Teachers also benefit from immediate feedback when learning new behaviors (i.e., Scheeler, Ruhl, & McAfee, 2005). The present study is designed to provide feedback to preservice

teachers via the self-study guide. Those completing the study guide are able to check their answers immediately and receive feedback regarding their accuracy. Again, this aspect of the instruction is appealing to teacher education programs as there is little strain on time, money, or personnel because it is self-directed by the preservice teacher.

Modeling. Providing learners with good models is important during all phases of instruction: during initial instruction, during practice, and after practice (Rosenshine, 1997). Observation is a powerful tool for learning new skills. Much can be learned by observing others model appropriate behaviors (Bandura & Walters, 1963). The programmed instruction format might be supplemented by providing a videotaped model of the speech sound inventory for preservice teachers to hear and see correct letter-sound production and correspondence. No additional personnel or class time is needed for this component of instruction in that preservice teachers can watch the video independently.

Summary

One cannot ignore the overwhelming research base for the vital role of systematic and explicit teaching in the areas of phonemic awareness and the alphabetic principle, nor can one ignore the findings that teachers lack knowledge in this area. It is also known that teacher education programs are frequently at maximum capacity concerning their course offerings and meeting state or federal certification requirements. Given these results, a language awareness program added to a teacher-education curriculum must have appeal in its efficiency as well as its effectiveness. A primary goal must be to increase teacher's knowledge base and awareness in language structure and to see application to the populations served.

If teacher education programs are to maintain accountability to the populations they serve, as well as legislation (No Child Left Behind), outside agencies (NCATE; CEC) and state departments of education, additions or modifications to current curriculum and teacher education practices are warranted. “It is no longer sufficient to put only minimally competent teachers in the classroom...[they] need to be as effective as possible as soon as they set foot in the classroom” (Education Commission of the States, 2003, p. 7). This appeal falls to the responsibility of teacher education programs, the last line of defense in producing “highly qualified teachers”.

Denton and colleagues (2003) suggest that teachers are likely to use what they learn in college, meaning that research based practices that are taught in college will be carried over into practice in the classroom. This implies that preservice preparation has the potential to influence directly the outcomes for students who are having difficulty learning to read. Although it appears to be conventional wisdom, the idea that “you can’t teach what you don’t know” (or in this case, what you have not been taught), is certainly apropos.

Researchers have repeatedly demonstrated that general and special education teachers entering the field are lacking basic knowledge about the structure of the very language they teach. Children who are beginning or struggling readers rely on systematic, structured, and accurate instruction about how to decode the meaningless text they face. Knowledge of the alphabetic principle is a key the decoding challenge and must be presented by well-informed teachers. Indeed, teachers who demonstrate a strong knowledge base in this content have better student outcomes in reading and writing.

A method of preparing teachers to meet this challenge must be efficient as well as effective to have appeal to already maximized teacher education programs. Researchers have already realized the content necessary to meet this goal; however, the best method of delivery has not yet been determined. The field of special education needs further research to explore the “best method of delivery” for language structure content to preservice teachers, as reading difficulties are the most frequently encountered disability in public education. Although not yet tested, one can assume that delivering information about the alphabetic principle in a manner consistent with principles of effective instruction would lead to positive learning outcomes for preservice teachers.

The value of incorporating language structure content into a teacher education program is invaluable to the future of special education as well the students served. Providing requisite knowledge (i.e., English language speech sound inventory) is one method to better prepare teachers to deal with one of their primary public school challenges.

This study’s purpose is to investigate the effect of instruction via a combination of self-study guide plus video tutorial on the language structure knowledge of preservice teachers enrolled in teacher education programs. Specifically, this study seeks to evaluate the impact of an instructional training module on letter-sound knowledge as well as the application and generalized use of that knowledge. The two instructional components (i.e., video and study-guide) have not been previously combined to create an “instructional package”.

Chapter 3

METHODOLOGY

The present study sought to examine the effect of a self-study guide and videotaped tutorial on 1) preservice teachers' language structure and letter-sound knowledge and 2) their ability to apply and generalize this knowledge. In addition, this study examined preservice teachers' feelings of preparedness to teach and their perceptions about early reading and spelling.

Experimental Design

This study utilized a pretest-posttest control group design (employing one variable in multiple conditions) to examine preservice teachers' language structure knowledge (primarily phoneme-grapheme identification and production) and subsequent application and generalization of these skills when assessing phoneme-grapheme errors of students

with or at-risk for disabilities. If properly carried out, a pretest-posttest design effectively controls for the eight threats to internal validity identified by Campbell and Stanley (p. 495, Gall, Borg, & Gall, 1996). The following chapter outlines the participants, procedures, instrumentation, and data analysis techniques.

Independent Variable and Materials

The independent variable was the instructional program targeting phoneme-grapheme knowledge for preservice teachers. The instructional treatment included two components: self-study guide and a video tutorial.

The self-study guide was an investigator-created written guide aimed at providing explicit instruction on principles of English language structure. Specifically, the self-study guide included information about the structure of English language phonemes, their organization, and common spellings (orthographic representations). The guide's content was based primarily on information deemed vital for evidence based reading instruction outlined by the National Reading Panel (2000) and Moats' "Language Essentials for Teachers of Reading" (2004), particularly as it related to teaching decoding skills. Additional sources of information for the guide include work from the following authors: Adams, 2000; Chall and Popp, 1996; Eldredge, 2004; Torgesen & Mathes, 2000; Wilson, Hall, Leu, and Kinzer, 2001. The model used for the present self-study guide resembles the programmed instruction formats used in tutorials created by Wilson, et al. and Eldredge. The guide was presented in an online format using the course management system provided by the large Eastern University where this study took place.

The study guide began with general background information and definitions of concepts such as "alphabetic principle", "phoneme", and "grapheme". Information was

presented in short (2 to 3 sentence) units, followed by fill-in-the-blank questions or statements about that specific content.

Following basic background information, the study guide presented individual speech sounds of English introduced in a systematic and structured format, organized by critical feature (e.g., place, manner, and voicing). An example of one study guide task involving the introduction of phoneme “pair” /t/ and /d/ can be viewed in Appendix J in two separate screenshots of the online study guide.

It should be noted that the study guide was a self-paced activity that was completed independently by each participant. The guide was designed to allow participants unlimited opportunities to practice and review material. Formal tracking procedures were used to determine amount of time spent completing entire study guide; however, the tracking measure was somewhat crude (due to the constraints of the Course Management System used for design) and tracked individual’s time to the nearest half-hour. In addition, participants were informed prior to study guide completion that they were to be paid \$10.00 per hour, thus creating an incentive to spend a longer amount of time engaged in instruction and review.

The video supplement was an investigator created instructional video about the speech sounds of English. The video presented the speech sounds along with their orthographic representation in a systematic and sequential manner. The video provided preservice teachers a “live model” of phonemes and associated spellings presented by distinctive feature (e.g., place, manner, and voicing). Informal opportunities for self-assessment and practice were included, although there was no formal monitoring tool to determine participation.

Participants

The sample for this study was 37 undergraduate students enrolled in teacher education courses at a large Eastern university. Participants were first through fourth year preservice teachers in special education and general education teacher certification programs. Participation was voluntary and preservice teachers' grades were not influenced by their participation. Participants who completed the study in its entirety received a small monetary honorarium. Participants self-selected (volunteered) to determine participation. Full participation of all eligible preservice teachers was sought. Participants were randomly assigned to the instruction or no instruction (control) group.

Because of the random assignment procedure, participants were likely to be "sufficiently similar" in age, skill level, and learning history (Tawney & Gast, 1984) however; a background questionnaire was administered to determine the key characteristics of the two groups.

Settings

Instruction took place in a classroom outside of any regularly scheduled class time (video tutorial) and independently at a location of participants' choice (study guide). Participants required **an average of 3.9** hours to complete the video tutorial and online self-study guide (see rationale for six-hour instructional time Spear-Swerling & Brucker, 2003). Participants were assessed in group and individual settings based on the dependent measure. Large group assessment took place in classrooms and individual assessments took place in a small office at The Pennsylvania State University.

Dependent Variables and Outcome Measures

For the present study, all participants (experimental and control group) completed five pretest and posttest measures as well as a perception survey and demographic information sheet. The four measures included: (a) Hear-Write Phoneme-Grapheme Probe; (b) See-Say Phoneme-Grapheme Probe; (c) Child Phoneme-Grapheme Error Identification Assessment; (d) Irregular Word Identification Task, and (e) Teacher Knowledge Assessment: Structure of Language. Descriptions of each measure are reported below.

Background Information. Preservice teachers participating in the study completed a 17-item survey of demographic information, teaching experience, and preparation (e.g., previous coursework related to literacy). All questions were presented in multiple-choice format and required the participant to circle the correct response. These data were tallied and used for analysis. This survey was adapted from a demographic questionnaire developed by Janice Sammons and Nancy Mather (personal communication, March 2003) that was used as part of a large scale federally funded grant: Project RIME (Reading Instructional Methods of Efficacy with Students At-Risk for Learning Disabilities and At-Risk English Language Learners). See Appendix B for sample background information data collection sheet.

Phoneme-Grapheme Probes. Two phoneme-grapheme probes were administered to assess participants' knowledge of letter-sound associations. One additional probe was administered as a generalization measure to assess preservice teachers' accuracy in identification and evaluation of child letter-sound errors. These assessments were administered as pretests and posttests for both the experimental and control groups. Probes include the English language speech-sound inventory as well as their most

common orthographic representations. These first two probes assessed preservice teachers' ability to hear-write and see-say letter sounds and the third measured their ability to identify student errors.

“Hear-Write” refers to participants' abilities to hear a speech sound produced and record the corresponding letter or letters in written form. This assessment evaluated preservice teachers' accuracy at letter-sound correspondence when presented with 43 target phonemes. Participants heard and watched a videotaped production model of each individual speech sound and wrote the corresponding grapheme. They then wrote a target word demonstrating use of that letter/sound correspondence. For example, participants heard the sound /b/, wrote the letter “b”, and wrote a word such as “boy”. The most common spellings for target sounds were marked as “correct”. Common spellings were determined by referencing two primary sources: *Teaching and Assessing Phonics: Why, What, When, How: A Guide for Teachers* (Chall & Popp, 1996) and *Speech to Print* (Moats, 2000). This assessment was administered in group and individual settings, depending on participant availability. A “percent produced correct” score was calculated by dividing the total number of correct responses by 86. See Appendix C for sample hear-write probe sheet.

“See-Say” refers to the participants' ability to see a visual stimulus (letter or letters) and orally produce the corresponding speech sound. This assessment evaluated preservice teachers' oral production accuracy. Participants were asked to produce individual phonemes based on corresponding graphemes presented on the probe sheet. For example, participants saw the visual stimulus “k” and orally produced the corresponding phoneme /k/. Fifty-four common graphemes were presented, including

multiple spellings for the same sound (e.g., ee; ea). This assessment was administered in group and individual settings, depending on participant availability. A “percent produced correct” score was calculated by dividing the total number of phonemes correctly produced by 54. See Appendix D for see-say letter prompts and recording sheet.

The final phoneme-grapheme probe assessed the error identification skills of preservice teachers. This activity assessed preservice teachers’ abilities to demonstrate generalized use of their letter-sound knowledge by identifying child production errors. Participants watched a video of a child participating in a see-say letter-sound task and recorded any errors the child made. The videotaped child was a seven year-old, African American boy at risk for developing reading and language disabilities. The video consisted of the boy producing approximately 52 phonemes when presented with corresponding letters during a see-say letter-sound production task. Using a prepared answer sheet, preservice teachers evaluated and recorded student phoneme errors. Participants determined if the child’s speech sound production matched stimulus grapheme. This assessment was administered in group and individual settings, depending on participant availability. A “percent identified correct” score was calculated by dividing the total number of errors correctly identified by 52. See Appendix E for sample student error phoneme-grapheme recording sheet.

Irregular Word Identification Task. Participants evaluated a 30-word list made up of a combination of regular (n = 12) and irregular words (n = 18). During this task, participants determined if each word was phonetically “regular” or “irregular” based on common/typical letter-sound correspondence. This task acted as an application measure to assess preservice teachers’ ability to apply their letter-sound knowledge.

Phonetically “irregular” words are typically words in which one or more letters represent a sound that is not common for that particular letter. The term *sight word* is often used to refer to irregular words (e.g., said, was, would). Phonetically “regular” words can be sounded out based on typical letter-sound correspondences (e.g., tree, bent, slug). I determined phonetic regularity of target words based on word study and analysis as well as referring to Fry, Fountoukidis, and Polk’s *The New Reading Teacher’s Book of Lists* (1985). This assessment was administered in group and individual settings, depending on participant availability. A “percent identified correct” score was calculated by dividing the total number of errors correctly identified by 30. See Appendix F for sample assessment.

Teacher Knowledge Assessment: Structure of Language. Participants took a 20-item multiple-choice test about the structure of language at both the word and sound levels prior to intervention. This assessment instrument was the same test used by previous researchers to assess teacher’s language structure knowledge (i.e., Bos, Mather, Dickson, et al., 2001) and has demonstrated strong internal consistency of .60 (Cronbach’s coefficient alpha). This assessment was administered in group and individual settings, depending on participant availability. A “percent identified correct” score was calculated by dividing the total number of errors correctly identified by 20. See Appendix G for sample assessment.

Teacher Perceptions About Early Reading and Spelling. Participants took a self-administered teacher perception survey prior to intervention. This survey was adapted from a perception survey provided by Janice Sammons and Nancy Mather (personal

communication, March 2003) that was used as part of a large scale federally funded grant: Project RIME and adapted from DeFord (1985). The survey was re-administered upon completion of instruction. The survey was designed to assess preservice teachers' perceptions about early reading and spelling. Participants provided a written response (circle) to 15 items using a likert-type scale from "strongly agree" to "strongly disagree". To evaluate social validity, the final perception survey given to the experimental group (posttest) contained six additional items that provided information about participants' ratings of utility of the supplemental instruction (questions adapted from McNaughton, 1995). These items included: (a) How effective was the supplemental instruction in improving your language knowledge related to reading and spelling? (b) Do you feel that the supplemental instruction was an efficient use of your outside class time? (c) How appropriate would it be for other preservice teachers to learn this content? A scale of 0 to 5 will be used (0 = not efficient/effective/appropriate; 5 = very efficient/effective/appropriate). The remaining three items asked participants to list: (d) components of the supplemental instruction that were the most helpful, (e) components of the supplemental instruction that were the least helpful, (f) how the supplemental instruction could be improved. See Appendix H for survey details.

Procedures

The present study employed pretest-posttest control group design. Upon receiving approval from Office of Human Subjects, preservice teachers were recruited for participation from various education courses offered during the Fall 2005 semester at a large Eastern university.

Pretesting

Prior to instruction, all participants were assessed using five dependent measures: Hear-Write Phoneme-Grapheme Probe, See-Say Phoneme-Grapheme Probe, Child Error Identification Probe, and Irregular Word Identification Task, and Teacher Language Knowledge Assessment (TLKA) In addition, a background information questionnaire and perception survey were administered. The Hear-Write Phoneme-Grapheme Probe, Child Error Identification Task, Irregular Word Identification Task, questionnaire, and perception survey were in a group or individual format. The See-Say Phoneme-Grapheme Probe was administered individually during prescheduled one-on-one (researcher-participant) sessions prior to and following instruction. All assessments were administered to experimental and control groups.

Instruction/Intervention

Following pretesting, the instructional intervention began for the experimental group. Preservice teachers attended a 45-minute instructional meeting to watch the instructional video (either as a group or individually, depending on scheduling needs). Following the video, participants independently completed the online self-study guide. A logging device included in the online software monitored study guide participation. Upon completion of both instructional components, preservice teachers were reassessed using the phoneme-grapheme probes and Teacher Perception Survey.

Inter-observer reliability. Inter-observer reliability checks for the See-Say dependent measure were performed, due to potentially subjective scoring. Oral production tasks were videotaped for later review. Twenty percent of participants' response probes were randomly selected for rescoring. A trained, independent judge

rescored samples. The pair of scores (one from each rater) were used to calculate an intraclass correlation.

Data Analysis

Following data collection, I used three types of analysis. First, descriptive statistics were computed and results reported numerically and graphically. Descriptive statistics were reported for demographic as well as for teacher perception data.

Secondly, inferential statistics were used to compare differences between the experimental and control groups using mean gain scores for five dependent measures (i.e., Hear-Write, See-Say, Irregular Word ID, Child Error ID, and TKLA). A gain score is the posttest score minus the pretest score (Gall, Borg, & Gall, 1996). Multiple analyses of variance (MANOVA) were conducted using SPSS statistical software package. This determined if groups differed on their average gain scores based on intervention received. A significance level of $<.05$ was used to determine the statistical significance of differences between the intervention and control group means.

Assumptions and Limitations

Gay and Airasian (2003) suggest that one should identify and state possible assumptions and limitations associated with the study. The main assumption for the current research was that preservice teachers have not received formal training in linguistics prior to participation in the study. Participants were asked to report number of literacy-related courses previously taken and answer questions about their feelings of preparedness to teach such content (e.g., “How prepared do you feel to teach phonemic awareness and phonics?”).

The present study had three limitations. The first limitation was the length of the study. Given the nature of the instruction and assessment, participants were required to commit several hours outside of class time. This may have influenced willingness to participate at the outset or affected attrition rates.

The second limitation was the estimated sample size. Given the length of commitment to participate over time, one can speculate that only a limited number of preservice teachers volunteered to participate.

The final limitation was based on the random sampling of participants. Participants from targeted education classes self-selected or volunteered for participation, therefore true random sampling was not possible (although random assignment was possible). Characteristics of a student who decides to engage in learning activities outside of the basic course requirements may be different from their nonvolunteering peers. Therefore, participants may not have been a truly representative sample of preservice teachers from the large Eastern University.

Smithson (2000) offers suggestions for handling experiments that involve randomized assignment but no random sample. In this situation, Smithson posits that statistical inference is permitted to make assertions about causation as well as generality of findings because there is “task learning”. As previously mentioned, there was an assumption that preservice teachers in the present study have not received prior instruction on what is to be learned, therefore, despite the lack of random sampling one is permitted to use statistical inference.

Summary of the Research Questions, Related Variables, and Analysis Techniques

Variables			
Research Question	Independent	Dependent	Analysis Technique
1. What is the effect of a self-study guide and videotaped tutorial on preservice teachers' language structure and letter-sound knowledge as measured by Teacher Knowledge Assessment: Structure of Language and See-Say and Hear-Write phoneme-grapheme probes?	Instruction: self-study guide and video	-Phoneme-Grapheme written production probe (Hear-Write Task) -Phoneme-Grapheme oral production probe (See-Say Task) -Teacher Knowledge Assessment: Structure of Language	MANOVA using Pre/Post Mean Gain Score Visual analysis
2. What is the effect of a self-study guide and videotaped tutorial on preservice teachers' application and generalization of letter-sound knowledge as measured by Irregular Word Identification and Child Error Identification tasks	Instruction: self-study guide and video	-Child Error Identification Task -Irregular Word ID Task	MANOVA using Pre/Post Mean Gain Score Visual analysis
3. What is the effect of a self-study guide and videotaped tutorial on preservice teachers' feelings of preparedness to teach and perceptions about early reading and spelling as measured by Teacher Perception Survey of Early Reading and Spelling?	Instruction: self-study guide and video	-Preparedness questions -Teacher Perceptions About Early Reading and Spelling	Descriptive statistical analysis

Chapter 4

RESULTS

Overview

This study was an investigation of the effects of an instructional package targeting the alphabetic principle on the language structure knowledge of preservice teachers. The specific research questions addressed include the effect of a self-study guide and videotaped tutorial on preservice teachers' language structure and letter-sound knowledge as well as their ability to apply and generalize this knowledge. In addition, affective data about preservice teachers' feelings of preparedness to teach and their perceptions about early reading and spelling are reported.

This chapter contains descriptive and inferential statistical results. Tables, graphs, and narrative text provide information concerning the statistical analyses and major findings. Results are divided into three areas: (a) description of sample, (b) pre-analysis procedures, and (c) examination of research questions. Four sections are used to organize the research questions addressed in this study: 1) affective results: attitudes and perceptions; 2) effects of the instruction on participants' letter-sound knowledge; 3) effects of the instruction on participants' abilities to apply and generalize letter-sound knowledge; and 4) social validity of instruction. A Summary of Results section includes a brief review of the results of interest.

Pre-Analysis Procedures

Prior to analysis, I examined each dependent measure for accuracy of data entry and missing values. I conducted inter-observer reliability on one potentially subjective

measure (i.e., See-Say letter-sound task) to determine the extent to which two independent, trained observers agreed on the scoring of participant responses (Gall, Borg, & Gall, 1996). In addition, I conducted preliminary testing to verify the basic assumptions underlying the use of multivariate analysis of variance. I used SPSS for Windows version 11.0.0 for all analyses. Each of these areas is discussed in more detail below.

Missing Data

Upon completion of the study, I determined that four participants did not sufficiently complete all components of dependent measures used for analysis. Scores for these individuals were deleted from further analyses.

Inter-observer Reliability

In order to calculate inter-observer reliability, two trained independent observers viewed a randomly selected sample of nine cases (24% of total) and scored responses on See-Say letter-sound production of preservice teachers. Inter-observer reliability was high with an intraclass correlation coefficient of .97. Agreement between two observers indicates reliable observations for assessing correct oral letter-sound production of preservice teachers.

Assumptions Underlying Statistical Analyses

Mean comparisons of pre and posttest scores using a MANOVA were used to examine the impact of instruction on preservice teachers' letter-sound knowledge and their ability to apply and generalize that knowledge. Post hoc comparisons (i.e., individual ANOVAs) were also conducted to specify exact nature of the overall effect. Specifically, these inferential statistical procedures were used to determine the effects of

instruction on preservice teachers' performance on letter-sound tasks (i.e., Hear-Write, See-Say), application tasks (i.e., Irregular Word ID), and generalization tasks (i.e., Child Error ID).

When utilizing inferential statistical techniques, one must test related assumptions so that results can be considered both reliable and valid (Huck, 2000). The first assumption, independent observations, is satisfied given the procedures employed for recruitment and random assignment into conditions as delineated in chapter 3.

The second assumption of equivalent variance/covariance structure across groups is satisfied given results from Box's M test for significance among variance (Box's M = 6.1 $p = .87$). This result provides evidence of equality of covariance.

The third assumption, multivariate normality, was tested utilizing a graphical method. Visual analysis using a histogram provided evidence of normality of all variables. Given this analysis combined with sample size (e.g., >30), the normality assumption is satisfied for all but one variable.

The fourth and final assumption suggests that the dependent variables not be highly correlated. Pearson's correlation indicates that one dependent measure (Teacher Knowledge of Language Assessment- TKLA) was highly correlated to both the See-Say and Hear-Write measures and moderately correlated with the Child Error Identification task at pretest. TKLA is a gross measure that subsumes knowledge targeted by the other variables. Thus, TKLA may be considered redundant and in order to meet the final assumption, this test was omitted from further statistical analysis. However, where appropriate, descriptive data are reported for this measure. See Table 1 for correlation matrix.

Table 1*Intercorrelations between Outcome Measures at Pretest*

	1	2	3	4	5
1. Hear-Write	1				
2. See-Say	.26	1			
3. Child Error ID	-.04	.13	1		
4. Irreg. Word ID	.23	.09	-.17	1	
5. TKLA	.52*	.42*	.28	.21	1

Note: TKLA = Teacher Knowledge of Language Assessment

*Correlation is significant at the .01 level (2-tailed)

Participants

The study involved preservice teachers (n= 43) enrolled in teacher certification programs at a large Eastern university. Of the 43 preservice teachers, most were women (n= 42), and the majority were in their sophomore or junior year of college. Two participants withdrew prior to completing the study and an additional four participants had missing data or data unsuitable for analysis. Final analysis was conducted using 37 participants working toward teaching certification in either elementary education (n=27) or special education (n=10). Seventeen individuals were randomly assigned to the instructional group; the remaining 20 received no instruction. See Table 2 for additional demographic information.

Table 2*Demographic and Background Information*

Demographic	Instructional Group		Control Group	
	n = 17	% ^b	n = 20	% ^b
Gender				
Female	16	94	20	100
Male	1	6	0	0
Age				
24 or under	16	94	100	0
25-30	0	0	0	0
31-40	0	0	0	0
41-50	1	6	0	0
51 or older	0	0	0	0
Ethnicity				
Anglo	12	71	17	85
Hispanic	1	6	1	5
African American	1	6	0	0
Asian/P. Islander	0	0	0	0
Native American	0	0	0	0
Other	2	12	2	10
No Response	1	6	0	0
College Status				
Freshman	2	12	2	10
Sophomore	7	41	8	40
Junior	7	41	9	45
Senior	1	6	1	5
Teaching Certificate Program				
Elem. Education	13	77	14	70
Special Education	4	23	6	30
Literacy Courses				
0	2	12	7	35
1	7	41	9	45
2-3	4	24	3	15
4-6	2	12	1	5
No Response	2	12	0	0

^b Percentage of respondents with valid scores.

Data Collection

Data collection took place over a three-week period with individual instructional time ranging from approximately 2 to 6 hours (i.e., 45-minute video followed by 1.5 to 5 hours self-directed online study guide). The time spent engaged with the online study guide is an estimate given the rudimentary tracking capabilities of the software.

Pre- and posttest data were collected on six measures: three letter-sound tasks, an irregular word identification task, a language knowledge assessment, and a perception survey (see Chapter 3 for details surrounding the origin and nature of these measures). Test-retest reliability was calculated using Pearson's Correlation Coefficient between pre- and posttest scores on each measure. Reliability scores appeared somewhat low given typical acceptable levels for group tests (e.g., .85); however, according to Ebel and Frisbie (1991) these scores are sufficient given the criterion-referenced nature of the tests. Therefore, test-retest reliability for each dependent measure used for analysis was sufficient. This indicates that the outcome measures were repeatable and yield consistent scores. See Table 3 for correlation coefficients.

Item analysis for each test item on the outcome measures was not conducted. Of the four tasks developed for this investigation (i.e., Hear-Write, See-Say, Child Error ID, Irregular Word ID), all are fact based with criterion performance set at 100%. Test items were not designed to discriminate between high and low achievers, rather to determine whether each participant had achieved specific skills.

Table 3*Test-Retest Reliability between Pretest and Posttest*

Outcome Measure	r
Hear-Write	.52*
See-Say	.68*
Child Error	.38*
Irreg Word ID	.55*
TKLA	.61*

Note: TKLA = Teacher Knowledge of Language Assessment

*Correlation is significant at the .01 level (2-tailed)

Affective Results: Attitudes and Perceptions

Preparedness. Prior to instruction, all preservice teachers answered questions about their feelings of preparedness to teach reading, struggling readers, and phonemic awareness and phonics. Using a likert-type scale (1 = not prepared; 4 = well prepared), preservice teachers, on average, felt “not prepared” to “somewhat prepared” to teach in these areas. Preservice teachers’ feelings of preparedness tend to be related to the number of literacy courses completed ($r = .4$; $p = .02$). This correlation is judged to be statistically significant ($\alpha = .1$ after Bonferroni correction). Despite the statistical significance of this result, “number of previous literacy courses” was not included as a covariate for analyses because no information was asked about the nature of these courses; there was no definition of what a “literacy course” was or what content it entailed. Table 4 lists mean and standard deviation results.

Table 4*Perceived Level of Preparedness to Teach Reading*

Area of Teaching Reading	Instructional Group ^a		Control ^a	
	Mean	SD	Mean	SD
Reading	1.76	.66	1.85	.75
Struggling readers	1.65	.49	1.55	.76
Phonological awareness & phonics	1.5	.51	1.65	.67

^a Ratings: 1 = not prepared, 2 = somewhat prepared, 3 = adequately prepared, 4 = well prepared

Perceptions about Early Reading and Spelling. Preservice teachers completed a pre and posttest Teacher Perception of Early Reading and Spelling (TPERS) targeting early reading and spelling. Mean ratings by theoretical orientation for each group were computed and are presented in Table 5. In addition, percentage of agreement or disagreement was calculated and is presented in Table 6. To calculate percentage of agreement, responses were collapsed into two categories: agree or disagree (Mather, Bos, & Babur, 2001). Any response containing “agree” (e.g., strongly agree, agree, or mildly agree) was collapsed into the “agree” category. Any response containing “disagree” (e.g., strongly disagree, disagree, mildly disagree) was collapsed in the “disagree” category. See Appendix H for description of survey items.

On average, pre- and posttest measures of preservice teachers’ perception about early reading and spelling revealed that most agree with explicit code-based theoretical orientations. Visual analysis of mean orientation scores suggests that both groups tend to disagree with implicit meaning-based theoretical orientations regardless of taking part in instruction (with the exception of “using picture cues to help identify unknown word

meanings”). Inferential statistical analyses were not conducted on perception survey data given that the focus of instruction was to improve knowledge, not change perceptions of preservice teachers.

History of learning to read. Out of 37 participants, 21 recalled some detail(s) about their early reading acquisition. The number of individuals describing a history of explicit/code based reading instruction exceeds the implicit/meaning based group. Fifteen individuals reported techniques typically judged to be aligned with an explicit/code-based orientation (e.g., letter-sound correspondence, phonics, sounding words out). Eight individuals reported techniques typically judged to be aligned with an implicit/meaning-based orientation (e.g., whole language, guided reading) (note: some individuals reported more than one detail). Analysis by group indicates that individuals in both the instruction and control group recall more experiences aligned with code based than meaning based instruction.

Table 5
Mean Ratings for Perception Survey by Theoretical Orientation

	Instructional Group				Control Group			
	Pretest		Posttest		Pretest		Posttest	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Explicit: Code Based^a Questions								
1. K-2 teachers should know how to assess and teach phonological awareness (i.e., knowing that spoken language can be broken down into smaller units, words, syllables, phonemes).	5.82	.39	5.82	.39	5.75	.44	5.60	.68
3. Controlling text through consistent spelling patterns (The fat cat sat on a hat.) is an example of an effective method for children who struggle to learn to identify words.	4.76	.97	4.76	.83	4.80	.83	4.75	.91
4. Poor phonemic awareness (awareness of the individual sounds in words) contributes to early reading failure.	4.41	.87	5.06	.83	4.60	1.10	4.60	.88
10. K-2 teachers should know how to teach phonics (letter/sound correspondences).	5.76	.44	5.82	.39	5.70	.47	5.60	.50
12. It is important for teachers to demonstrate to struggling readers how to segment words into phonemes when reading and spelling.	5.47	.62	5.65	.49	5.20	.62	5.25	.55
14. Phonic instruction is beneficial for children who are struggling to learn to read.	5.29	.47	5.65	.49	5.45	.60	5.35	.67
Grand Mean:	5.25 (.56)		5.46 (.44)		5.25 (.47)		5.19 (.43)	

Table 5 (continued)
Mean Ratings for Perception Survey by Theoretical Orientation

	Instructional Group				Control Group			
	Pretest		Posttest		Pretest		Posttest	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Implicit: Meaning Based^a Questions								
5. Materials for struggling readers should be written in natural language with little regard for the difficulty of vocabulary.								
	2.65	1.06	2.94	1.30	2.55	1.0	2.55	1.15
7. Learning to use context clues (syntax and semantics) is more important than learning to use grapho-phonetic cues (letters and sounds) when learning to read.								
	2.76	.83	2.29	.85	2.70	.86	3.10	1.02
8. If a beginning reader reads "house" for the written word "home," the response should not be corrected.								
	2.35	1.17	2.47	1.42	2.30	1.38	2.50	1.19
11. Picture cues can help children identify words in the early stages of reading.								
	5.52	.62	5.06	.66	5.55	.60	5.30	.66
15. All children can learn to read using literature-based, authentic texts.								
	3.47	1.17	3.64	1.22	3.45	1.57	3.70	1.38
	Grand Mean:		3.28 (1.12)		3.31 (1.32)		3.43 (1.15)	

^a Ratings: 1 = strongly disagree, 2 = disagree, 3 = mildly disagree, 4 = mildly agree, 5 = agree, 6 = strongly agree; See Appendix XX for question description

Table 6
Percent Agreement by Theoretical Orientation

	Instructional Group				Control Group			
	Pretest %		Posttest %		Pretest %		Posttest %	
	Agree	Disagree	Agree	Disagree	Agree	Disagree	Agree	Disagree
Explicit:								
Code Based Questions								
1. K-2 teachers should know how to assess and teach phonological awareness (i.e., knowing that spoken language can be broken down into smaller units, words, syllables, phonemes).	100	0	100	0	100	0	100	0
3. Controlling text through consistent spelling patterns (The fat cat sat on a hat.) is an example of an effective method for children who struggle to learn to identify words.	94	6	94	6	95	5	90	10
4. Poor phonemic awareness (awareness of the individual sounds in words) contributes to early reading failure.	82	18	100	0	95	5	90	10
10. K-2 teachers should know how to teach phonics (letter/sound correspondences).	100	0	100	0	100	0	100	0
12. It is important for teachers to demonstrate to struggling readers how to segment words into phonemes when reading and spelling.	100	0	100	0	100	0	100	0
14. Phonic instruction is beneficial for children who are struggling to learn to read.	100	0	100	0	100	0	100	0

Table 6 (continued)*Percent Agreement by Theoretical Orientation*

	Instructional Group				Control Group			
	Pretest %		Posttest %		Pretest %		Posttest %	
	Agree	Disagree	Agree	Disagree	Agree	Disagree	Agree	Disagree
Implicit:								
Meaning Based Questions								
5. Materials for struggling readers should be written in natural language with little regard for the difficulty of vocabulary.	24	76	35	65	20	80	15	85
7. Learning to use context clues (syntax and semantics) is more important than learning to use grapho-phonetic cues (letters and sounds) when learning to read.	18	82	6	94	20	80	25	75
8. If a beginning reader reads "house" for the written word "home," the response should not be corrected.	18	82	23	77	25	75	20	80
11. Picture cues can help children identify words in the early stages of reading.	100	0	100	0	100	0	100	0
15. All children can learn to read using literature-based, authentic texts.	47	53	71	29	45	55	55	45

Pre- and Post-treatment Skills Differences between Groups

Results from the MANOVA of mean difference scores confirmed skill differences between preservice teachers who received supplemental instruction and those who did not (Wilks' Lambda [5, 32] = .456 $p = .000$). Post hoc tests of between-groups' effects revealed the nature of these differences. See Table 7 for post hoc results comparing instructional and control groups.

Mean Gain on Letter-Sound Measures. Letter-sound knowledge was evaluated using two measures: Hear-Write and See-Say letter-sound tasks. Preservice teachers demonstrated their letter-sound knowledge by identifying (Hear-Write) and orally producing (See-Say) phoneme-grapheme correspondences. Comparisons were made between the instruction and no instruction conditions on these letter-sound knowledge tasks.

Preservice teachers who received instruction demonstrated differences that were statistically significant when compared to their control group peers on both Hear-Write and See-Say letter-sound tasks (see Table 7). Inspection of Table 8 reveals that preservice teachers in the instruction group gained an average of five points more than their control group peers on Hear-Write measures and four points more on See-Say measures as seen in Figure 1. Effect sizes for mean gain scores on Hear-Write and See-Say letter-sound tasks indicate large practical significance for both tasks ($d = .94$ and $.90$ respectively). Effect size results indicate that mean gain scores of individuals in the instructional group are one standard deviation higher than those who did not receive instruction. Similarly, a pairwise comparison between groups revealed confidence intervals that support true

differences between groups on both Hear-Write and See-Say measures. See Table 9 for confidence interval results.

Percent Correct on Letter-Sound Measures. The percentages of items answered correctly on the Hear-Write and See-Say letter-sound posttests are presented in Table 10. Using 100% as the criterion standard for acceptable achievement, posttest results indicate that following instruction, preservice teachers remain below standard on both Hear-Write and See-Say letter-sound tasks. One individual performed at criteria for the See-Say measure at posttest (i.e., 100%). No one met criteria for the Hear-Write task.

Examination of Letter-Sound Errors. The two tasks (Hear-Write and See-Say) that targeted written and oral production of letter-sound correspondences revealed similar error patterns at pre- and posttest for all participants. The most frequently missed sounds ($\geq 50\%$) as well as sounds that were answered correctly by 100% of participants are listed in Table 11. Frequency data reveal that certain vowels and digraphs (i.e., /zh/ like in the word *beige*; /th/ like in the word *thumb* or *these*) are the most oft-missed letter-sound associations for both See-Say and Hear-Write tasks. For scoring purposes during the See-Say task, I (a certified speech-language pathologist) did not penalize participants for imperfect articulation due to regional dialect or second language issues. In addition, elongation of consonant sounds by adding a “schwa” (e.g., “puh” instead of /p/) was not counted as an error. Anecdotal notes indicate that incidence of schwa use appeared to decrease following instruction; however, formal data were not taken to support this.

Mean gain on generalization and application measures. Application and generalization of letter-sound knowledge were evaluated using two measures: Irregular Word ID and Child Error ID. Preservice teachers applied their letter-sound knowledge

during an Irregular Word ID task by determining which words (out of 30) were phonetically regular or irregular based on common phoneme-grapheme correspondences. They demonstrated generalization of their letter-sound knowledge by evaluating child see-say letter-sound production during the Child Error ID task. Comparisons were made between instruction and no instruction conditions on these generalization and application tasks.

Preservice teachers who received instruction demonstrated mean gains that were statistically significant when compared to their control group peers on the Irregular Word Identification application task (see Table 7). Inspection of Table 8 reveals that preservice teachers in the instruction group gained an average of four (2.0-6.4) more points than their control group peers on Irregular Word Identification as seen in Figure 1. The effect size for mean gain score on this task indicates strong practical significance ($d=1.34$). Similarly, a pairwise comparison between groups revealed confidence intervals that support true differences between groups on Irregular Word Identification measure. See Table 9 for confidence interval results.

Preservice teachers who received instruction demonstrated mean gains that were not statistically significant when compared to their control group peers on the Child Error Identification generalization task (see Table 7). It should be noted that because the normality assumption was violated on this measure, results should be interpreted with caution. Inspection of Table 8 reveals that preservice teachers in the instruction group gained an average of one (-.9 to 3.75) more point than their control group peers on Child Error Identification as seen in Figure 1. Effect sizes were not calculated due to lack of statistical significance.

Percent Correct on Application and Generalization Measures. Percentage of items answered correctly on the Child Error ID and Irregular Word ID tasks are presented in Table 10. Using 100% as the criterion standard for acceptable achievement, posttest results indicate that following instruction, preservice teachers, on average, remain below standard on both measures. No individuals met criterion at posttest.

Examination of Generalization and Application Errors. The Irregular Word ID task contained 30 words that participants were asked to evaluate as phonetically “regular” or “irregular”.

Table 7

Comparison of Mean Gain Scores between Intervention and Control Groups

Source	DF	Sum of Squares	Mean Square	F	p	d^a
Hear-Write	1	236	236	8.22	.007*	.94
See-Say	1	113	113	7.47	.010*	.90
Irreg. Word ID	1	163	163	15.52	.000*	1.34
Child Error ID	1	18	18	1.53	.225	

*p < .05; ^aEffect Size = $M_1 - M_2 / (SD_1 - SD_2 / 2)$

Table 8*Means and Standard Deviations of Gain Scores*

Outcome Measure	Instructional Group n=17		Control Group n=20	
	M	SD	M	SD
Hear-Write Task	8.1	5.2	3.1	5.5
See-Say Task	5.4	3.8	1.9	4.0
Child-Error ID	1.1	3.9	-.3	3.1
Irreg Word ID	3.8	2.8	-.5	3.6
TKLA	1.1	1.7	-.1	2.4

Note: TKLA = Teacher Knowledge of Language Assessment

Table 9*Pairwise Comparison*

Outcome Measure	Mean Difference	SE	P	95% Confidence Interval for Difference	
				Lower	Upper
Hear-Write Task	5.1	1.8	.007*	1.48	8.65
See-Say Task	3.5	1.3	.010*	.90	6.10
Child-Error ID	1.4	1.1	.225	-.91	3.74
Reg/Irreg Word ID	4.2	1.1	.000*	2.04	6.38

* significant at the .05 level

Table 10*Posttest Percent Correct*

Measure	Instructional Group		Control Group	
	M %	Range %	M %	Range %
Hear-Write Task	85	73-95	84	77-92
See-Say Task	91	78-100	87	72-98
Child-Error ID	62	52-79	60	48-65
Irreg Word ID	73	57-93	70	47-93
TKLA	60	30-85	55	20-75

Note: TKLA = Teacher Knowledge of Language Assessment

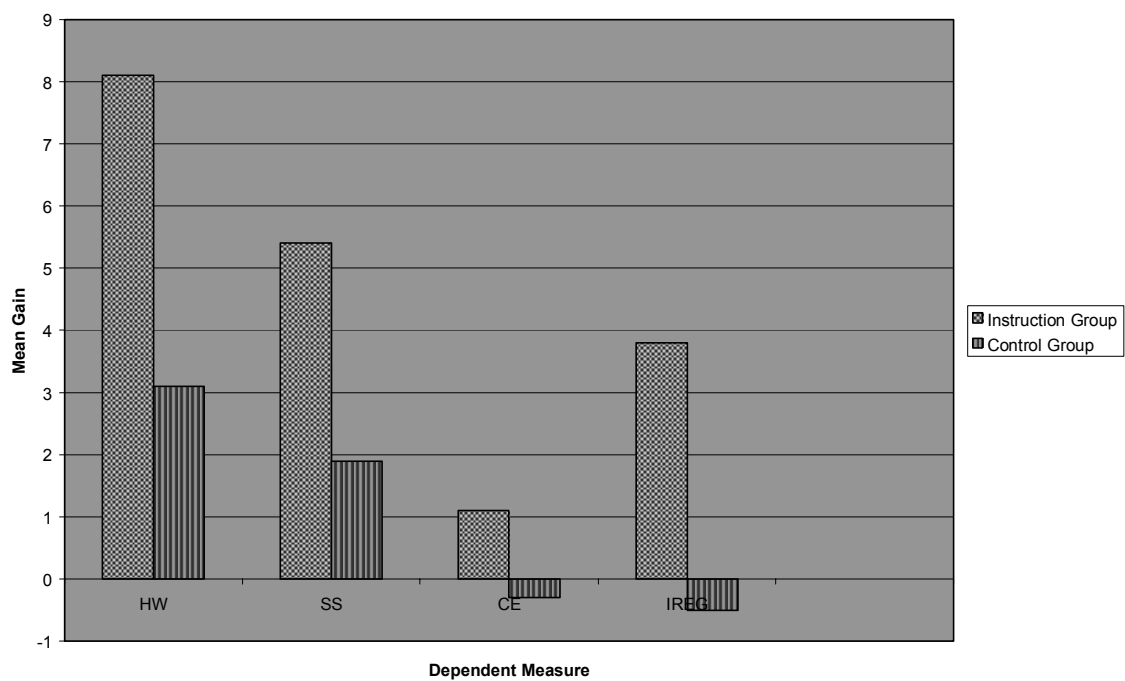
Figure 1**Mean Gain Scores by Group**

Table 11
Percentage of Most Frequently Accurate/Inaccurate Letter-Sounds

	Instructional Group			Control Group		
	Pretest Accuracy* 100%	Posttest Accuracy* 100%	Pretest Accuracy* 100%	Posttest Accuracy* 100%	Pretest Accuracy* 100%	Posttest Accuracy* 100%
Hear-Write^a	/f/ /s/ /z/ /er/ /n/ /ee/ /o_e/	/f/ /d/ /b/ /t/ /v/ /th/-voice /s/ /sh/ /ch/ /m/ /z/ /l/ /j/ /er/ /h/ /ee/ /g/ /or/ /o_e/ /i_e/	/zh/ /ar/ /ng/ /u/ /oo/ /o/	/ar/ /ng/ /oo/ /o/ /oy/	/f/ /k/ /t/ /v/ /s/ /sh/ /ch/ /m/ /z/ /ay/ /l/ /j/ /er/ /n/ /ee/ /i/ /w/ /oo/ /p/ /i.e/ /oy/	/zh/ /ng/ /u/ /oo/ /wh/ /o/
Hear-Write^b	/f/ /s/ /sh/ /m/ /l/ /w/	/f/ /d/ /b/ /t/ /v/ /v/ /s/ /th/-voice /u_e/ /ch/ /m/ /l/ /h/ /ee/ /or/ /g/ /ow/	/th/-unvoice /zh/ /ar/ /ng/ /u/ /oo/ /e/ /o/	/th/-unvoice /ng/ /oo/ /o/ /zh/ /o/	/f/ /k/ /b/ /t/ /v/ /s/ /sh/ /z/ /ai/ /l/ /ee/ /i/ /w/ /ow/ /oy/	/zh/ /ng/ /o/ /oo/ /wh/ /
See-Say^c	oi sh th ar or oy ch	ou ai au r igh a u p oi sh wh th c ar or z t b k v ee h oy m l ew ch f ng g d n	ou ai au r igh a u	ou r a u	oi ey sh i ar ou r a v oo ee oy m ew s g d	ou r a

*Accuracy rates are based on number of participants who answered correctly 100% of time or erred $\geq 50\%$ of time. All letter-sounds are not presented here.

Note: /zh/ like in beige; /oo/ like in foot; /th/ like in thumb (unvoiced); /th/ like in these (voiced)

^a Response: write letter(s) that matches given sound.

^b Response: write word demonstrating correct use of target letter-sound.

^c Response: say sound that matches given letter(s).

Social Validity of Instruction

To address the social validity of instruction, participants responded to three questions about the efficiency, effectiveness, and appropriateness of instructional content. In addition, participants listed components they found the most and least helpful as well as components in need of improvement.

Instruction Effectiveness, Efficiency, and Appropriateness. The majority of preservice teachers who took part in the instruction rated it as both highly effective and efficient (94% and 88% respectively). Almost all (94%) rated the content as very appropriate for other preservice teachers to learn. Participants were asked to write which aspects of the instruction they found least or most helpful and what they might change to improve the instruction. Participants identified the video tutorial and speech sound models as the most helpful components of the instruction. Other components reported as helpful were the online study guide, repetition of material between study guide and video, and opportunities to learn new vocabulary and speech sound information. See Table 12 for mean ratings.

Some participants identified particular components of the delivery format as “least helpful”. For example, some found the online study guide least helpful. Three individuals did not like having answers next to fill-in blanks as part of the programmed instruction study-guide. To a lesser degree, some individuals found the content too technical or dense for the delivery format. For example, a few participants wanted the instruction to extend over a longer time period.

Instructional Improvements. Approximately half of the participants suggested that the instruction could be improved by allowing extended time and distributing content into

a less condensed format, including more opportunities for practice. Presently the instruction time ranged from 2 to 6 hours: 45 minutes to watch the video and 1.5 to 5 hours independently engaged in study guide. The average time spent engaged in the online study was 3.9 hours. A number of individuals suggested guided notes for the video tutorial as an improvement.

Table 12

Mean Rating of Effectiveness, Efficiency and Appropriateness of Instruction

Area of Rating	Mean	SD
Effectiveness*	4.29	.59
Efficiency*	4.47	.72
Appropriateness for Other PT*	4.71	.59

* Rating Scale: 1 = not effective/efficient/appropriate; 5 = very effective/efficient/appropriate; PT = preservice teachers

Summary of Results

This investigation sought to test and answer four primary and one secondary research questions. The first set of questions compared letter-sound knowledge of preservice teachers following instruction (experimental group) or no instruction (control group). Within the instructional condition, preservice teachers gained letter-sound knowledge as measured by two tasks: Hear-Write and See-Say letter sound tasks. Mean

increase obtained on the Hear-Write task was statistically significant ($F= 8.22$; $P= .007$) as well as practically significant ($d=.94$). Mean increase obtained on the See-Say task was also statistically significant ($F=7.47$; $P= .010$) as well as practically significant ($d=.90$). These results indicate that, on average, preservice teachers gain more letter-sound knowledge given the target instructional program. However, the present investigation also suggests that certain letter-sound combinations (e.g., zh, ng, oo, o, th, a) are difficult to change, in spite of 2 to 6 hours of general instruction with 2 to 3 trials for each individual sound.

The second set of questions compared generalization and application of letter-sound knowledge of preservice teachers following “instruction” or “no instruction”. Mean increase obtained on the Irregular Word Identification task was statistically significant ($F= 15.52$; $P=.000$) as well as practically significant ($d=1.34$). There were no statistically significant differences between conditions on Child Error Identification ($F=1.53$; $P= .225$); however, this finding should be interpreted with caution given the violation of normality assumption. These results indicate that, on average, preservice teachers gained letter-sound application skills with the target instructional program, although differences in generalization of these skills was not significant.

Secondary questions were answered using descriptive statistics. Preservice teachers’ feelings of preparedness to teach various aspects of reading indicate that in general, they do not feel adequately prepared to teach reading, struggling readers, or phonemic awareness and phonics. Perceptions about early reading and spelling reveal a general tendency for preservice teachers to orient toward a explicit code-based ideal. See Table 13 for a summary of the research questions.

Table 13*Primary Research Question Summary*

	Research Question	Finding
Primary Questions:	1. Does a self-study guide and video tutorial significantly improve written letter-sound identification in preservice teachers?	Yes F(1, 35)=8.22, p=.007, <i>d</i> =.94
	2. Does a self-study guide and video tutorial significantly improve oral letter-sound production in preservice teachers?	Yes F(1, 35)=7.47, p=.010, <i>d</i> =.90
	3. Does a self-study guide and video tutorial significantly improve preservice teachers' ability to identify regularly vs. irregularly spelled words?	Yes F(1, 35)= 15.52, p=.000, <i>d</i> =1.34
	4. Does a self-study guide and video tutorial significantly improve preservice teachers' ability to identify letter-sound production errors in children?	No F(1, 35)=1.53 p=.225
Secondary Questions:	5. How do preservice teachers rate their feelings of preparedness to teach reading, struggling readers, and phonemic awareness and phonics?	“Somewhat prepared” to “Not prepared”
	6. To which theoretical orientation do preservice teachers align before and after supplemental instruction?	Explicit: Code-Based (before <i>and</i> after)

Chapter 5

Discussion

Interpretation of Findings

This study was designed to investigate effects of an instructional package featuring the speech sounds of English on letter-sound knowledge, application, and generalization of preservice teachers enrolled in a teacher education program. Previous research in this area has examined increases in teachers' language structure knowledge, in general, but never their letter-sound knowledge specifically or in detail. Unlike previous studies (e.g., Spear-Swerling & Brucker, 2004), the present investigation attempts to provide one aspect of the language structure content (i.e., alphabetic principle) in an efficient yet effective format utilizing multimedia. Therefore, the unique contribution of the present study is to focus only on instruction of the alphabetic principle and deliver the content in a "training module" format.

The alphabetic principle has been identified as a vital skill for learning to read and spell (Adams) as well as a vital component for research-based effective reading instruction (NRP). Because of this, Brady and Moats (year) include the alphabetic principle as one component of the language structure knowledge base that teachers must possess to be considered effective teachers of reading. In order to be proficient in the area of letter-sound knowledge, however, one must be able to orally produce the sounds associated with letters (see-say) as well as write the symbol when given a target sound (hear-write). This study, therefore, examined the impact of an instructional package on the accuracy of oral and written letter-sound correspondence in preservice teachers.

As was reported in previous literature (Bos, Mather, Friedman-Narr, & Babur, 1999; McCutchen, Abbott, et al. 2002; McCutchen & Berninger, 1999), findings from this analysis indicate that instructing teachers in language structure content improves their knowledge in this area. Specifically, this study indicates that preservice teachers can improve their knowledge of letter-sound correspondence and apply that knowledge as measured by their performance on irregular word identification tasks.

Effectiveness of Instruction on Letter-Sound Knowledge

Participants demonstrated gains in their letter-sound association skills; specifically, their ability to (a) orally produce sounds when presented with target letters (graphemes) and (b) write letters and words when presented with target sounds (phonemes). Because of the need for “linguistically informed” teachers, these gains are important and promising, as these skills make up the core of the alphabetic principle.

Upon closer examination, however, one must note that though the trajectory of improvement is robust, proficiency does not reach the criterion accuracy level of 100% (e.g., 85% on Hear-Write task; 91% on See-Say task). Given the importance and influence of the alphabetic principle, a criterion level set at 100% is justified for those individuals who will be assessing and teaching these skills in young and struggling readers. There are three potential explanations for these observed results: (a) nature of letter-sound errors, (b) opportunities for practice, and (b) a combination of both the nature of errors and opportunities for practice (note: the combined explanation will be discussed within the context of the previous two explanations below).

Nature of letter-sound errors. After examining the frequency and nature of specific letter-sound errors on both Hear-Write and See-Say tasks, a distinct pattern was

evident. As reported earlier, participants tended to struggle primarily with letter-sound correspondence related to the following sounds: /th/ (like in *thumb*), /zh/ (like in *beige*), /o/ (like in *hot*), /a/ (like in *cat*), /ng/ (like in *song*), /oo/ (like in *foot*), and /ou/ (like in *out*). Because of this pattern, one can surmise that these types of letters and/or sound are more challenging to preservice teachers than those rarely or infrequently missed (e.g., /f/).

The challenging nature of these types of letters and sounds is not limited to the present study. For example, digraphs (e.g., /th/) are often instructed later in the scope and sequence of most phonics-type programs (e.g., Open Court; Direct Instruction Reading) and vowels are more complex to learn because they typically lack the regular one to one letter-sound correspondence when compared to consonants. Indeed, some teacher educators at institutions of higher education omit teaching these sounds all together (Gormley, 2004).

Regardless of their perceived challenging nature, however, these letters and sounds are still part of the speech sound inventory of English and must be understood by teachers. Ignoring them or not teaching them is omitting an important part of the English language. By omitting certain sounds, we may be “telling” students that “you have to know how to decode words such as “*cop*” and “*cat*” but not “*chop*” or “*chat*”.

Opportunities for practice. Individuals who have increased opportunities to practice newly acquired skills are more likely to maintain those skills overtime as well as engage in those skills in a variety of settings, conditions, etc. (e.g., Rosenshine, 1997). To address these issues, participants were given opportunities to practice newly acquired skills via fill-in-the-blank and multiple-choice questions as part of the online study-guide.

In addition, during the video tutorial, participants were encouraged to “say the sound aloud” on several occasions. Based on the findings of this study, however, practice opportunities may not have been (a) frequent enough or (b) under enough varying conditions for participants to be fluent.

Given the pattern of phoneme and grapheme errors observed on the Hear-Write and See-Say tasks, two issues arise: 1) opportunities for practice and 2) opportunities for more in-depth language study. It appears that participants were not given enough practice opportunities to reach a level of fluency on *all* content (e.g., /zh/, /ng/, /oo/). In this particular case, participants may need more practice beyond simple one grapheme to one phoneme mapping. In this case, their error patterns suggest the need for in-depth language study (and practice) beyond the phonological and orthographic levels (Adams, 1994). For example, by studying morphology (units of meaning within words), preservice teachers are more likely to recognize the phoneme /zh/ as part of a common suffix “-sion”, like in “*television*” or “*fusion*”, rather than some “rare” sound that is difficult to learn and even harder to teach. In other words, learning about letters and sounds involves some analysis using context and other language structure concepts as a framework beyond simple stimulus and response training (Adams, 1994). The present instructional “module” focuses only on building proficiency with the alphabetic principle (e.g., letter to sound correspondence) rather than extending the instruction to additional layers of language study. Certainly, there is a need for preservice teachers to study and practice more in-depth language structure, but it is beyond the scope of the present training module.

Effectiveness of Instruction on Application and Generalization

Participants demonstrated gains in their ability to apply the knowledge learned during instruction to an Irregular Word ID task. Application of letter-sound knowledge to this task is important given the likelihood of similar tasks occurring in the classroom. For example, it is common for a child to come to an unknown word in text and be told to “sound it out” by a well-meaning teacher. Obviously, this strategy is only useful in situations where the target word is phonetically “regular”. Preservice teachers in this study demonstrated improved skills in their own identification of “regular” and/or “irregular” words. Thus, they are better equipped to make an appropriate instructional decision before telling a child to “sound out the word ‘was’”.

Despite being better equipped to make instructional decisions, however, there remains room for growth in preservice teachers’ ability to identify regularly and irregularly spelled words. On average, participants in the present study correctly identified only 73% of words following instruction. Although this is a significant gain (up from 60% at pretest) it does not imply fluency. It should be noted, however, that participants were never formally instructed on how to identify words as phonetically regular or irregular. Rather, this task acted as an application of the letter-sound correspondence information provided as part of instruction. Therefore, one might predict even greater increases if formal instruction were provided.

Participants’ ability to generalize their gains in letter-sound knowledge was not as promising as their application abilities. Their average gains on the Child-Error ID task (<60% accuracy rate) failed to reach significance or desired proficiency. Upon reflection

of this task, there are three potential reasons for these findings: (a) statistical issues, (b) videotape quality, and (c) opportunities for practice.

Statistical issues. Statistical issues may have influenced the results. The normality assumption was violated at the start of analysis, which compels one to interpret results with caution. In addition, the relatively small sample size has potential to mask significant differences when they are in fact present.

Videotape quality. The quality of the videotape as a “model” for child errors may be somewhat questionable. The videotape is an investigator created recording of a child producing letter sounds during a see-say task. Because it is a “real life” scenario, the child represented in the video produces sounds in a fairly rapid-fire manner, often self-correcting during the task. Evaluating rapid sound production during see-say tasks is common and mimics assessment duties of most teachers; however, as a novel task for preservice teachers, the pace and self-corrections certainly add to the challenge of accurately evaluating errors.

In addition to fast pacing and self-correcting, the child in the video also demonstrated some minor (and possibly developmental) articulation errors during his speech sound production. For example, the child tended to “glide” his production of /r/ and r-controlled vowels (/er/, /or/, /ar/) by substituting /w/ or “y” for /r/. He also tended to lateralize his production /s/ by allowing some air to escape from the sides rather than front of his mouth. It is possible that preservice teachers evaluated a closely approximated /r/ production as incorrect, when indeed the child was producing his best attempt at this sound. Participants were not instructed to avoid penalizing differences in dialect or minor articulation errors, which may have influenced their rate of accuracy.

In the future, explicit directions must be given to evaluators when making determinations of “matching” target sounds to letters. One should also consider additional practice opportunities for preservice teachers to evaluate children with a variety of dialectal and articulation differences. Making determinations about children’s speech “differences” is beyond the scope of this study, but deserves further investigation. It should be noted that the quality of the videotape (and child model) influenced both the instruction and control groups the same and may account for the overall lack of proficiency on this task (rather than reflect true failure to generalize knowledge).

Opportunities for practice. As previously mentioned, individuals are likely to perform better on tasks when they have had opportunities to engage in and practice beforehand. Because the Child-Error ID task was designed as a generalization measure, participants did not have an opportunity to actually engage in such a task during the instruction. Given the novelty of this task, preservice teachers were not successful, regardless of the letter-sound knowledge gains they achieved as a group. Therefore, one can surmise that given more opportunities to engage in and practice identifying child letter-sound errors, preservice teachers would improve in this area.

Affective Results: Attitudes and Perceptions *Affective Results: Attitudes and Perceptions*

Perceptions about Early Reading and Spelling. Preservice teachers in both instruction and control groups appear to be aligned with a more code-based, explicit orientation to early reading and spelling. Because formal statistical comparisons were not conducted using pre and posttest data, one cannot comment on statistical significance of change in perceptions, although visual analysis of mean differences appeared minimal or nonexistent.

One potential contribution to the perception findings may be the early reading experiences of preservice teachers. Given the somewhat early stage of participation in their teacher education programs, preservice teachers' perceptions of early reading and spelling may be shaped most strongly by their own personal experiences in learning to read. The number of individuals with a history of explicit code/based reading instruction exceeds the meaning based group and may account for the prevalence in code based orientation across participants. This finding does not align with similar research in this area where researchers found that preservice teachers tended to agree with implicit meaning based approaches prior to instruction in any specific language structure content (Mather, Bos, & Babur, 2001). Without further information, it is difficult to posit the factors contributing to this finding.

Preparedness. Prior to instruction, preservice teachers rated their preparedness to teach reading, struggling readers, or phonemic awareness/phonics as being “not prepared” to “somewhat prepared”. In addition, they reported completing between 0 and 6 literacy courses, which was positively correlated to their feelings of preparedness. Compared to previous research in this area (i.e., Bos, Mather, Dickson, et al.), preservice teachers in the present study were low in their ratings. Although these feelings were not re-evaluated following instruction, the low ratings indicate a potential need for this instructional content. One can surmise that due to the low ratings, previous literacy courses taken did not offer information on how to teach reading, struggling readers, or phonemic awareness/phonics. However, caution should be used when interpreting this result as no information was gathered on the nature of the content in the literacy courses.

Social Validity of Instruction

Effectiveness, efficiency & appropriateness. Issues related to social validity of this instruction were evaluated and positive findings were observed. The effectiveness, efficiency, and appropriateness of the instructional package were all highly rated by participants. This finding is important for not only preservice teachers, but also the teacher education programs that prepare them. In the present study, preservice teachers seem motivated to learn this content, particularly since it may help them have a stronger sense of “preparedness” to teach young and struggling readers. Given the statistical, practical, and social significance of this training, teacher education programs may be more likely to include such content, particularly in a training module format using online and video technology.

Benefits and Educational Implications

Improvements in letter-sound knowledge and application were achieved in a short instructional period using a 45-minute video tutorial and online study-guide. The video tutorial instructed participants on the speech sounds of English, presented in a systematic and sequential manner. Participants independently completed an online study guide about the alphabetic principle (including video models of speech sound production) in 1.5 to 5 hours. The total time that participants engaged in instruction ranged from 2 to 6 hours over the course of approximately one week. The video tutorial and online study-guide provided repetition and some opportunities for practice while utilizing a programmed instruction feedback format.

The relatively short instructional time and delivery format are appealing when compared to previous models of delivery. In the past, language structure content has been delivered via two-week intensive training courses with extensive yearlong follow-up (Bos, Mather, Friedman-Narr, & Babur, 1999; McCutchen, Abbott, et al. 2002; McCutchen & Berninger, 1999). Although these studies included additional content beyond the alphabetic principle and speech sounds of English, their intensity appears to differ with regard to the efficiency and learner independence found in the training module investigated here.

There are many benefits of the current instructional model for preservice teachers, teacher education programs, and ultimately, children. First and perhaps most importantly, this study shows that language structure content can be broken down into a training module format and be delivered in both an efficient and effective manner. Second, the format of the instruction provides several advantages. This format (a) allows participants to work at an individual pace while taking advantage of available technology for modeling, practice, and feedback, (b) facilitates the easy duplication, dissemination and implementation of content with a high degree of fidelity, and (c) helps minimize strain on already taxed teacher education programs by reducing the demands on personnel and teaching resources. Third, this instructional content fills a void in the preparation and training of preservice teachers. Finally, increases in language structure knowledge in teachers lead to improved student outcomes in reading (McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002). Therefore, this training module (and perhaps additional forthcoming modules) will facilitate the gains in reading achievement that will help close the gap for struggling readers.

Limitations

Although this investigation makes significant contributions to the current knowledge of teacher preparation in the area of language structure, some limitations to the study require consideration. First, the sample size was relatively small which may influence interpretation of results due to sampling error, reliability issues, and power of statistical tests applied to data (Isaac & Michael, 1997).

Second, the sampling procedures may influence the generalizability of the results. Although preservice teachers from several undergraduate courses received equal chance to be involved in the present study, participation was ultimately based on volunteerism. One cannot be certain if the treatment would have been equally effective on groups of preservice teachers who did not volunteer to participate (Isaac & Michael, 1997).

Third, the application and generalization outcome measures did not directly measure preservice teachers' knowledge on "live" students. Although these assessments provide an early and quick glance into a skill set of preservice teachers, they do not provide direct insight into their ability to make instructional decisions with "real life" struggling readers in a classroom setting.

Fourth, preservice teachers may need increased opportunities for practice to reach criterion proficiency and fluency levels. The instruction designed in the present study did not provide ample opportunities for preservice teachers to practice their newly learned skills, particularly with more challenging sounds/letters (e.g., /zh/, /th/, /ou/). While gaining knowledge in an area vital for student success (e.g., alphabetic principle) is important, teachers need to be able to perform at high levels of fluency to have the maximal positive impact on their students.

Fifth, determination of acceptable sound production needs clarification. The scoring procedures for the See-Say task and the participant scoring procedures for the Child Error ID task did not offer clear enough guidelines. It was unclear if one should accept sound production that included a schwa sound (e.g., “buh” vs. /b/) as “correct”. Despite this confusion, there was consistency in scoring across all participants, therefore, mean gain scores are judged to be accurate.

Sixth, because participants were informed prior to study guide completion that they were to be paid \$10.00 per hour, there was an incentive to spend a longer amount of time engaged in instruction and review. This incentive may have influenced the true amount of time participants needed to engage in instruction in order to learn the content.

Finally, the design and delivery of the online self-study guide created for this training module was limited due to the constraints of the available course management system. Some participants did not find the programmed instruction format helpful, perhaps due to the placement of correct responses (e.g., immediately after the “fill-in blank”). The quality of the course (or in this case, training module) can be negatively affected by using web-based learning management systems as the ultimate tool for course development (Johnson, 2004). One must consider the instructional intent and nature of content when designing online learning material rather than be dictated by available course management systems (Johnson, 2004).

Recommendations for Future Research

Empirical evidence suggests that inservice teachers who increase their own language structure knowledge ultimately improve their students’ reading success (McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002). However, it is

unknown if the same holds true for preservice teachers and if they can generalize this declarative knowledge into practice. Therefore, an important line of future research is to examine the generalization of preservice teachers' letter-sound knowledge to the analysis of student reading or spelling errors for instructional decision-making.

Future research should also examine two issues related training. First, the training module reviewed in the present study focuses only on speech sounds of English. This offers a foundation or starting point to discuss many other areas of language knowledge that are necessary to be a well informed and highly qualified teacher of reading. Additional training modules can be developed that focus on more areas of language structure. For example, as Moats and Brady (1997) suggest, instruction in the area of language structure must also include applied knowledge about the linguistic concepts related to reading and writing including: phonetics, phonology, phonics, morphology, syntax, text structure and pragmatics.

The second training issue that should be examined is the delivery and design of the current instructional module. As previous research suggests, computerized programmed instruction offers an effective method for delivering content to college students (Tudor & Bostow, 1991). However, one should not limit the quality of instruction based on the course management system available for use (Johnson, 2004). Providing a correct response only after the participant types in their answer is a better example of active learning. Hence, the learner is more likely to search and recall the answer (rather than simply re-type the response provided).

The design of future training modules must include additional practice opportunities for preservice teachers to engage and apply newly learned content. The

results from the current investigation indicate target content that should be included for additional practice and feedback (e.g., specific letters/sounds: /zh/, /th/, /ou/, etc.). In addition, guided notes should be provided during the video tutorial to ensure active engagement of learners.

Summary

This study provided an investigation of the efficacy of an instructional training module focused on the alphabetic principle. By completing a video tutorial and online study-guide on the speech sounds of English, preservice teachers' increased their oral and written letter-sound correspondence knowledge as well as their ability to apply their knowledge to tasks requiring letter-sound analysis. Future research to extend the generalizability of the newly acquired skills to young and struggling readers is necessary. The instructional training module offered in this study provides an efficient and effective model by which to deliver language structure content to preservice teachers.

“An empowered teacher is one who knows and can implement the best practices of the field, as established by a scientific research consensus” (Moats, 2004, p. 1). By gaining knowledge about the language structure of the English language, preservice teachers can be empowered to be the best, most highly qualified teachers they can be.

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Appendix A

Recommended Course Content (Brady & Moats, 1997)

<p>Conceptual Foundations: Theoretical and scientific underpinnings for understanding literacy development.</p>	<p>Knowledge and Understanding of:</p> <ul style="list-style-type: none"> • relationship b/w spoken and written language • basics of language organization • historical evolution of English • comparison of English writing system w/ other languages. • development of phonological awareness • process of learning to read. • how children progress from a lack of awareness of sound structure of language to full appreciation of speech sounds in words • steps involved in going from non-reader with no concepts regarding print to initial strategies employed by beginning readers, to sophisticated abilities of skilled readers. • importance of automaticity in decoding • importance of vocabulary concepts • importance of text structures • importance of comprehension strategies • what constitutes adequate research evidence • research regarding sources of difficulty for individuals who are having trouble learning to read • strengths are central to skilled reading. <p>Ability to:</p> <ul style="list-style-type: none"> • assess a child’s progress in learning to read and make informed decisions about the relevance of specific teaching techniques • critique future claims about reading acquisition, reading failure, or “new” methods of instruction. <ul style="list-style-type: none"> • Introduction to concepts of phonetics, phonology, phonics, morphology, syntax, text structure, and pragmatics. • Ability to apply the content (above) by interpreting student errors in reading and writing, giving corrective feedback, designing instructional activities, and critiquing existing instructional materials. • Working knowledge of units and rules of spoken and written English.
<p>Knowledge of Structure of Language: Linguistic units of speech and print.</p>	<p>Knowledge of:</p> <ul style="list-style-type: none"> • English speech sound system and its production (phonetics and phonology) • structure of English orthography and its relationship to sounds and meaning (phonics and morphology). • phoneme-grapheme correspondence (phonics) and of spelling generalizations and rules (single and multisyllable words) • major patterns for dividing words into their syllables • most frequent morpheme patterns (prefix, suffix, roots, etc) <p>Ability to identify:</p> <ul style="list-style-type: none"> • produce, classify, and manipulate the speech sounds in English

Appendix B

Background Information

Directions: Answer each question. Circle on the correct answer.

1. Gender
 - a. Female
 - b. Male

2. Age
 - a. 24 or under
 - b. 25-30
 - c. 31-40
 - d. 41-50
 - e. 51 or older

3. Ethnicity
 - a. Anglo
 - b. Hispanic
 - c. African American
 - d. Asian/Pacific Islander
 - e. Native American
 - f. Other

4. Do you speak more than one language proficiently?
 - a. yes
 - b. no

5. Are you working toward an Elementary Education teaching certificate?
 - a. yes
 - b. no

6. Are you working toward a Special Education teaching certificate/endorsement?
 - a. yes
 - b. no

7. Have you worked as an instructional aide?
 - a. yes
 - b. no

8. Have you taught reading in an instructional setting (e.g., classroom, tutorial)?
 - a. yes
 - b. no

9. Highest degree earned:
 - a. High school
 - b. AA
 - c. BA/BS
 - d. MA/Med/MS

11. Have you worked as a teacher?
 - a. yes
 - b. no

12. Number of courses in teaching reading and language arts
 - a. 1
 - b. 2-3
 - c. 4-6
 - d. 7 - 10
 - e. > 10

13. How well do you think you are prepared to teach **children** how to read?
 - a. not prepared
 - b. somewhat prepared
 - c. adequately prepared
 - d. well prepared

14. How well do you think you are prepared to teach **struggling readers** how to read?
 - a. not prepared
 - b. somewhat prepared
 - c. adequately prepared
 - d. well prepared

15. How well do you think you are prepared to use **phonological awareness and phonics** in teaching early reading?
 - a. not prepared
 - b. somewhat prepared
 - c. adequately prepared
 - d. well prepared

Appendix C		HEAR-WRITE PHONEME-GRAPHEME PROBE	
Letter(s)	Sample Word	Letter(s)	Sample Word
1. _____	like in the word _____	27. _____	like in the word _____
2. _____	like in the word _____	28. _____	like in the word _____
3. _____	like in the word _____	29. _____	like in the word _____
4. _____	like in the word _____	30. _____	like in the word _____
5. _____	like in the word _____	31. _____	like in the word _____
6. _____	like in the word _____	32. _____	like in the word _____
7. _____	like in the word _____	33. _____	like in the word _____
8. _____	like in the word _____	34. _____	like in the word _____
9. _____	like in the word _____	35. _____	like in the word _____
10. _____	like in the word _____	36. _____	like in the word _____
11. _____	like in the word _____	37. _____	like in the word _____
12. _____	like in the word _____	38. _____	like in the word _____
13. _____	like in the word _____	39. _____	like in the word _____
14. _____	like in the word _____	40. _____	like in the word _____
15. _____	like in the word _____	41. _____	like in the word _____
16. _____	like in the word _____	42. _____	like in the word _____
17. _____	like in the word _____	43. _____	like in the word _____
18. _____	like in the word _____		
19. _____	like in the word _____		
20. _____	like in the word _____		
21. _____	like in the word _____		
22. _____	like in the word _____		
23. _____	like in the word _____		
24. _____	like in the word _____		
25. _____	like in the word _____		
26. _____	like in the word _____		

Appendix D

Preservice Teacher See-Say Probe Sheet

p oi ey j o ur ph
ou sh wh ai i ea th
aw c ar au or z t
gh qu r b igh k w
v oo ee h oy m oa
a l ew ch y ow u
x ay s e f ng g
oe ir er d n

Appendix E

Child Error Identification Response Sheet

Listen and watch the video of a child producing speech sounds.

Here is a list of the letter(s) the child is seeing.

Mark + for correct production. Mark — for incorrect production or omission (no response).

p	oi	ey	j	o	ur	ph
pop___	oil___	hey___ valley___	jump___	hot___ pole___	fur___	phone___
ou	sh	wh	ai	i	ea	th
out___ soup___	shoe___	what___	paid___ said___	sip___ life___	eat___ head___	thumb___ these___
aw	c	ar	au	or	z	t
saw___	cat___ city___	far___ dollar___	haul___	horn___ doctor___	zoo___	tall___
gh	qu	r	b	igh	k	w
laugh___	queen___	red___	boat___	sigh___	kite___	wait___
v	oo	ee	h	oy	m	oa
vest___	boot___ foot___	see___	hot___	toy___	man___	soap___
a	l	ew	ch	y	ow	u
hat___ tape___	life___	chew___	chip___ christ___ chute___	yes___ funny___ sky___	cow___ tow___	up___ cute___
x	ay	s	e	f	ng	g
box___ x-ray___	pay___	sit___	pet___	fish___	ring___	go___ gym___
oe	ir	er	d	n		
toe___	sir___	her___	dog___	not___		

Total Correct _____

Percent _____

Appendix F

Identify Regular vs. Irregular Words

Read the following words. Determine if the word is phonetically “regular” or “irregular”. In other words, could a child successfully “sound out” the word based on common/typical letter-sound correspondence? Mark the correct box with an “X”.

		Regular	Irregular
1	said		
2	of		
3	should		
4	walk		
5	one		
6	would		
7	tree		
8	porch		
9	was		
10	bent		
11	they		
12	could		
13	slug		
14	none		
15	shift		
16	must		
17	give		
18	shoe		
19	come		
20	stamp		
21	some		
22	calm		
23	paid		
24	cream		
25	know		
26	the		
27	back		
28	write		
29	stripe		
30	climb		

Appendix G

Teacher Knowledge of Language Structure

1. Which word contains a short vowel sound?
 - a. treat
 - b. start
 - c. slip
 - d. cold
 - e. point

2. A phoneme refers to:
 - a. a single letter
 - b. a single speech sound
 - c. a single unit of meaning
 - d. a grapheme

3. A pronounceable group of letters containing a vowel sound is a:
 - a. a phoneme
 - b. a grapheme
 - c. a syllable
 - d. morpheme

4. If tife were a word, the letter “i” would probably sound like the “i” in:
 - a. if
 - b. beautiful
 - c. find
 - d. ceiling
 - e. sing

5. A combination of two or three consonants pronounced so that each letter keeps its own identity is called a:
 - a. silent consonant
 - b. consonant digraph
 - c. diphthong
 - d. consonant blend

6. Example of a voiced and unvoiced consonant pair would be:
 - a. b – d
 - c. g - j

¹Selected items were adapted from:

Lerner, J. W. (1997). *Learning disabilities: Theories, diagnosis, and teaching strategies*, (7th ed.). New York: Houghton Mifflin.

Moats, L. C. (1994). The missing foundation in teacher education: Knowledge of the structure of spoken and written language. *Annals of Dyslexia*, 44, 81-102.

Rath, L. K. (1994). The phonemic awareness of reading teachers: Examining aspects of knowledge. Unpublished doctoral dissertation, Harvard University, Cambridge.

- b. p – b d. c - s
7. Two combined letters that represent one single speech sound are a:
- schwa
 - consonant blend
 - phonetic
 - digraph
 - diphthong
8. How many speech sounds are in the word “eight”?
- two
 - three
 - four
 - five
9. How many speech sounds are in the word “box”?
- one
 - two
 - three
 - four
10. How many speech sounds are in the word “grass”?
- two
 - three
 - four
 - five
11. What type of task would this be?
Say the word “cat.” Now say cat without the /c/ sound.
- blending
 - rhyming
 - segmentation
 - deletion
12. What type of task would this be?
“I am going to say some sounds that will make one word when you put them together.
What does /sh/ /oe/ say?”
- blending
 - rhyming
 - segmentation
 - manipulation
13. Mark the statement that is false:
- Phonological awareness is a precursor to phonics.
 - Phonological awareness is an oral language activity

- c. Phonological awareness is a method of reading instruction that begins with individual letters and sounds.
 - d. Many children acquire phonological awareness from language activities and reading.
14. What is the second sound in the word “queen”?
- a. u
 - b. e
 - c. k
 - d. w
15. A reading method that focuses on teaching the application of speech sounds to letters is called:
- a. phonics
 - b. phonemics
 - c. orthography
 - d. phonetics
 - e. either a or d
16. A soft c is in the word :
- a. Chicago
 - b. cat
 - c. chair
 - d. city
 - e. none of the above
17. Identify the pair of words that begins with the same sound.
- a. joke - goat
 - b. chef - shoe
 - c. quiet - giant
 - d. chip - chemist

The next two items involve saying a word and then reversing the order of the sounds. For example, the word “back” would be “cab.”

18. If you say the word, and then reverse the order of the sounds, ice would be:
- a. easy
 - b. sea
 - c. size
 - d. sigh
19. If you say the word, and then reverse the order of the sounds, enough would be:
- a. fun
 - b. phone
 - c. funny
 - d. one

20. All of the following nonsense words have silent letters, except:
- a. bamb
 - b. wrin
 - c. shipe
 - d. knam
 - e. phop

Appendix H
Pretest

Teacher Perceptions About Early Reading and Spelling²

Directions: As a teacher, think about what you believe about early reading and spelling instruction. Select the response that **best** indicates to what degree you agree with each item and circle your response on this answer sheet.

	Strongly Agree	Agree	Mildly Agree	Mildly Disagree	Disagree	Strongly Disagree
1. K-2 teachers should know how to assess and teach phonological awareness (i.e., knowing that spoken language can be broken down into smaller units, words, syllables, phonemes).	SA	A	MA	MD	D	SD
2. Literacy experiences in the home contribute to early reading success.	SA	A	MA	MD	D	SD
3. Controlling text through consistent spelling patterns (The fat cat sat on a hat.) is an example of an effective method for children who struggle to learn to identify words.	SA	A	MA	MD	D	SD
4. Poor phonemic awareness (awareness of the individual sounds in words) contributes to early reading failure.	SA	A	MA	MD	D	SD
5. Materials for struggling readers should be written in natural language with little regard for the difficulty of vocabulary.	SA	A	MA	MD	D	SD

²Selected items were adapted from: Deford, D .E. (1985). Validating the construct of theoretical orientation in reading. *Reading Research Quarterly*, 20, 351-367.

6. Time spent reading contributes directly to reading improvement.	SA	A	MA	MD	D	SD
7. Learning to use context clues (syntax and semantics) is more important than learning to use grapho-phonics cues (letters and sounds) when learning to read.	SA	A	MA	MD	D	SD
8. If a beginning reader reads “house” for the written word “home,” the response should not be corrected.	SA	A	MA	MD	D	SD
9. Children should read different types of text for different instructional purposes.	SA	A	MA	MD	D	SD
10. K-2 teachers should know how to teach phonics (letter/sound correspondences).	SA	A	MA	MD	D	SD
11. Picture cues can help children identify words in the early stages of reading.	SA	A	MA	MD	D	SD
12. It is important for teachers to demonstrate to struggling readers how to segment words into phonemes when reading and spelling.	SA	A	MA	MD	D	SD
13. Adult-child shared book reading enhances language and literacy growth.	SA	A	MA	MD	D	SD
14. Phonic instruction is beneficial for children who are struggling to learn to read.	SA	A	MA	MD	D	SD

15. All children can learn to read using literature-based, authentic texts.	SA	A	MA	MD	D	SD
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Posttest

Teacher Perceptions About Early Reading and Spelling³

Directions: As a teacher, think about what you believe about early reading and spelling instruction. Select the response that *best* indicates to what degree you agree with each item and circle your response on this answer sheet.

	Strongly Agree	Agree	Mildly Agree	Mildly Disagree	Disagree	Strongly Disagree
1. K-2 teachers should know how to assess and teach phonological awareness (i.e., knowing that spoken language can be broken down into smaller units, words, syllables, phonemes).	SA	A	MA	MD	D	SD
2. Literacy experiences in the home contribute to early reading success.	SA	A	MA	MD	D	SD
3. Controlling text through consistent spelling patterns (The fat cat sat on a hat.) is an example of an effective method for children who struggle to learn to identify words.	SA	A	MA	MD	D	SD
4. Poor phonemic awareness (awareness of the individual sounds in words) contributes to early reading failure.	SA	A	MA	MD	D	SD
5. Materials for struggling readers should be written in natural language with little regard for the difficulty of vocabulary.	SA	A	MA	MD	D	SD

³Selected items were adapted from: Deford, D .E. (1985). Validating the construct of theoretical orientation in reading. *Reading Research Quarterly*, 20, 351-367.

6. Time spent reading contributes directly to reading improvement.	SA	A	MA	MD	D	SD
7. Learning to use context clues (syntax and semantics) is more important than learning to use grapho-phonics cues (letters and sounds) when learning to read.	SA	A	MA	MD	D	SD
8. If a beginning reader reads “house” for the written word “home,” the response should not be corrected.	SA	A	MA	MD	D	SD
9. Children should read different types of text for different instructional purposes.	SA	A	MA	MD	D	SD
10. K-2 teachers should know how to teach phonics (letter/sound correspondences).	SA	A	MA	MD	D	SD
11. Picture cues can help children identify words in the early stages of reading.	SA	A	MA	MD	D	SD
12. It is important for teachers to demonstrate to struggling readers how to segment words into phonemes when reading and spelling.	SA	A	MA	MD	D	SD
13. Adult-child shared book reading enhances language and literacy growth.	SA	A	MA	MD	D	SD
14. Phonic instruction is beneficial for children who are struggling to learn to read.	SA	A	MA	MD	D	SD

15. All children can learn to read using literature-based, authentic texts.	SA	A	MA	MD	D	SD
---	----	---	----	----	---	----

Continue to Part 2 (experimental group only)

Part 2 Directions:

Think about the study guide and video instruction sessions you just completed. Select the response that **best** indicates to what degree you agree with each item and circle your response on this answer sheet. Questions 4, 5, and 6 require written responses. Thank you for your time.

1. How effective was the supplemental instruction to improving your language knowledge related to reading and spelling?	Very Effective 5	4	3	2	1	Not Effective 0
2. Do you feel that the supplemental instruction was an efficient use of your outside class time?	Very Efficient 5	4	3	2	1	Not Efficient 0
3. How appropriate would it be for other preservice teachers to learn this content?	Very Appropriate 5	4	3	2	1	Not Appropriate 0
4. Which components of the supplemental instruction were the most helpful to you? (please list)						
5. Which components of the supplemental instruction were the least helpful to you? (please list)						
6. How could the supplemental instruction be improved? (please describe)						

Adapted from McNaughton (1995)

Appendix I

Teacher Perception Survey Questions	Classification by Theoretical Orientation
1. K-2 teachers should know how to assess and teach phonological awareness (i.e., knowing that spoken language can be broken down into smaller units, words, syllables, phonemes).	Code Based
2. Literacy experiences in the home contribute to early reading success.	Neutral
3. Controlling text through consistent spelling patterns (The fat cat sat on a hat.) is an example of an effective method for children who struggle to learn to identify words.	Code Based
4. Poor phonemic awareness (awareness of the individual sounds in words) contributes to early reading failure.	Code Based
5. Materials for struggling readers should be written in natural language with little regard for the difficulty of vocabulary.	Meaning Based
6. Time spent reading contributes directly to reading improvement.	Neutral
7. Learning to use context clues (syntax and semantics) is more important than learning to use grapho-phonetic cues (letters and sounds) when learning to read.	Meaning Based
8. If a beginning reader reads “house” for the written word “home,” the response should not be corrected.	Meaning Based
9. Children should read different types of text for different instructional purposes.	Neutral
10. K-2 teachers should know how to teach phonics (letter/sound correspondences).	Code Based
11. Picture cues can help children identify words in the early stages of reading.	Meaning Based
12. It is important for teachers to demonstrate to struggling readers how to segment words into phonemes when reading and spelling.	Code Based
13. Adult-child shared book reading enhances language and literacy growth.	Neutral
14. Phonic instruction is beneficial for children who are struggling to learn to read.	Code Based
15. All children can learn to read using literature-based, authentic texts.	Meaning Based

Appendix J

Shannon's Dissertation - Microsoft Internet Explorer provided by Compaq

File Edit View Favorites Tools Help



Show Map | Help | Log Off | My Profile
SHANNON GORMLEY

About Calendar Content Members In Touch Tools

Shannon's Dissertation

2. The next phoneme pair is /t/ and /d/.

The tip of your tongue taps behind your front teeth for both /t/ (like in top) and /d/ (like in dog).



Press play for /t/

Press play for /d/

Can you determine which sound uses your voice? Which one does not use your voice?

/t/ is the unvoiced sound....no vocal vibration.

start | Shannon's Dissertatio... | Dissertation Final Aft... | Internet | 11:49 AM

Shannon's Dissertation - Microsoft Internet Explorer provided by Compaq

File Edit View Favorites Tools Help

Show Map | Help | Log Off | My Profile
SHANNON GORMLEY

About Calendar Content Members In Touch Tools

Shannon's Dissertation

/d/ is the voiced sound...your vocal cords are vibrating when you say */d/ /d/ /d/*.

The phoneme */t/* is represented in print by the grapheme T.

The phoneme */d/* is represented in print by the grapheme D.

Question:

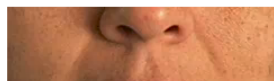
The two sounds _____ *t/* and _____ *d/* are a pair.

Both sounds are produced the _____ same way in your mouth.

/t/ is _____ unvoiced and */d/* is voiced because the vocal cords are _____ vibrating.

3. The next phoneme pair is */k/* and */g/*.

The back of your tongue kicks or scrapes the roof of your mouth for both */k/* (like in *kite*) and */g/* (like in *go*).



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Publications

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