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# Promoting Literacy Development in the Early Childhood Classroom: An Evaluation of Phonemic Awareness and Phonics Instruction

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# PROMOTING LITERACY DEVELOPMENT IN THE EARLY CHILDHOOD CLASSROOM: AN EVALUATION OF PHONEMIC AWARENESS AND PHONICS INSTRUCTION

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**Abstract**

Research has consistently demonstrated that literacy skills are associated with a host of benefits that are both substantial and long lasting. Given the implications of reading skill development, efforts to understand the most effective methods of teaching students how to read are consequential. Fortunately, substantial research has been conducted on this topic and has subsequently highlighted two essential building blocks of a balanced literacy framework: phonemic awareness and phonics. The current literature on the reading acquisition process shows that if students are to benefit from phonics instruction, they must have a certain level of phonemic awareness proficiency. The question remains, however, as to the amount of phonemic awareness mastery one must have to maximally benefit from formal phonics programming. The current study utilized a randomized, quasi-experimental group design with a delayed treatment control component to compare the reading outcomes of early elementary students who master phonemic awareness prior to phonics instruction versus those who begin phonics with only rudimentary phonemic awareness skill development. Effects on participants' phonemic segmentation, letter naming, and pseudoword reading scores were examined through repeated measures analyses of variance. In sum, participants in both treatment groups demonstrated substantial mean gains in reading skills over time. Furthermore, when equating for instructional time across conditions, participants exhibited relatively superior literacy ability when phonemic awareness was mastered prior to beginning extensive phonics instruction. The implications of these findings for the reading acquisition process in applied settings are discussed, in addition to recommendations for future research.

## Introduction

Accountability in education has become an increasingly prominent issue in the education policy landscape. While accountability systems can take varied forms, they often operate by providing incentives and/or penalties to schools contingent upon student performance data, as measured by state standardized assessments. The No Child Left Behind (NCLB) Act of 2001, which was passed as a reauthorization of the Elementary and Secondary Education Act (ESEA) and signed into law in the United States in 2002, heavily emphasizes the school accountability agenda (No Child Left Behind [NCLB], 2003). Under NCLB, states must implement rigorous academic standards and test students annually, with the primary purpose being to evaluate student achievement in relation to statewide progress objectives. Another benchmark of the bill is the requirement of states, school districts, and schools to report assessment results, which are made public in annual report cards. Should schools be unable to demonstrate "adequate yearly progress" (AYP) toward proficiency targets, they may be subject to school improvement, corrective action, and/or restructuring measures. NCLB encompasses numerous other federal education programs as well, however the accountability requirements have arguably had the largest influence on American public education.

The standards and assessment provisions of NCLB specifically require the implementation of rigorous academic standards in reading and mathematics, as well as annual testing in both subjects. As originally written, the mandate requires that all students reach proficiency by the end of the 2013-2014 school year (NCLB, 2003). Unfortunately, nearly a decade after NCLB was passed in 2002, Congress had not been able to reauthorize the act. To address concerns associated with NCLB and provide flexibility within the law, the U.S. Department of Education announced the provision of waiver agreements in 2011 (U.S.

Department of Education, 2011). In order for State Education Agencies (SEAs) to receive flexibility regarding select requirements of NCLB, they must develop and adopt plans to implement a series of reform measures in the areas of academic standards, assessments, and accountability systems. As is the case with the original mandates of NCLB, the reforms outlined in state waiver agreements maintain an intense emphasis on the subjects of reading and mathematics.

**Fundamental Importance of Literacy**

The concentration on reading in federal and state education policy comes as no surprise when one considers the evidenced significance of the skill. As research has consistently demonstrated, a solid foundation in literacy is inevitably linked to and necessary for success in all formal education. In a study examining the effects of literacy instruction, Cantrell (1999) found that primary students who received recommended instructional practices significantly outperformed the comparison group on assessments of reading and writing, including measures of comprehension, fluency, writing quality, and use of language mechanics. There is also evidence to indicate long-term academic benefits of literacy achievement. For example, research shows that a student's vocabulary size at the end of first grade predicts his or her reading comprehension ten years later with compelling accuracy (Biemiller, 2012). In addition to the implications of literacy achievement on reading and writing skills themselves, literacy serves as a basic requirement for academic success in other content areas. As students progress through middle school, high school, and beyond, they are expected to read increasingly difficult content area texts. Chall and Jacobs (2003) state that "in order to read, understand, and learn from these more demanding texts, the readers must be fluent in recognizing words, and their vocabulary and knowledge need to expand, as does their ability to think critically and broadly" (p. 14). Alluding

to this view is the notion that typically developing students transition from "learning to read" to "reading to learn" (Chall, 1983). In essence, literacy is a gateway to success for all current and future learning.

Not surprisingly, literacy skills are also associated with a host of benefits that extend beyond the classroom. For example, research has demonstrated that individuals who acquire strong literacy skills show improved self-esteem (Bown, 1990). As Galbraith and Alexander (2005) point out, a student

> who fails initially to achieve reading skills will soon develop a lack of confidence in his/her own ability to succeed. S/he will begin to avoid potentially humiliating situations and will refuse to take risks for fear of failure. The consequent negative self-belief may diminish the opportunities to acquire and refine the cognitive strategies that are characteristic of proficient learners. (p. 29)

Literacy has other empowering qualities as well, providing individuals with the capacity to exercise increased control on their surroundings. Easton (2005) notes that participation in literacy programs facilitates the development of learners "into authors of their own learning, developers of their own knowledge and partners in dialogue about limit situations in their lives" (p. 7). It is no wonder, then, that a robust relationship exists between educational attainment, particularly mastery of fundamental reading skills, and specific democratic behavior. Educated individuals are more likely to demonstrate democratic citizenship in the form of increased voter turnout, enhanced political knowledge, and attainment of civic skills that are necessary to navigate the political process (Hillygus, 2005). Rosenstone and Hansen (1993) explain that as a result of "their schooling, the well educated have the skills people need to understand the abstract subject of politics, to follow the political campaign, and to research and evaluate the issues and candidates" (p. 136).

While the evidence is still emerging, there is also a promising body of literature highlighting the social and economic benefits of literacy. For example, participation in literacy programs is associated with reduced infant mortality (Sandiford, Cassel, Montenegro, & Sanchez, 1995), gains in health-related knowledge and practices (Burchfield, Hua, Baral, & Rocha, 2002), and gender equality (Horsman, 1990; Jutting, Morrisson, Dayton-Johnson, & Drechsler, 2008). The relationship between literacy achievement and economic benefits at both the individual and aggregate level has also been well established. The 2003 National Assessment of Adult Literacy (NAAL), conducted by the National Center for Education Statistics (NCES), is the United States' most extensive study of literacy commissioned by the government (Kutner et al., 2007). The direct measure was administered to over 19,000 individuals ages 16 and older to assess achievement in three types of literacy: prose, document, and quantitative. The results of the survey provide a large set of data that illustrate the literacy skills of the American adult population, as well as the specific profile of literacy abilities exhibited by the workforce.

Although caution should be taken while interpreting such complex variables and interactions, the findings demonstrate the notable benefits associated with advanced levels of literacy, such as increased labor force participation and earnings. More specifically, in 2003, individuals with higher literacy levels were more likely to be employed full-time and in professional occupations, whereas many adults with lower levels of literacy worked in service jobs. Adults exhibiting higher levels of literacy typically earned higher wages as well. Furthermore, low literacy skills disproportionally impacted women and their ability to earn sustaining wages (Kutner et al., 2007). The results of the NAAL mirror findings of other research projects investigating the effect of literacy on life outcomes. Dugdale and Clark (2008) note that improved literacy rates reduce men's likelihood of being on state benefits from 19% to 6%, and

only a moderate rise in a man's level of literacy increases his likelihood of owning his own house from 40% to 78%. The preponderance of data on this topic clearly demonstrates that the return on investment for strong literacy skills is substantial.

The corollary to the evidence noted above is the fact that deficits in an individual's literacy development can have negative, long-term ramifications. An analysis utilizing data from the 1979 Bureau of Labor Statistics' National Longitudinal Study presents disquieting findings (Hernandez, 2011). Upon examining the reading scores and subsequent graduation rates of nearly 4,000 students, the author found that those who struggled with reading in early elementary grades comprised 88% of students who did not earn a high school diploma. Interestingly, 70% of students who did not receive a diploma spent at least one year living in poverty, making poverty an even less reliable predictor of graduation rates than poor literacy skills. Third grade was found to be an especially critical point for students' education. The research analysis revealed that one in six children who cannot read proficiently in the third grade are unable to graduate from high school on time. This is four times the rate for students who demonstrate proficient reading skills in the third grade (Hernandez, 2011). The Children's Literacy Initiative highlights the extent to which literacy is a powerful determinate for life outcomes, noting that the ability to read "is strongly linked to success in school and, consequently, success in life. Americans are faced with disheartening statistics: 85 percent of the juveniles who appear in court and 75 percent of unemployed adults are illiterate" (Adams, 1990). While the statistics are daunting, understanding the implications of poor literacy development is essential for a thorough interpretation of this critical issue.

**Literacy in the United States**

Research substantiating the negative consequences that can result from a faulty foundation in literacy skills is especially noteworthy when one considers the overall picture of our nation's reading proficiency levels. The National Assessment of Educational Progress (NAEP), a congressionally authorized assessment of student achievement, provides data regarding the academic performance of elementary and secondary students in various subjects (National Center for Education Statistics [NCES], 2013). The reading measure specifically requires students to answer multiple-choice and constructed-response comprehension questions based on grade-level reading material.

The results, which are provided to the public in what is commonly referred to as the Nation's Report Card, highlight trends at the national, state, and local levels. Student achievement is detailed in terms of performance standards, which are used to categorize scores into basic, proficient, and advanced levels. According to the most current NAEP data released in 2013, over 30% of fourth-grade students cannot perform at even a basic level of reading achievement. While some individual states did demonstrate improvement, the average score for fourth-graders was not substantially different from the 2011 national reading score. Among eighth-graders, over 20% of students attained scores that were considered below basic. Unfortunately, reading achievement data for students in Grade 12 were not available in 2013, however the most recent data collected in 2009 revealed that over 25% of 12th-graders performed at below basic levels in reading. In sum, the NAEP results indicate that a substantial number of students in elementary and secondary school cannot demonstrate even a partial mastery of rudimentary comprehension skills when reading grade-appropriate text (NCES, 2013).

The literacy abilities of adults in the United States have also been of paramount importance to researchers and policymakers alike. According to the 2003 National Assessment of Adult Literacy (NAAL) analyses, as many as 11 million American adults are not literate in English, equating to roughly 5% of the adult population (White & Dillow, 2005). Debate exists as to whether these results indicate a serious dilemma for the country. The vast majority of those who demonstrated limited reading ability self reported sufficient reading and writing skills and little support needed to accomplish common, everyday literacy tasks. Nevertheless, sufficient data support the view that limited reading skills still negatively correlate with indicators of successful life functioning. For example, adults who exhibited skills in the lowest levels of performance were substantially more likely to live in poverty and rely on government assistance (White & Dillow, 2005). The stark reality is that far too many Americans, both children and adults, cannot read proficiently.

**Literacy in Low-Income Communities**

Unfortunately, individuals living in low-income and under-resourced communities are often those that are most plagued by the ill effects of poor literacy development. This finding is notably demonstrated in a classic study conducted by researchers Betty Hart and Todd Risley (Hart & Risley, 1995). Over the course of more than two years, the interactions between parents and their children were observed, transcribed, and analyzed for 42 families. The researchers specifically took data on families' language, vocabulary, and interaction styles. The demographics of the families varied widely: 6 were living on welfare, 13 were lower socioeconomic status, 10 were middle socioeconomic status, and 13 were considered upper socioeconomic status. The results of the researchers' work were the first of its kind to highlight just how influential children's early experiences are for their development. The data specifically

revealed that there exists a substantial discrepancy between the number of words poorer children encounter, as compared to the verbal language exposure for children living in more affluent homes. Children living in the lowest sector of the socioeconomic scale were exposed to roughly 13 million words over four years, while those in the upper end of the socioeconomic scale heard a total of 45 million words. As a result, children living in poverty are already at a tremendous disadvantage in terms of language exposure and development when they enter their first year of formal schooling.

In addition to the sheer number of words communicated, the researchers analyzed the patterns of interactions and communication styles between parents and their children. The results revealed striking differences in the number of praise and reprimand statements heard by children. Those living in higher income households were exposed to roughly six encouragements for every one discouragement. On the other hand, the ratio of encouragements to discouragements for the average child living in welfare was two to one. The findings, which were extrapolated to further understand the long-term implications of early cumulative experience, showed that these were lasting effects that did not diminish over time. Children's rate of growth exhibited at age three predicted their academic performance six and seven years later. More specifically, children's vocabulary use and rate of vocabulary growth at age three was strongly predictive of later scores on the Peabody Picture Vocabulary Test-Revised (PPVT-R) of receptive vocabulary and the Test of Language Development-2: Intermediate (TOLD). Vocabulary use was also strongly correlated with reading comprehension abilities, as measured by the Comprehensive Test of Basic Skills (CTBS/U). The disparities in foundational literacy skills between low- and high-income children clearly have impactful and long-lasting effects. Hart & Risley (2003) summarize the implications

of their findings by noting that "the problem of skill differences among children at the time of school entry is bigger, more intractable, and more important than we had thought" (p. 9).

When such data are taken into account, it is perhaps not surprising that students attending low-income schools consistently underperform on measures of literacy, as compared to their peers living in more affluent communities. The NAEP reports illuminate the disparities that persist between groups of students from different socioeconomic backgrounds, as well as differences in literacy skills that are apparent by race and ethnicity. Long-term trend data reveal that although gaps have narrowed between black and white students since 1980, white students attained average scores in reading that were at least 26 points higher than black students (Vanneman, Hamilton, Anderson, & Rahman, 2009). Researchers have noted that this gap that is divided among racial lines extends throughout students' formal schooling (Irvine, 1990).

The Matthew effect, a term adopted for use in the education domain by psychologist Keith Stanovich, may help to explain why faulty reading skills in school continue to persist over time. In essence, the Matthew effect refers to the phenomenon that the academically rich get richer, while the academically poor get poorer (Stanovich, 1986). Numerous researchers have found convergent evidence indicating that a student's reading ability is linked to reading volume and subsequent vocabulary development. Allington (1984) analyzed the extent to which student groups that varied in reading level were exposed to significantly different amounts of contextual reading. The data revealed that groups comprised of more advanced readers were exposed to more reading overall during instructional sessions, as compared to groups made of students with lower literacy skills. Fielding, Wilson, and Anderson (1986) found similar effects in literacy practices outside of school, with students' reading abilities positively correlated with the amount of time spent reading independently. Furthermore, there is a general consensus among researchers

that increased reading volume drives growth in students' vocabulary knowledge (Nagy, Herman, & Anderson, 1985). Students with early literacy skills will subsequently read more, exhibit growth in the size of their vocabulary, and continue to improve their reading skills. In essence, reading spawns reading in an exponential fashion. As Stanovich (1986) notes, there is the likelihood "that processes may be interlocked with reading relationships of reciprocal causation: that individual differences in a particular process may cause differential reading efficiency, but that reading itself may in turn cause further individual differences in the process in question" (p. 378). He describes such relationships as "bootstrapping" and goes on to explain that attention need be paid to

> the concepts of reciprocal relationships - situations where the causal connection between reading ability and the efficiency of a cognitive process is bidirectional - and organism-environment correlation - the fact that differentially advantaged organisms are exposed to nonrandom distributions of environmental quality. (p. 360)

The notion that individuals both select and are acted on by environmental changes helps to explain the Matthew effect phenomenon that is so readily observed in proficient readers.

The unfortunate reality is that the absence of early reading skills can engender similar reciprocal causation that results in a negative downward spiral toward poor reading outcomes. If a student lacks basic reading skills in the early elementary grades, he or she will likely be exposed to a smaller volume of print and new words. His or her vocabulary acquisition will be detrimentally affected, which will inhibit further growth in reading. Furthermore, research indicates that poor readers tend to be exposed to reading material that is too challenging for advantageous instruction (Gambrell, Wilson, & Gantt, 1981). Stanovich (1986) points out that a lack of reading practice and exposure to overly difficult material combine to result in

> unrewarding early reading experiences that lead to less involvement in reading-related activities. Lack of exposure and practice on the part of the less skilled reader delays the development of automaticity and speed at the word-recognition level . . . reading for

> meaning is hindered, unrewarding reading experiences multiply, and practice is avoided or merely tolerated without real cognitive involvement. The downward spiral continues . . . (p. 364)

**Literacy and Early Childhood Education**

Fortunately, developments in recent research show that participation in high quality pre-kindergarten programs can decrease students' likelihood of entering the downward spiral in the first place. The burgeoning research has contributed significantly to the rising trend in early childhood education enrollment across the country. The percentage of children in center-based care prior to entering kindergarten remained relatively stable between the years of 1995 and 2007. Since 2007, however, the proportion has increased from 55% to 61%. These trends are evident across race, ethnic, and socioeconomic lines (Federal Interagency Forum on Child and Family Statistics, 2013). States have played an especially prominent role in supporting early childhood education, with state-funded pre-kindergarten programs serving more than 1.3 million children annually (Barnett, Carolan, Fitzgerald, & Squires, 2012). While the characteristics of these programs vary from state to state, their increasing numbers have provided researchers with ample opportunity to evaluate the effects of pre-k programming for students.

In an analysis of the Georgia Pre-Kindergarten Program, Henry et al. (2003) found that low-income students, on average, began preschool scoring below national norms on measures of letter and word recognition. Those who attended preschool, however, demonstrated significant gains, scoring above national norms upon completion of the program. Findings from research evaluating the effectiveness of New Mexico's pre-kindergarten program also revealed a number of benefits for participants. Those who completed the program exhibited growth in various areas of academic functioning, most notably early literacy. The literacy scores of participants increased by an average of 23 raw score points, representing a gain of roughly 130% of the standard

deviation for the control group. The specific subtests that were statistically significant included the Phonological Awareness, Alphabetic Principle, and Concepts About Print measures. The effect of preschool participation on students' receptive vocabulary skills was also significant (Hustedt, Barnett, Jung, & Friedman, 2010).

A number of longitudinal studies indicate that gains evident at the conclusion of preschool participation maintain over time. Researchers evaluating Louisiana's LA 4 Early Childhood Program analyzed scores on the state standardized assessment, the Louisiana Educational Assessment Program (LEAP) test. Given the nonrandom assignment of participants into groups and the fact that those who sought LA 4 may be different from those who did not, the results should be considered with caution. Nevertheless, the analysis showed promising findings. On all eighth grade LEAP measures, at-risk students who participated in LA 4 outperformed at-risk students who did not participate (Cecil J Picard Center for Child Development and Lifelong Learning, 2013). Evaluations of public pre-k programs in New Jersey and Texas also revealed long-term benefits in literacy achievement for participating students, as measured by assessments administered throughout elementary school (Andrews, Jargowsky, & Kuhne, 2012). Taken together with the growing body of literature highlighting the benefits of preschool for literacy achievement, these studies demonstrate the importance of providing young children with a developmentally appropriate foundation in early literacy skills.

**Call for Evidence-Based Research**

In 1997, upon request from Congress, the National Institute of Child Health and Human Development formed the National Reading Panel (NRP) to evaluate the research base surrounding, among other topics, best practices in reading instruction. The panel, which was comprised of 14 individuals considered to be leaders in the field of reading research, was

specifically convened to provide a report based on the current research available regarding how students learn to read (National Institute of Child Health and Human Development [NICHD], 2000). In addition, the goals of the NRP were to provide recommendations on how to disseminate their findings to those working at the local level, including school administrators, teachers, and others charged with providing literacy instruction to elementary and secondary students. Congress also requested that the report include suggestions for future research based on the existing gaps in the literature. In essence, the report was to be a meta-analysis on all of the reading research to date.

The panel put methodological standards into place a priori to establish an effective and streamlined screening process. Initial criteria for research admittance included a focus on children's reading development and achievement. Studies also had to be published in peer-reviewed journals to validate their quality, as determined by scholars in the field via a stringent peer review process. Upon meeting the initial requirements set forth by members of the panel, studies were further examined to evaluate whether they met subsequent criteria. For example, to be included in the meta-analysis, study interventions, outcome assessments, and treatment fidelity had to be described in detail. Only experimental or quasi-experimental studies were included, and they had to be of adequate size to allow for generalizability to the larger population. More than 100,000 published research articles were reviewed in total. To supplement the literature search, the panel held five regional hearings to gather direct testimony from those considered to be the primary consumers of reading research, including students, parents, teachers, scientists, and policymakers. The input gathered from these hearings provided additional direction and recommendations to the panel.

At the national level, the NRP report has served as the cornerstone of federal initiatives designed to improve reading instruction and outcomes for students across the country. Most notably, the findings have helped to shape the Reading First Initiative, a grant program established under the No Child Left Behind Act of 2001 (Moss, Jacob, Boulay, Horst, & Poulos, 2006). Through Reading First, federal funds are distributed to state and local educational agencies based on proposals detailing plans for raising students' reading achievement. Programs are considered for eligibility only if they incorporate practices based on scientific research, including valid and reliable assessments, research-based instructional materials and methods, strong professional development, and instructional leadership.

More specifically, reading assessments should serve as screening and progress monitoring tools, and they must be used when making instructional decisions linked toward explicit reading goals. Professional development is considered high quality if it is based on local need and delivered in a coherent, logical sequence. Training should be provided for all individuals responsible for promoting student reading outcomes, including school administrators, teachers, and coaches. Strong instructional leadership is also necessary for an effective reading program. Successful leaders are able to establish expectations for student reading progress and provide the resources necessary to achieve these goals. The Reading First Initiative specifically emphasizes the role of coaches in providing leadership at the local level. The effectiveness of this professional development delivery model is due in part to its focus on observing teacher instructional practices and providing feedback and support in vivo. Lastly, reading programs must highlight the five essential components of effective reading instruction, as determined by the National Reading Panel: phonemic awareness, phonics, fluency, vocabulary, and

comprehension. Grant funds from the Reading First Initiative are prioritized for programs that are able to incorporate these elements of effective reading programs (Moss et al., 2006).

**Balanced Literacy: A Brief History**

The five fundamental skills of reading prioritized by the NRP (phonemic awareness, phonics, fluency, vocabulary, and comprehension) are often discussed as individual elements. It is worthwhile to note, however, that research points to the importance of integrating these components into what is commonly referred to as a "balanced" literacy approach. This current view of effective programming is based on a long history of debate regarding what makes for productive reading instruction. This debate has been so polarized that some scholars have described the rancor between factions as the "reading wars" in education (Kim, 2008). Tracing the history of the reading wars provides context that is critical for a deeper understanding of the current state of affairs in reading research and practice.

Up until the middle of 19th century, most scholars and researchers shared the belief that students learn to read by mastering decoding skills. Horace Mann, the secretary of the Massachusetts Board of Education in 1837 and a leader in education reform, changed this commonly held view by advocating for instruction that teaches students to recognize whole sight words. Numerous others working in the field of education also believed that teaching children to break words down into their symbol-sound relationships was too arduous a process. As a result, over the next century, students were primarily taught to recognize words automatically and practice their reading skills in leveled readers. When students came across an unfamiliar word, they were instructed to use context clues, such as utilizing the meaning of words adjacent to the unknown word. In essence, the whole-language approach considered the word to be the basic unit of language (Kim, 2008).

In the mid-1950s, the debate heightened with the publication of a controversial book by Rudolf Flesch. In his highly disputatious text, Flesch attacked the whole-word method and ultimately the entire education system (Flesch, 1955). Flesch asserted that "the teaching of reading all over the United States, in all the schools, in all the textbooks is totally wrong and flies in the face of all logic and common sense" (p. 2). He went on to state that the country "could have perfect readers in all schools at the end of second grade if we taught our children by the system used in Germany . . . It's very simple . . . Teach the child what each letter stands for and he can read" (pp. 2-3). As one can imagine, his rhetoric spurred defensive rebuttals against the change in public opinion. One particularly harmful consequence of Flesch's work, as noted by Adams (1990), is that the debate regarding how children best learn to read was politicized and reduced to a choice between a phonics-based approach and a whole-word methodology. The argument continued for years after the publication of Flesch's book.

Fortunately, the debate has generally subsided, as most researchers and educators agree that a balanced approach to literacy instruction is optimal. The essence of this well-rounded approach is the integration of direct and systematic instruction in letter-sound correspondences with sufficient opportunities to practice these foundational skills. The ability to utilize decoding skills with automaticity is a prerequisite to reading complex texts. Based on a synthesis of major reading studies conducted from 1967 to 2000, Cowen (2003) aptly defines balanced literacy instruction as:

> research-based, assessment-based, comprehensive, integrated, and dynamic, in that it empowers teachers and specialists to respond to the individual assessed literacy needs of children as they relate to their appropriate instructional and developmental levels of decoding, vocabulary, reading, comprehension, motivation, and socio-cultural acquisition, with the purpose of learning to read for meaning, understanding, and joy. (p. 10)

At the base of a balanced literacy framework are two fundamental building blocks: phonemic awareness and phonics.

**Best Practices in Literacy Instruction: Phonemic Awareness**

The 26 letters of the English alphabet, referred to as graphemes, serve as symbols for phonemes. Phonemes are single units of sound and are the smallest components of the spoken language. There are approximately 41 phonemes in the English language, consisting of consonant and vowel sounds. Although a few words consist of only one phoneme, most words in the English language are comprised of a blend of two or more phonemes. For example, the word "school" has four distinct phonemes, /s/ /k/ /u/ /l/. It is important to note that phonemic awareness is a component of the more encompassing skill of phonological awareness, although the terms are often mistakenly used interchangeably. Phonological awareness relates to the recognition of larger spoken units, such as syllables and words. Phonological awareness activities might include generating rhyming words, identifying and counting syllables in words, or identifying and counting words in sentences.

Phonemic awareness more specifically refers to one's ability to identify and manipulate phonemes in a word. Phonemic awareness can be demonstrated through a variety of tasks, including phoneme identification, categorization, deletion, segmenting, and blending. For example, a student's ability to identify phonemes could be demonstrated by requiring him or her to name the initial sounds in words (e.g., "What is the first sound in cat?" "/k/"). Blending and segmenting activities are also common phonemic awareness tasks. During a phoneme blending activity, students listen to distinct spoken sounds and are required to combine them to form words (e.g., "What word is /k/ /a/ /t/?" "cat"). Segmentation activities require students to break spoken words into individual sounds (e.g., "What are the sounds in cat?" "/k/ /a/ /t/"). Phoneme

identification, categorization, deletion, segmenting, and blending are all valuable activities for phonemic awareness development, as they provide students the opportunity to practice manipulating phonemes in words. However, research has demonstrated that segmenting and blending activities are the most important phonemic awareness tasks, given their especially high correlations with reading and spelling outcomes (NICHD, 2000).

Various instructional methods and programs have been identified as effective for teaching phonemic awareness skills to young children. The Lindamood Phonemic Sequencing (LiPS) program, a phonemic awareness program developed by Lindamood and Lindamood (1998), teaches students to identify, decode, and blend sounds in words. Particular focus is given to the shape of the lips and tongue, facilitating students to recognize changes in mouth movements. Pictures of mouth positions, as well as mirrors, are sometimes incorporated into instruction to help students differentiate phonemes. While the success of the LiPS program has been variable across studies, the effect size on reading outcomes has been as high as 1.22 for first-graders (McGuiness, McGuiness, & Donohue, 1995). In a study examining phonemic awareness training for kindergarteners, the "say it and move it" procedure also demonstrated positive effects. During this activity, students practiced their phonemic awareness skills by moving a blank tile down a page for each phoneme in a word that was spoken. Researchers also taught students to slide manipulatives into Elkonin boxes, which were connected squares drawn on a page representing individual phonemes in words (Blachman, Ball, Black, & Tangel, 1994). These studies contribute to the growing body of literature that highlight the various ways in which students can learn and practice the phonemic awareness skill.

The scientific basis illustrating the benefits of phonemic awareness instruction is prolific, leading some to identify phonemic awareness ability as the strongest predictor of a student's

success in reading (Stanovich, 1986). Indeed, the findings of numerous studies reveal a consistent relationship between sound awareness and positive reading outcomes. Early research conducted in 1983 utilized two methods, longitudinal and intensive training in sound categorization, to evaluate the relationship between phonemic awareness skills and later success in reading. The results revealed strong correlations between phonemic awareness ability and students' reading and spelling scores more than three years later. This study was one of the first of its kind to provide direct evidence of a causal relationship between the two variables, as the effects remained significant after controlling for IQ and memory ability (Bradley & Bryant, 1983). Hulme et al. (2002) similarly reported a unique contribution of phonemic awareness to later reading and spelling ability. Even when age, spoken vocabulary, and initial word reading variables were removed from statistical analyses, measures of phonemic awareness were highly significant predictors of reading skill. Subsequent work has demonstrated that the positive effects of phonemic awareness instruction hold for both high- and low-performing students (Share, Jorm, Maclean, & Matthews, 1984).

The results of the meta-analyses conducted by the National Reading Panel further support the findings of these earlier studies. The panel determined that not only can phonemic awareness be taught systematically in the classroom, but doing so results in notable effects on reading and spelling, as measured by assessments of word reading, pseudoword reading, and reading comprehension (NICHD, 2000). Furthermore, compelling studies have shown that phonemic awareness can be an even stronger predictor of reading achievement than IQ (Adams, 1990) and nonverbal intelligence (Stanovich, 1986). The converging evidence regarding the benefits of phonemic awareness achievement has generated great interest in professional literature and discussion. Marilyn Adams, a prominent and influential researcher in the field of education,

argued that "the discovery and documentation of the importance of phonemic awareness . . . is the single most powerful advance in the science and pedagogy of reading this century (Adams, 1991, p. 392).

**Best Practices in Literacy Instruction: Phonics**

Phonics, or the alphabetic principle, refers to knowledge of the alphabetic system. Phonics skills include the identification and naming of letters, the understanding of sound-symbol correspondences and spelling patterns, and the application of this knowledge during reading and spelling. As recommended by the National Reading Panel, phonics instruction should be delivered in an explicit and systematic manner. More specifically, students should be directly taught the complete phonemic code, including the relation between consonants, short vowels, long vowels, consonant and vowel digraphs, and their sounds. Additionally, discrete skills are to be presented in a research-based scope and sequence framework. Students first learn common sound-spelling correspondences (letters such as *p*, *s*, and *a*), and then they progress to less frequently encountered relationships (letters such as *x* and *z*). The sequential instruction increases in difficulty until students master more complex spelling patterns, conventions, or morphemes. Lastly, a critical hallmark of sequential instruction is ample opportunity for students to review previously mastered content while learning new skills. These components of a phonics program are essential for maximizing instruction and students' achievement in phonics (NICHD, 2000).

Phonics programs can differ with respect to a number of features, such as the number of letter-sound relations taught, how letter-sound relations are presented to students, the sequencing of instruction, and the extent to which skills are practiced with the use of decodable text formats. In their analyses on phonics research, the NRP compared three specific phonics programs: synthetic phonics, larger-unit phonics, and miscellaneous programs that maintained features

fundamentally different from those in the other two categories. In a synthetic phonics approach, students are taught to first convert letters into sounds and then blend the sounds for a complete pronunciation of the word. A larger-unit approach, on the other hand, requires students to blend subparts of words that are larger than individual letters, such as letter combinations or spelling patterns. The findings revealed that the systematic delivery systems did not differ statistically from one another, leading the researchers to conclude that they are not significantly distinct in terms of their effectiveness (NICHD, 2000). It appears that the driving force behind any phonics approach is the extent to which it is delivered in an explicit and systematic manner.

As is the case with phonemic awareness instruction, systematic phonics training has been shown to relate to a host of positive outcomes for students' reading and writing development. In a study examining the effects of phonics instruction, Stuart (1999) compared a systematic phonics program to a nonsystematic program delivered to kindergarten students for 12 weeks. Students who completed the systematic program were able to read significantly more words and pseudowords than those who took part in the nonsystematic program. Additionally, systematic program participants were able to write significantly more words. These effects in reading and writing maintained when students were retested a year later (Stuart, 1999). Additionally, phonics instruction has the potential to support students identified as reading disabled by remediating their difficulties. Researchers examining phonics programming for this specific population found that participation in a phonics program resulted in substantial gains in both word recognition and spelling (Lovett, Warren-Chaplin, Ransby, & Borden, 1990).

The meta-analytic work conducted by the NRP further substantiates the significant and extensive benefits of systematic phonics instruction. The panel found that students who received systematic phonics instruction demonstrated significantly more growth in reading, as compared to

students who received unsystematic or no phonics instruction. The greatest effects were observed on measures of decoding regularly spelled words ($d = 0.67$) and pseudowords ($d = 0.60$). Systematic phonics instruction also significantly impacted young students' reading comprehension ability ($d = 0.51$) and spelling ($d = 0.67$). Taken together, the data demonstrate that effective phonics programming can serve to provide students with a solid foundation in reading, as well as eliminate the potential need for reading intervention in the future (NICHD, 2000).

It is important to note that, as previously stated, phonemic awareness and phonics should not be the sole components of any literacy program. Rather, they should be incorporated with other elements of reading instruction to create a balanced and well-rounded approach to literacy development. To effectively accomplish this, it is necessary to consider the benefits of other instructional practices in reading, such as read-alouds, shared story retelling, and sight word activities. Furthermore, there is not a "one size fits all" approach that maximizes every student's reading ability. It is critical for those planning and delivering instruction to evaluate students' pre-existing knowledge and provide differentiated instruction accordingly. Allowing for flexibility within the sequence of reading lessons provides teachers the opportunity to adjust instruction to meet the needs of students. As members of the NRP note, "By emphasizing all of the processes that contribute to growth in reading, teachers will have the best chance of making every child a reader" (NICHD, 2000, p. 2-136).

**Theoretical Accounts of the Reading Acquisition Process**

Although phonemic awareness and phonics are widely used terms in the education arena, they are often misunderstood and used interchangeably. As such, confusion remains regarding their exact meanings. The academic literature, however, makes clear distinctions between the

terminologies. Phonemic awareness relates strictly to oral and auditory processing; it does not involve letters or words in print. Phonics, on the other hand, is always associated with print. Keeping this in mind, it is important to note that while phonemic awareness and phonics do not refer to identical concepts, they both combine to provide the foundation of effective literacy instruction.

Interestingly, even though there are numerous studies demonstrating the correlation between phonemic awareness and phonics skills, the exact nature of the relationship between the two concepts remains ambiguous. Upon theoretical scrutiny, some scholars have indicated that phonemic awareness plays a supportive role in the development of phonics. The logic follows that if students are phonemically aware, subsequent learning of alphabetic print is made more sensible. When first exposed to alphabetic print on a page, students make the connection that it is those units of sounds that are represented by the symbols. Students who are not phonemically aware may view the printed symbols as meaningless. Supporters of this view argue that students require a solid foundation of phonemic awareness upon which phonics skills can later be developed.

There is research to suggest that some level of phonemic awareness is necessary for maximum growth in phonics skills. In their proposed model of literacy acquisition, Juel, Griffith, & Gough (1986) hold that phonemic awareness is the first step in students' abilities to gain spelling-sound knowledge. Therefore, even if a student is exposed to a significant amount of print, he or she will not be able to properly develop phonics skills until phonemic awareness is established. To test their hypothesis, the researchers compared two groups of first grade students who were both exposed to fairly large amounts of print but who differed in terms of phonemic awareness ability. The researchers tested students' phonics skills using a pseudoword reading

assessment and subsequently found that those with a high level of phonemic awareness ability demonstrated significantly superior phonics skills. These results support the notion that some amount of phonemic awareness is necessary for the attainment of phonics skills. As the researchers state, in the absence of "such phonemic awareness, exposure to print does little to foster spelling-sound knowledge" (Juel, Griffith, & Gough, 1986, p. 254).

This view of the reading development process is further supported by the results of a two-year longitudinal study evaluating the influence of metalinguistic skills on reading acquisition (Tunmer, Herriman, & Nesdale, 1988). At the beginning of the school year, 118 first-graders were individually administered three measures of metalinguistic ability to gauge their capacity to manipulate structural features of spoken language. They were also given three assessments of prereading and reading skills (Letter Identification Test, Concepts-about-Print Test, and Ready-to-Read Word Test), the Peabody Picture Vocabulary Test (PPVT), and a measure of concrete operational thought. Researchers utilized median splits of the distributions of the letter-naming and phonological awareness measures to assign each student into one of four groups: low phonological awareness and low letter-name knowledge, high phonological awareness and high letter-name knowledge; low phonological awareness and high letter-name knowledge, or high phonological awareness and low letter-name knowledge. Students with high phonological awareness and high-letter name knowledge outperformed every other group in terms of pseudoword decoding ability. The results also revealed that regardless of letter-name knowledge, students with poor phonological ability exhibited lower scores on the pseudoword decoding measure. These data led the researchers to conclude that "some minimal level of phonological awareness may be necessary for children to profit from letter-name knowledge" (p. 155).

The seemingly contradictory view is that while phonemic awareness skills may be critical to learning to read, mastery of such skills prior to print exposure is not necessary for optimal instruction. In fact, some studies demonstrate that instruction in phonemic awareness is made more effective with the addition of alphabet recognition training (Blachman, 2000). Ball and Blachman (1991) conducted an intervention study to examine the influence of phonemic awareness and phonics instruction on kindergarten students' reading skills. Their findings revealed that instruction in the connection between phonemic segments and letters, combined with phoneme awareness intervention, resulted in significantly improved early reading and spelling skills. These results converge with the findings of Bradley and Bryant (1983), which indicated that phonemic awareness training is particularly effective when combined with explicit instruction in the alphabet.

To continue the investigation regarding the extent to which letter knowledge accelerates students' phonemic awareness skills, Carroll (2004) conducted an eight-month longitudinal study. Participants included 56 early elementary students who completed tasks assessing their letter knowledge, receptive vocabulary, and phoneme awareness. The phonemic awareness measure administered at the beginning of the study specifically required students to complete an initial phoneme matching task. At the conclusion of the eight-month period, students were also administered phoneme completion and initial phoneme deletion tasks. A series of scatter plots were constructed to evaluate the relationship between scores on the letter knowledge assessment and scores on the phoneme completion and deletion tasks. The results revealed a close relationship between letter knowledge and phonemic awareness ability, particularly phoneme completion. Additionally, on both the phoneme completion and deletion tasks, students did not score two or more correct unless they knew a minimum of four letter sounds (Carroll, 2004).

To extend these findings, Carroll (2004) conducted an intervention study in which students' phonemic awareness abilities were monitored while they received training in letter knowledge. Training specifically consisted of direct instruction in eight letters, with an emphasis on each letter's shape and distinguishing characteristics. Students also completed varied activities to practice connecting letter shapes to their corresponding sounds. Pre- and post-testing for students in the experimental group consisted of letter knowledge and initial phoneme matching tasks. Follow-up testing, which also incorporated phoneme completion and deletion tasks, was completed approximately seven weeks after the conclusion of training. Results of the post-tests revealed that although letter knowledge of the experimental group improved significantly, there was not a significant difference on initial phoneme matching scores. One proposed explanation for this finding is that the effect of letter knowledge on phonemic awareness development is not immediate. Rather, an extended or "sleeper" effect could be in play (Carroll, 2004). Interestingly, follow-up testing revealed that students who had mastered three or more letters were more proficient on the phoneme completion task. The results of both studies, therefore, indicate that letter knowledge is important for phonemic awareness development.

In line with studies noted above, the meta-analyses of the NRP revealed significant effects of incorporating letters into phonemic awareness instruction. In fact, the researchers found that teaching phoneme manipulation skills with letters resulted in effect sizes nearly twice as large, as compared to teaching phonemic awareness without the use of letters. Similar effect sizes were observed at follow-up tests. The authors hypothesize that incorporating letters into phonemic awareness training is more effective "because reading and spelling processes require knowing how phonemes are linked to letters" (NICHD, 2000, p. 2-21). As a result of these

findings, the NRP makes the following recommendation to those providing literacy instruction to students:

> It is essential to teach letters as well as phonemic awareness to beginners. PA training is more effective when children are taught to use letters to manipulate phonemes. This is because knowledge of letters is essential for transfer for reading and spelling. Learning all the letters of the alphabet is not easy, particularly for children who come to school knowing few of them. Shapes, names, and sounds need to be overlearned so that children can work with them automatically to read and spell words. Thus, if children do not know letters, this needs to be taught along with PA. (NICHD, 2000, p. 2-41).

**Mutually Facilitative Relationship of Phonemic Awareness and Phonics**

Given conflicting findings in the literature, as well as the inconsistent recommendations proffered to educators, it is no wonder that confusion regarding the phonemic awareness-phonics relationship continues to exist. One fact that is made clear by the literature is that there is a strong relation between phonemic awareness development and print. In fact, some scholars have indicated a mutually dependent relationship between phonemic awareness and phonics (Fitzpatrick, 1997). Morais, Mousty, and Kolinsky (1998) assert that

> the relationship between the acquisition of phoneme awareness and the acquisition of alphabetic literacy is one of reciprocal causation. As both skills develop over an extended period of time, in principle, mutual causal influence can take place between them. Phoneme awareness begins developing when and because children have to learn what letters stand for. At the same time, children need to master both the simple and complex (i.e., context-dependent) graphophonological conversion rules necessary for phonological decoding. (p. 127)

In essence, phonemic awareness skills facilitate reading ability, and instruction in phonics combined with exposure to print leads to further phonemic awareness development.

In a study testing this very hypothesis, Perfetti, Beck, Bell, and Hughes (1987) assigned 82 elementary students to either a “direct code” or “basal” group. Students in the direct code group received instruction in phonemic awareness skills, specifically blending, and letter-sound correspondences. Those in the basal group were taught with a commercial basal reader series and

did not receive direct phonics instruction. Measures of phonemic awareness and phonics were administered at four points throughout the course the school year. The battery of assessments included three phonemic awareness tasks involving phoneme synthesis and deletion, a pseudoword reading task, and the Wide Range Achievement Test (WRAT). The researchers also examined students' progress made through the reading curriculum. Partial time-lag correlations revealed that phonemic knowledge, as measured by the deletion task, did indeed have a reciprocal relationship with reading. Students' growth in reading ability enabled gains in phonemic awareness skills, which subsequently fostered further gains in reading ability. These results led the researchers to conclude that phonemic awareness and phonics skills are mutually facilitative.

Perhaps the most compelling evidence for this view of reciprocal causation between phonemic awareness and phonics comes from a study conducted by Morais, Cary, Alegria, and Bertelson (1979). The researchers administered phonemic awareness tasks to two groups of adults. One group was comprised of illiterate adults, while the other group consisted of literate adults who had been taught to read beyond the typical age (15 years old or more). The data revealed that adults with literacy skills were able to add and delete consonants at the beginning of pseudowords, while illiterate adults were unable to complete this task. In essence, for those with some level of literacy skills, the exposure to print appears to have facilitated phonemic awareness ability (Morais, Cary, Alegria, & Bertelson, 1979).

Although the relationship between phonemic awareness and phonics instruction remains unclear, the prolific literature does reveal the common theme that phonemic awareness is an essential condition for learning to read. In other words, if students are to benefit from formal phonics programming, they must have a certain level of phonemic awareness skill development. The question remains, however, as to the specific amount of phonemic awareness ability one

must have to maximally benefit from phonics instruction. Previous research examining this critical question of reading instruction has not clarified whether mastery of phonemic awareness skills is optimal, or whether only a rudimentary level is sufficient for phonics development.

A deeper understanding of this question has value for a number of reasons, perhaps most notably the potential impact on assessment and instructional practices in the classroom. If research indicates that a solid foundation in phonemic awareness is needed to maximize phonics instruction, early elementary teachers will need to assess students to ensure mastery of these fundamental skills prior to moving along in the curriculum. Additionally, it may highlight the need for teachers to provide differentiated instruction should some students develop phonemic awareness skills more readily than others. On the other hand, if research suggests that a simultaneous presentation of phonemic awareness and phonics instruction is optimal, teachers can begin introducing letter names and sounds to students early in the school year. Considering the substantial implications associated with proficient literacy skills, it is critical that researchers, administrators, and teachers understand how to deliver the most effective reading instruction.

Similarly, the most up-to-date research regarding phonemic awareness and phonics instruction is needed in order to develop optimal reading curriculum for use in the classroom. Indeed, upon examination of widely used basal reading programs, one can see that the scope and sequence tend to vary substantially. Research regarding the reading acquisition process may shed light on how the phonemic awareness and phonics concepts should be presented to students over the school year. Such information will help reading curriculum developers charged with creating year-long, unit, and lesson plans for early elementary teachers.

Lastly, given that students are in the classroom for a finite amount of time each day, it is important to consider the element of instructional efficiency for any teaching practice. An

effective intervention is one in which desired student outcomes are achieved with the most profitable expenditure of instructional time. If research reveals that mastery of phonemic awareness skills prior to phonics instruction results in significantly better outcomes, increased instructional time in this skill will actually be economical in the long-term. On the other hand, if simultaneous presentation of phonemic awareness and phonics is optimal, time may be saved by presenting letters earlier in the school year. A thorough understanding of the most economical instructional format is especially needed for underperforming students who require efficient instruction to catch up to their peers.

To address the ambiguity surrounding the relationship between phonemic awareness and phonics that is currently present in the literature, the current study aimed to determine the extent to which mastery of phonemic awareness skills prior to phonics instruction significantly improves young students' reading abilities. This study specifically examined three potential outcomes of the design/sequencing of phonemic awareness and phonics instruction:

- Students who master phonemic awareness skills prior to the introduction of phonics instruction will demonstrate improved reading outcomes, as compared to students who receive phonemic awareness and phonics instruction simultaneously.
- Students who receive instruction in phonemic awareness and phonics simultaneously will demonstrate improved reading outcomes, as compared to students who are provided with sequential presentation of phonemic awareness and phonics instruction.
- The presentation of phonemic awareness and phonics instruction, sequential versus simultaneous, does not significantly influence students' reading outcomes.

Research providing clarity regarding the reading acquisition process is necessary if students are to be provided with optimal reading instruction. This point is made even more salient when one considers the significance of and implications for early literacy development.

# Method

## Participants and Setting

Pre-kindergarten and kindergarten students at local schools in Southeastern Louisiana were recruited to participate in the current study. A letter was sent home to the parents of the students detailing the study and requesting consent for participation. In total, 48 students returned signed consent. Upon receiving parental informed consent and child assent, the students were screened for study eligibility. All students who met the screening requirements detailed below were included, resulting in a total sample size of 44. A power analysis computed prior to initiation of the study indicated that 42 participants were necessary for sufficient power. As such, it is assumed that requirements related to power were appropriately met.

The total sample included 20 pre-kindergarten and 24 kindergarten students across two schools. Twelve students from one school were randomized to the sequential and simultaneous conditions, and 32 students from the second school were randomized to the sequential, simultaneous, and delayed treatment control conditions. After randomization, the sequential condition was comprised of 15 participants in total, including six pre-kindergarten and nine kindergarten students. The simultaneous condition equally included 15 participants, made of 10 pre-kindergarten and five kindergarten students. Lastly, the delayed treatment control condition included 14 students. Four participants in this group were pre-kindergarten students, while the remaining 10 were kindergarteners.

Testing sessions were conducted individually, and intervention sessions were delivered in small groups of four to six students. All sessions were completed in a designated quiet location in the school building. The sessions were specifically conducted away from the typical classroom

environment to minimize distraction for the participants, as well as their non-participating peers and classroom teachers.

**Dependent Variables, Data Collection, and Interobserver Agreement**

The primary dependent variable of the study was the degree of student change in early literacy skills, specifically phonemic awareness and phonics. Dependent measures included the AIMSweb Test of Early Literacy (TEL), which is comprised of standardized measures of phonemic awareness, phonics, and pseudoword reading (each measure is described below). To ensure the accurate detection of phonemic awareness growth over time, an examiner-created phonemic awareness measure was also included. The phonemic awareness and phonics probes were administered preintervention, postintervention, at maintenance, and weekly throughout treatment to ascertain student response to teaching over time. The pseudoword reading probe was administered preintervention, postintervention, and at maintenance. Lastly, interobserver agreement was calculated to judge the reliability of data collection.

The primary researcher provided training to all examiners prior to the start of the study. Examiner training included explanations, modeling, and supervised practice. To confirm accurate test administration, examiners were required to independently perform each measure according to protocol at the conclusion of training.

**Phonemic Awareness.** Phonemic awareness was assessed utilizing the AIMSweb Phonemic Segmentation (PS) measure, as well as an examiner-created PS measure. During the AIMSweb PS assessment, the examiner orally presented words that consisted of two (vowel-consonant) or three (consonant-vowel-consonant) letters. Participants were required to verbally segment words into their individual phonemes and received one point for each correctly identified phoneme. For example, if the examiner said, “tab” and the student responded “/t/ /a/ /b/,” he or

she received three points for correctly segmenting all possible phonemes in the word. The total score was the number of correct phonemes produced in one minute.

The AIMSweb PS measure has demonstrated both reliability and criterion validity. Previous research conducted in kindergarten settings found the retest and two-week, alternate-form reliability to be .85 and .84, respectively (Elliot, Lee, & Tollefson, 2001). Interscorer agreement reliability is .87. Criterion validity of the PS measure has been established with other standardized assessments, including the Woodcock-Johnson Broad Reading ($r$ = .44) and Reading Skills ($r$ = .60) clusters. Additionally, criterion validity has been demonstrated with the Test of Phonological Awareness ($r$ = .52) and Developing Skills Checklist, Pre-Reading Total Score ($r$ = .54) (Elliot et al., 2001).

As previously stated, an examiner-created PS measure was included in the battery of assessments. The primary purpose of doing so was to address the concern that the AIMSweb PS measure lacked the sensitivity required to identify small change in phonemic awareness ability. The administration procedures for the examiner-created PS measure were identical to those of the AIMSweb PS measure. Participants verbally segmented words that were presented orally, and they received one point for each correctly identified phoneme. The words on the examiner-created PS assessments were randomly chosen from a list of pre-kindergarten vowel-consonant and consonant-vowel-consonant words.

**Phonics.** Fundamental phonics skills were assessed using the AIMSweb Letter Naming (LN) fluency measure. During the LN assessment, the examiner presented the participant with a page of upper- and lower-case letters displayed in random order. The participant was asked to name as many letters as he or she could in one minute. The score on the LN measure was calculated by summing the number of letters named correctly in one minute.

Elliot et al. (2001) evaluated the reliability and validity of the AIMSweb LN measure. The researchers found the retest reliability to be .90 and the two-week, alternate-form reliability to be .80. Interscorer agreement is .94. Lastly, the criterion validity of the PS measure has been established with the Woodcock-Johnson Broad Reading ($r$ = .63) and Reading Skills ($r$ = .75) clusters, in addition to the Test of Phonological Awareness ($r$ = .50) and Developing Skills Checklist, Pre-Reading Total Score ($r$ = .67).

**Pseudoword Reading.** A reading transfer task, the AIMSweb Nonsense Word (NW) measure, was administered to assess participants' ability to decode individual phonemes and then blend the sounds together to read pseudowords. During the NW fluency assessment, the examiner provided the participant with a list of vowel-consonant and consonant-vowel-consonant nonsense words (e.g., hib, mam, pob). The participant was required to either verbally generate the individual letter sound of each letter or read the whole word. For example, the participant could earn a total of three possible points for the nonsense word "hap" if he or she said, "/h/ /a/ /p/" or read the entire word. While scoring the assessment, the examiner differentiated participants' responses by underlining each correct letter sound produced in isolation or underlining the entire word if read correctly. The total score was the number of correct letter-sounds produced in one minute.

Alternate-form stability scores for the NW measure, as reported in the AIMSweb manual, range from .71 to .78 (Pearson, 2012). Additionally, researchers found the NW measure to be positively correlated with several criteria, including the Illinois Standards Achievement Test ($r$s = .49, .61), Minnesota Comprehensive Assessment ($r$s = .42-.55), and Pennsylvania System of School Assessment ($r$s = .44-.51). Criterion validity of the NW measure has also been demonstrated with the R-CBM ($r$s = .68, .72).

**Interobserver Agreement.** The reliability of measurement was evaluated by calculating interobserver agreement (IOA) on 73% of data probes across all testing sessions. An observer, in addition to the primary examiner, independently scored participants' responses at the time of assessment. IOA was based on agreement on the correctness of each response provided by the participant. An agreement was defined as both examiners recording the same classification of response (e.g., both examiners scoring the same letter sound response as correct). A disagreement was defined as examiners noting a different classification of response (e.g., one examiner recording a letter sound response as incorrect while the other examiner recorded it as correct). A percentage of total agreement was calculated by dividing agreements with agreements plus disagreements and multiplying by 100. Mean IOA across all data probes was 87.95% (range 72-100%).

## Experimental Design and Conditions

A randomized, quasi-experimental group design with a delayed treatment control group was utilized to evaluate the optimal timing of combining two aspects of literacy instruction, phonemic awareness and phonics. Participants were randomly assigned to one of three conditions: sequential condition, simultaneous condition, or delayed treatment control condition. Participants in each condition received four weeks of treatment in total.

**Sequential Condition.** Participants in the sequential condition first received direct instruction in phonemic awareness skills. Phonemic awareness lessons were delivered three days per week and lasted approximately 25 minutes each. Thus, participants received about 75 minutes of direct instruction in phonemic awareness skills weekly. Phonemic awareness lessons continued until mastery was demonstrated. Immediately upon attaining the phonemic awareness mastery

criterion, participants began receiving instruction in phonics only. Phonics lessons were delivered three days per week, also lasting about 25 minutes each.

Phonemic awareness mastery was defined utilizing a group-based criterion, such that an average of 17 phonemes correct was considered a sufficient demonstration of skill fluency. Seventeen phonemes correct per minute is the pre-kindergarten fall benchmark at the 50th percentile, as determined by AIMSweb national normative data (Pearson, 2012). Scores from either the AIMSweb or examiner-created PS measure could trigger the change to phonics instruction. On average, participants demonstrated mastery of phonemic segmentation after the second week of phonemic awareness instruction. As such, participants in the sequential condition received two weeks of phonemic awareness instruction and two weeks of phonics instruction.

**Simultaneous Condition.** Participants in the simultaneous condition received direct instruction in both phonemic awareness and phonics in each lesson. As in the sequential condition, lessons in the simultaneous condition lasted approximately 25 minutes each and were delivered three days per week for four weeks. Thus, instructional time was equated across conditions, with participants in both conditions receiving the same amount of phonemic awareness and phonics instruction.

**Delayed Treatment Control Condition.** When comparing the effects of sequential versus simultaneous presentation of phonemic awareness and phonics skills, the postintervention measures demonstrated that participants in the sequential treatment condition maintained the largest mean gains in reading skills (including phonemics awareness, phonics, and pseudoword reading). To determine whether these treatment effects were replicated, the sequential presentation of phonemic awareness and phonics instruction was provided to the delayed treatment control group between postintervention and maintenance measures. As was the case

with the original sequential group, delayed treatment control participants demonstrated phonemic awareness mastery after the second week of treatment.

## Procedure

**Screening.** To screen for study eligibility, students were administered the AIMSweb Phonemic Segmentation (PS) and Letter Naming (LN) measures according to the protocol described above. The purpose of the screening was to ensure participants had not acquired foundational skills in phonemic awareness and phonics prior to the start of the study. Both screeners were administered individually in one sitting, and a brief, two-minute break was provided between the assessments. Students who earned a score of three or below on both the PS and LN subtests were included in the study. The researcher determined these inclusion criteria after careful consideration of the main purpose of the screener. The criteria allowed for up to three correct responses due to extraneous variables such as instruction provided in the home; however, a score of three or below on both measures also undoubtedly indicated a lack of substantial phonemic awareness and phonics skill development.

**Teaching Procedure.** Instructional lessons were adapted from *Stepping Stones to Literacy*, a curriculum designed to teach students pivotal early literacy skills (Nelson, Cooper, & Gonzalez, 2004). The original program consists of 25 lessons on listening, conventions, phonological awareness, phonemic awareness, and serial processing. For the purposes of the current study, the curriculum was modified so that participants received instruction on only the phonemic awareness and letter naming/letter sounds (phonics) components. *Stepping Stones* utilizes a model-lead-test procedure in all of its activities. Such an approach allowed instructors to model the skill, provide sufficient opportunities for guided practice, and test students on their ability to independently perform the skill. Additionally, *Stepping Stones* incorporates error-

correction procedures, specifically error detection and reteaching. As recommended by the curriculum guide, instructors repeated lessons using the model-lead-test procedure when participants were unable to perform a skill independently.

The findings of two randomized controlled trials evaluating the effectiveness of *Stepping Stones* support its use with early elementary students (Nelson, Benner, & Gonzalez, 2005; Nelson, Stage, Epstein, & Pierce, 2005). In both studies, the intervention groups received *Stepping Stones to Literacy*, in addition to the regular curriculum. The comparison groups received the regular curriculum only. The results revealed that the intervention groups significantly outperformed comparison students on measures of phonological awareness, phonemic awareness, and phonics. Based on these findings, What Works Clearinghouse (WWC) concluded that *Stepping Stones* has positive effects on students' reading outcomes, particularly in the alphabetics domain (U.S. Department of Education, 2011).

**Phonemic Awareness Instruction.** The primary goal of phonemic awareness instruction was to facilitate participants' ability to hear and manipulate individual sounds. Particular attention was paid to teaching participants how to identify and segment individual phonemes within a word. Each lesson consisted of the following components, which were delivered in sequence: (a) introduction to the lesson by listening to and participating in a nursery rhyme; (b) modeling, guided practice, and independent practice of the phoneme identification skill; and (c) modeling, guided practice, and independent practice of the phoneme segmentation skill. Although each phonemic awareness lesson followed the same general format, the activities and examples utilized differed from lesson to lesson. The purpose of utilizing multiple activity modalities was to encourage and maintain participant engagement, as well to provide participants with sufficient practice.

**Phonics Instruction.** Explicit, systematic phonics instruction was delivered to participants, with the overarching focus being to teach participants to identify and name letters. Each phonics lesson consisted of the following sequential components: (a) introduction to the lesson by listening to and participating in the alphabet song; (b) modeling, guided practice, and independent practice of identifying and naming letter(s); (c) letter naming practice; and (d) conclusion of the lesson with a letter naming cumulative review. As was the case with phonemic awareness instruction, phonics lessons incorporated various methods to teach and practice the skills. Examples of such methods included tracing the shapes of letter formations, practice writing the letters, and identifying letters among a list.

**Phonemic Awareness/Phonics Instruction.** Participants in the simultaneous condition received both phonemic awareness and phonics instruction in each lesson. For the first half of the lesson, participants received instruction in phonemic awareness, while the second half of the lesson focused on phonics. The same model-lead-test procedure was utilized throughout simultaneous lessons, however fewer activities were included to allow for equated instructional time.

**Integrity of Experimental Procedures.** A procedural manual outlining all intervention steps was provided to the experimenters. Prior to intervention implementation, the primary researcher trained experimenters on the procedures as outlined in the manual. To assess integrity of experimental procedures, treatment fidelity data were collected for 35% of the intervention sessions across all conditions. Utilizing a treatment fidelity checklist developed by the primary researcher, an independent observer scored whether or not the experimenter executed each step in the procedure correctly. Treatment integrity was calculated by dividing the number of

components performed accurately by the total number of components and multiplying by 100. In the current study, mean treatment integrity was 94.08% (range 75-100%).

## Results

Data were analyzed using IBM SPSS, version 23.0 software. A repeated measures analysis of variance (RMANOVA) focused on the interaction between time and treatment condition was the primary statistical analysis. Time (preintervention, postintervention, and maintenance) served as the within-subjects variable, and treatment condition (sequential instruction, simultaneous instruction, and delayed treatment control) served as the between-subjects variable. Given the potential independence of each of the three dependent variables (phonemic awareness, phonics, and pseudoword reading), separate analyses were conducted for each outcome measure. Alpha was set at .10 for each main effect and post hoc analysis due to the modest sample size in the study.

Upon submitting the AIMSweb PS scores to a RMANOVA, Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $\chi^2(2) = 12.35, p < .01$. Given the heterogeneity of covariance, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity. The main effect of treatment condition did not attain significance, $F(2, 41) = 1.54$, $MSE = 158.90$, $p = .23$, however the main effect of time did reach significance, $F(1.58, 64.79) = 52.28, MSE = 57.27, p < .001$, $\eta_p^2 = .56$. These results indicate that when taking the average AIMSweb PS scores across time points, participants in the three conditions performed similarly. The significant main effect of time suggests that across conditions, average AIMSweb PS scores changed significantly over time. Post hoc analyses utilizing pairwise comparisons and a Bonferroni correction for multiple tests revealed that AIMSweb PS scores at time 3 ($M = 15.31$, $SE = 1.68$) were significantly higher than those at time 2 ($M = 9.93$, $SE = 1.68$), $p < .001$. Furthermore, AIMSweb PS scores at time 2 were significantly higher than those at time 1 ($M = .80$, $SE = .16$), $p < .001$. The interaction between time and treatment was not

significant [$F(3.16, 64.79) = 1.76, p = .16, \eta_p^2 = .08$], which suggests that no significant differences existed between groups over time in phonemic awareness skills, as measured by the AIMSweb PS assessment. These results are presented in Figure 1.

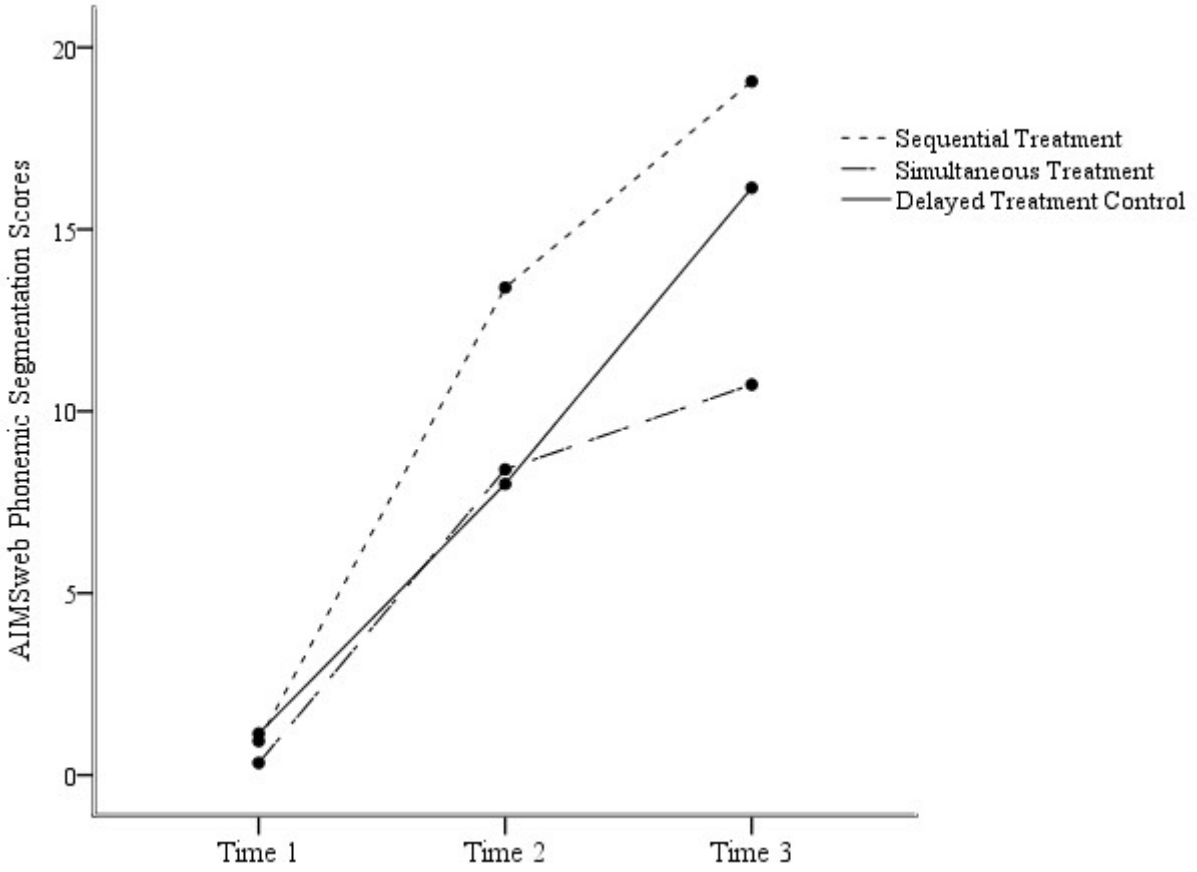


Figure 1. Interaction between time and treatment condition on AIMSweb Phonemic Segmentation scores.

To further investigate the interaction between time and treatment condition on phonemic awareness skill attainment, the same pattern of analyses was repeated with scores from the examiner-created PS measure. Mauchly's test suggested that the sphericity assumption had been violated, $\chi^2(2) = 14.63, p < .01$, therefore degrees of freedom were corrected utilizing Greenhouse-Geisser estimates of sphericity. There was a significant main effect of treatment condition [$F(2, 41) = 2.73, MSE = 379.85, p = .08, \eta_p^2 = .12$], with post hoc analyses

demonstrating that the average PS score for the sequential condition ($M$ = 18.38, $SE$ = 2.91) was significantly higher than that of the simultaneous condition ($M$ = 9.11, $SE$ = 2.91), $p$ = .09. None of the remaining treatment group comparisons were statistically significant. In addition to the main effect of treatment condition, the main effect of time was found to be significant, $F(1.53, 2.78) = 73.59$, $MSE = 103.32$, $p < .001$, yielding an effect size of $\eta_p^2 = .64$. Post hoc analyses demonstrated that participant PS scores at time 3 ($M$ = 25.07, $SE$ = 2.57) were significantly higher than those at time 2 ($M$ = 16.16, $SE$ = 2.30), $p < .001$, which were significantly higher than those at time 1 ($M$ = 2.24, $SE$ = .58), $p < .001$. Lastly, RMANOVA revealed that the interaction between time and treatment condition was significant for PS scores [$F(3.06, 62.78) = 5.24$, $p < .01$, $\eta_p^2 = .20$], indicating that significant differences existed between groups over time in phonemic awareness skill attainment, as measured by the examiner-created PS assessment.

The significant time by treatment effect was further probed with one-way ANOVAs for each of the treatment conditions. A significant difference was observed for the sequential condition between time 1 ($M$ = 2.40, $SE$ = 1.14) and time 2 ($M$ = 22.93, $SE$ = 5.05), $p < .01$, as well as between time 2 and time 3 ($M$ = 29.80, $SE$ = 5.20), $p < .001$. A significant difference was also observed for the simultaneous condition between time 1 ($M$ = .60, $SE$ = .41) and time 2 ($M$ = 12.53, $SE$ = 3.32), $p < .01$. However, unlike in the sequential condition, no significant differences were observed between times 2 and 3 ($M$ = 14.20, $SE$ = 2.81) for the simultaneous condition ($p$ = .28). These results indicate that participants in both conditions demonstrated significant improvement in phonemic segmentation skills between times 1 and 2, although improvement continued after intervention was terminated for the sequential group, whereas the simultaneous group simply maintained gains. Lastly, a significant difference was found for the delayed treatment control group between time 1 ($M$ = 3.71, $SE$ = 1.28) and time 2 ($M$ = 13.00, $SE$ = 3.18),

$p < .01$, as well as between time 2 and time 3 ($M = 31.21$, $SE = 5.03$), $p < .01$, suggesting that the significant effects of the sequential treatment on phonemic segmentation skills were replicated with the delayed treatment control group. See Figure 2 for a graph of the interaction.

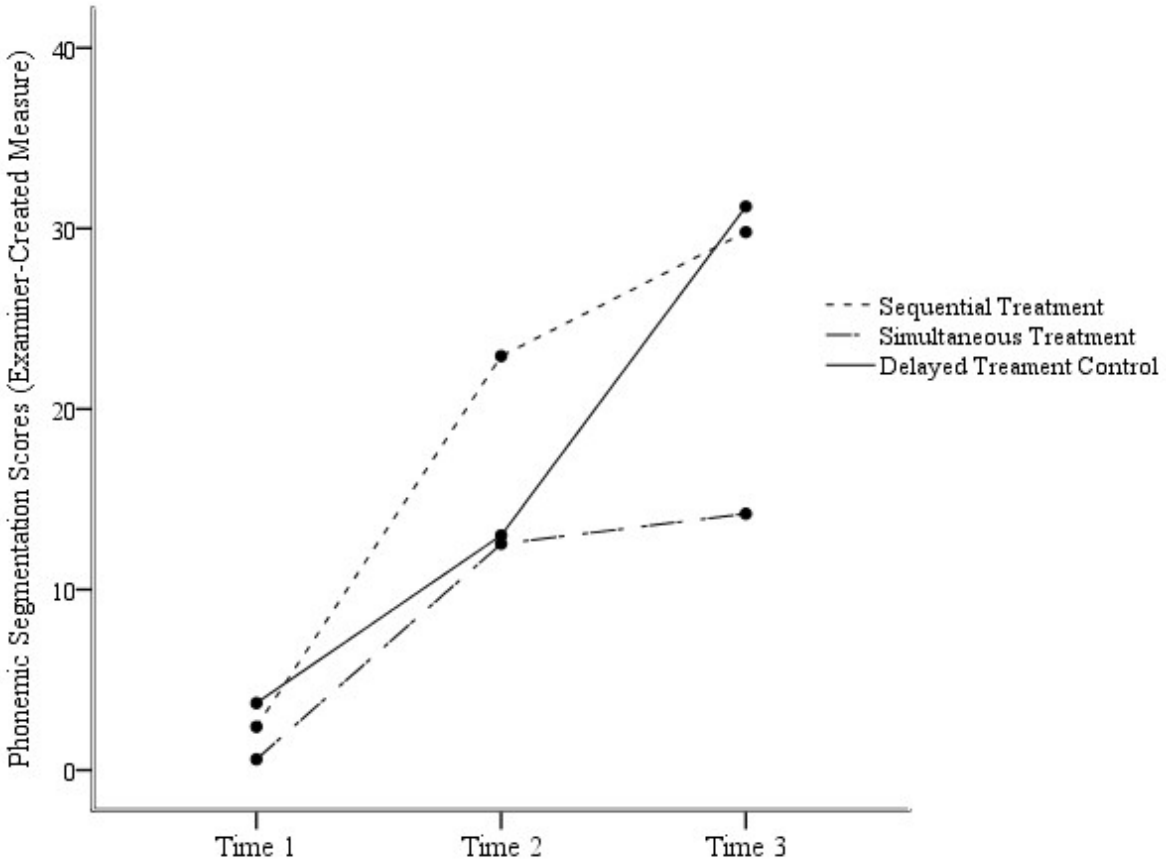


Figure 2. Interaction between time and treatment condition on phonemic segmentation scores (examiner-created measure).

AIMSweb LN scores were also submitted to a RMANOVA to analyze the interaction between time and treatment condition on the attainment of phonics skills. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity, given the significance of Mauchly's test, $\chi^2(2) = 25.62, p < .001$. The main effect of treatment did not reach significance, $F(2, 41) = .52$, $MSE = 731.51$, $p = .60$, suggesting that participants in all three conditions performed comparably on the AIMSweb LN measure across time. There was a significant main

effect of time, however [$F(1.36, 55.67) = 17.84$, $MSE = 82.40$, $p < .001$, $\eta_p^2 = .30$]. These results indicate that across conditions, AIMSweb LN scores changed significantly over time. Post hoc analyses suggested that although significant differences were not observed between time 1 ($M = 21.34$, $SE = 2.53$) and time 2 ($M = 24.75$, $SE = 2.56$), significant differences did occur between times 2 and 3 ($M = 30.75$, $SE = 2.50$), $p < .001$. Lastly, results of the RMANOVA revealed that the interaction between time and treatment condition was not significant, $F(2.72, 55.67) = .42$, $p = .72$. As such, it appears as if no statistically significant differences existed between groups over time in phonics skills, as assessed by the AIMSweb LN measure.

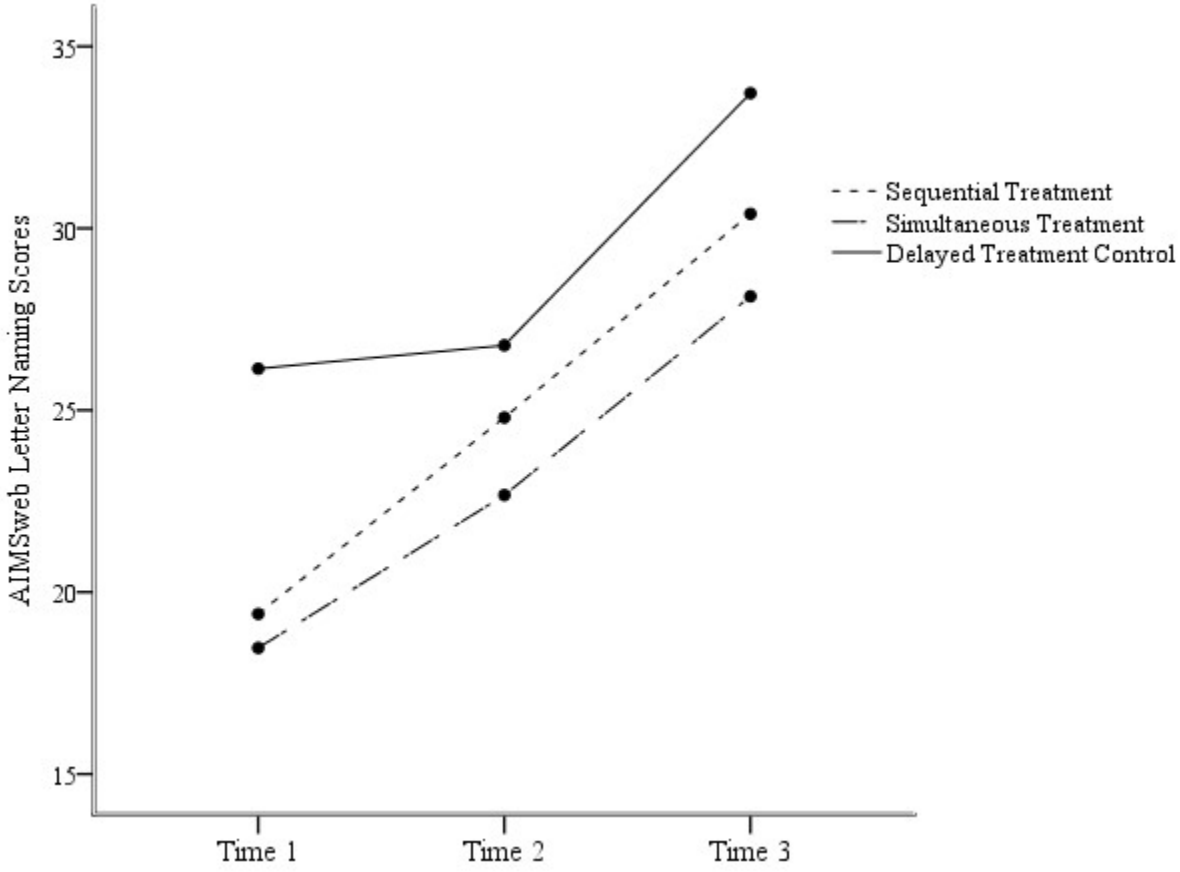


Figure 3. Interaction between time and treatment condition on AIMSweb Letter Naming scores.

Lastly, to examine the influence of sequential versus simultaneous presentation of phonemic awareness and phonics instruction, the same pattern of analyses was repeated with

AIMSweb NW scores. Mauchly's test was again significant [$\chi^2(2) = 47.20, p < .001$], therefore the Greenhouse-Geisser correction was utilized. The main effect of treatment condition did not reach significance, $F(2, 41) = .12$, $MSE = 260.52$, $p = .89$, indicating that participants in the three conditions performed similarly when averaging AIMSweb NW scores across time points. As was the case with all other measures of reading, there was a significant main effect of time on NW scores, $F(1.18, 48.44) = 26.61$, $MSE = 65.17$, $p < .001$, $\eta_p^2 = .39$. Post hoc analyses utilizing pairwise comparisons and a Bonferroni correction for multiple tests revealed that AIMSweb NW scores at time 2 ($M = 9.25$, $SE = 1.64$) were significantly higher than those at time 1 ($M = 3.26$, $SE = 1.23$), $p < .01$. Furthermore, significant differences were observed between times 2 and 3 ($M = 12.81$, $SE = 1.87$), $p < .001$. The interaction between time and treatment condition was also significant [$F(2.36, 48.44) = 3.19$, $p = .04$, $\eta_p^2 = .14$], suggesting that statistically significant differences existed between groups over time in pseudoword reading skills.

The significant interaction term was probed further with the conduction of one-way ANOVAs for the sequential, simultaneous, and delayed treatment control conditions. For the sequential condition, a significant difference was not observed between time 1 ($M = 5.27$, $SE = 2.51$) and time 2 ($M = 9.93$, $SE = 3.52$), $p = .36$, however there was a significant difference between times 2 and 3 ($M = 12.40$, $SE = 3.64$), $p < .01$. Interestingly, the simultaneous condition participants did demonstrate significant improvement between time 1 ($M = .80$, $SE = .60$) and time 2 ($M = 11.47$, $SE = 2.18$), $p < .001$. Participants in this group did not exhibit further gains once treatment was discontinued, as evidenced by no statistically significant differences between times 2 and 3 ($M = 10.40$, $SE = 1.96$), $p = .51$. Lastly, a significant difference was not found for the delayed treatment control group between time 1 ($M = 3.71$, $SE = 2.69$) and time 2 ($M = 6.36$, $SE = 2.61$), $p = 1.00$. However, the delayed treatment control group did demonstrate statistically

significant improvement between times 2 and 3 ($M = 15.64$, $SE = 3.86$), $p < .001$, the time interval during which treatment was provided. These results indicate that unlike the initial sequential treatment condition, the delayed treatment control group made significant gains in nonsense word reading skills immediately upon receiving the sequential presentation of phonemic awareness and phonics instruction. The initial sequential condition also demonstrated significant gains in nonsense word reading, however this improvement was not observed until time 3, as illuminated by AIMSweb NW maintenance scores.

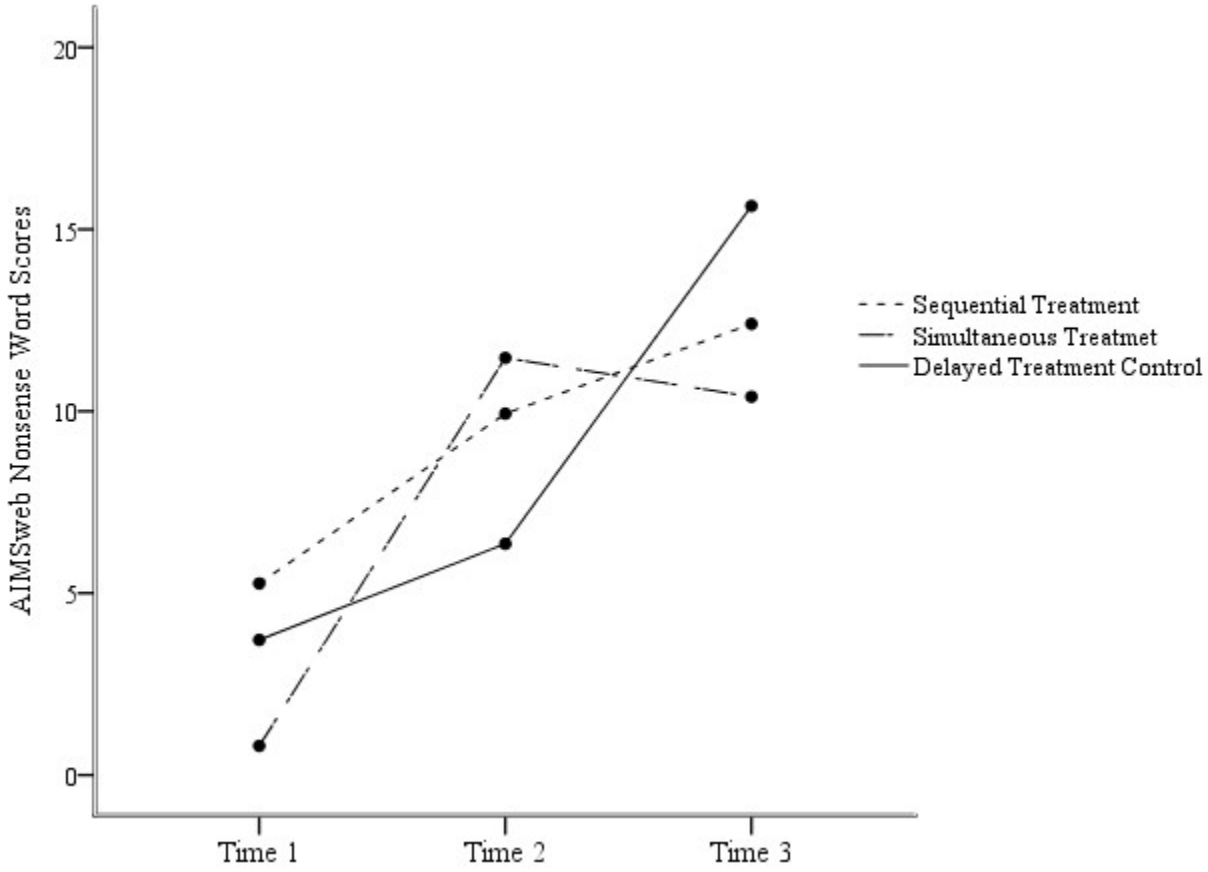


Figure 4. Interaction between time and treatment condition on AIMSweb Nonsense Word scores.

## Discussion

The purpose of the current study was to evaluate sequential versus simultaneous sequencing of phonemic awareness and phonics instruction. Specifically, the study aimed to examine the effects of these instructional designs on the reading skills of early elementary students. The preponderance of data on the academic benefits of phonemic awareness and phonics instruction suggested that participants in the treatment groups would demonstrate significantly improved reading abilities. Overall, results of the study did support this hypothesis. Given the consideration of all dependent measures and the delayed treatment control results, however, especially noteworthy outcomes did emerge. These findings observed in the current study are examined and discussed below.

Data from the examiner-created PS measure revealed that participants who received the sequential treatment, as opposed to those in the simultaneous condition, demonstrated significantly superior growth in phonemic segmentation skills. While participants in both conditions showed significant improvement immediately after completing the intervention, only those in the sequential treatment continued demonstrating significant gains weeks later. The effect size for sequential treatment on phonemic awareness proficiency fell within the range that is typically considered a large effect. Participants in the simultaneous condition, on the other hand, made no further gains, as their phonemic segmentation scores leveled off after concluding the lessons. Furthermore, although there was a nonsignificant interaction for the AIMSweb PS measure, its associated $p$ value (.16) was close to significance. The modest sample size in the present study ($N = 44$) may have played a role in limiting the significance of this statistical comparison. A post hoc power analysis revealed that on the basis of the effect size observed, a sample size of 72 would be needed for group differences to reach statistical significance at the .05

level. As such, it is likely that the nonsignificant time by treatment interaction for the AIMSweb PS measure may be partly attributed to the limited sample size. In sum, while acknowledging the absence of an interaction for the AIMSweb PS dependent variable, the results indicate superiority for a sequential phonemic awareness and phonics instructional approach for the development of phonemic awareness skills.

It is important to note that participants in the sequential treatment condition received additional opportunities to rehearse phonemic segmentation skills prior to beginning phonics instruction. This massed practice was perhaps the key to establishing larger phonemic awareness gains, as opposed to the growth demonstrated by participants in the simultaneous treatment condition. These results conflict with the current literature demonstrating that direct instruction in letter knowledge promotes students' phonemic awareness skills (Bradley & Bryant, 1983; Carroll, 2004). However, in a number of these previous studies, the effect of letter naming instruction on phonemic awareness growth was not immediate. It is suggested that perhaps with more weeks of active treatment, this "sleeper" pattern would have been observed among simultaneous condition participants in the current study.

Surprisingly, data from the examiner-created PS measure revealed that those in the delayed treatment control group made significant gains in phonemic segmentation skills between measures 1 and 2, during which time they were not receiving the direct intervention. These participants also displayed statistically significant growth immediately upon conclusion of the sequential instruction, thus replicating the results of the original sequential group. Nonetheless, the improvement observed between times 1 and 2 suggests that the significant growth in phonemic awareness skills cannot be attributed solely to the effects of the sequential treatment. Indeed, participants in this group were still receiving literacy instruction in the classroom when

not participating in the intervention. While detailed information regarding the format of this instruction was not collected, it is hypothesized that the typical classroom teaching was enough to bolster phonemic awareness ability for the delayed treatment control participants.

Results of the AIMSweb LN measure were utilized to evaluate the impact of the interventions on the development of phonics skills. The data revealed that when comparing sequential and simultaneous delivery of phonemic awareness and phonics instruction, the two approaches appear to have similar effects on letter naming fluency. Albeit nonsignificant, participants across both conditions exhibited growth in letter naming skills upon completion of treatment. It is perhaps not surprising that participants did not demonstrate significant improvement, as previous research has noted the high difficulty level of learning the alphabet, particularly for students who begin school with minimal letter naming ability (NICHD, 2000). It is suggested that the total intervention time was simply not enough for students to gain mastery of this skill. The fact that students in both conditions profited from intervention with more time, as evidenced by the significant growth from the conclusion of treatment until maintenance, provides further support for this hypothesis.

Perhaps most importantly, one treatment did not emerge as superior over the other for the purposes of phonics skill attainment. This result extends the current literature suggesting that mastery of phonemic awareness skills does not ensure subsequent enhanced understanding of alphabetic print (Blachman, 2000). Indeed, the minimal level of phonemic awareness ability exhibited by participants at baseline may have been sufficient for them to profit modestly from letter name instruction. Lastly, upon examining the pattern of AIMSweb LN scores, one can conclude that delayed treatment control participants performed commensurately with those in the

original sequential condition. As such, it appears as if the effects of sequential instruction on phonics skills were replicated with the delayed treatment control group.

Unlike the other measures, the AIMSweb NW assessment measured a skill not directly taught in either of the treatment conditions. Upon probing the significant interaction term, the results revealed interesting discrepancies between treatment conditions in terms of their effects on nonsense word reading skills. More specifically, the sequential group did not show significant gains in AIMSweb NW scores at the conclusion of treatment, while participants in the simultaneous condition did demonstrate significant growth. This difference may have been partly due to the fact that the simultaneous condition received phonemic awareness training with the incorporation of letters for a longer amount of time. This outcome provides further support for the literature highlighting the benefits of utilizing letters during phoneme manipulation instruction (NICHD, 2000).

When comparing AIMSweb NW scores from the original two treatment conditions, it is critical to note that the significant growth observed in the simultaneous condition did not endure after the discontinuation of active treatment. On the other hand, participants in the sequential condition did demonstrate continued gains in nonsense word fluency after intervention termination, as evidenced by their significant AIMSweb NW scores at maintenance. As such, while the benefits of phonemic awareness mastery may not translate into enhanced reading skills immediately, a solid foundation in phonemic awareness does appear to be critical for reading success over time. These data contribute to the already burgeoning literature identifying the causal relationship between phonemic awareness ability and subsequent success in reading (Adams, 1990; Bradley & Bryant, 1983; Hulme et al., 2002; Stanovich, 1986).

Interestingly, the results were not replicated with participants in the delayed treatment control group, as they demonstrated significant gains in nonsense word reading ability immediately after concluding the sequential intervention. As previously discussed, delayed treatment control participants were making significant gains in phonemic awareness skills when not in treatment. It is suggested that perhaps their significantly higher level of phonemic awareness ability at the start of intervention (as opposed to those in the original sequential group) may have impacted the effect of treatment on pseudoword reading. More specifically, it is hypothesized that their increased phonemic awareness ability facilitated nonsense word reading, which subsequently fostered additional gains in phonemic awareness skills. These results extend the current literature indicating that phonemic awareness and phonics share a mutually facilitative association (Fitzpatrick, 1997; Morais, Mousty, & Kolinsky, 1998; Perfetti, Beck, Bell, & Hughes, 1987). Indeed, this hypothesis is further corroborated when one considers the meaningful gains in phonemic awareness scores demonstrated by delayed treatment control participants between times 2 and 3.

When taken altogether, the data reveal noteworthy patterns from which inferences can be drawn. First, there was a significant main effect of time on scores from all dependent measures, including phonemic awareness, phonics, and pseudoword reading. These gains were observed across all participants who initially began with a low level of phonemic awareness ability, including those participants attending a low-performing school. This finding reveals that early elementary students make significant gains in reading when they are provided with direct, systematic, small-group instruction in literacy skills. It is also consistent with previous studies demonstrating that these significant improvements hold for low-income students as well (Share, Jorm, Maclean, & Matthews, 1984). As suggested by the NRP, the primary influential factor in

any reading intervention appears to be the extent to which it is administered explicitly and systematically (NICHD, 2000).

Furthermore, while acknowledging the absence of interactions for two of the four dependent variables, the results demonstrate that participants in the sequential treatment condition maintained the largest mean gains in reading skills (including phonemics awareness, phonics, and pseudoword reading) over time. Results from the delayed treatment control group provide additional evidence highlighting the benefits of the sequential intervention. Therefore, when early elementary students begin with a relatively low level of reading ability, it appears as if they profit more from a sequential presentation of phonemic awareness and phonics instruction, as opposed to a simultaneous presentation. This finding extends the literature demonstrating that phonemic awareness ability is a necessary prerequisite to the subsequent learning of alphabetic print and reading gains in general (Juel, Griffith, & Gough, 1986; Tunmer, Herriman, & Nesdale, 1988).

There are implications of these findings for assessment and instructional practices in the classroom, particularly when one considers the important element of instructional efficiency. First, the current study points to the need for teachers to ensure that a solid foundation in phonemic awareness is established prior to spending a significant amount of time on more advanced reading skills. Differentiated instruction, a high number of opportunities to respond, and frequent progress monitoring appear to be especially helpful when developing this critical skill in students. Additionally, it is necessary to utilize sensitive progress monitoring probes that accurately capture the phonemic awareness gains made by students over time. With the use of appropriate measures, teachers will be more likely to discern when it is suitable to begin instruction on more sophisticated reading skills. Lastly, the study highlights the relatively small amount of time that is needed to devote to teaching and practicing phonemic awareness skills,

even if the instructional time required for mastery varies by student. This finding is in line with recommendations made by the NRP regarding the amount of daily instructional time that need be devoted to phonemic awareness training (NICHD, 2000). Considering that time is a highly relevant factor in any school, the sizeable return on investment observed in the current study is especially noteworthy.

**Limitations and Future Research**

There are several limitations of the current study that should be noted. First, participants in the delayed treatment control group exhibited a significant amount of growth in reading skills, particularly phonemic awareness ability, when not in treatment. Given the fact that they were still in school, the delayed treatment control condition essentially represented treatment as usual. This limitation appreciably hinders the conclusions that can be drawn about the effectiveness of both the sequential and simultaneous interventions. In the future, detailed information regarding the typical classroom instruction should be collected so that proper comparisons can be made between the control and treatment groups. Even more preferably, conducting the study when students are not in school (over the summer, for example) would ensure the delayed treatment control group is not receiving any type of direct reading instruction when not in treatment. This is perhaps the largest flaw in the study design and should assuredly be addressed in future studies examining this research question.

A second potential limitation of the study is the total amount of instructional time provided to participants in each condition. When considering the time frame of an entire school year, four weeks is a relatively short amount of time to implement a reading intervention that accurately represents the scope and sequence of a typical reading curriculum. This argument is made even more salient when one considers the difficulty of and time required for mastering

letter name fluency (NICHD, 2000). While the amount of daily instruction need not change, future studies should extend the total number of weeks that participants are delivered the treatment. Doing so would likely allow for instruction that more accurately depicts what is possible in schools, which may subsequently reveal patterns not otherwise detected.

Prior to the start of the study, it was assumed that positive student behavior would be sufficiently enhanced by use of the following techniques: proximity to the examiner, reminders of group behavioral expectations, frequent opportunities to respond, and labeled praise. While these strategies were effective for the majority of participants, the examiners did occasionally cite problem behavior as a possible barrier to maximum intervention effectiveness. The problem behaviors most frequently reported were off-task behaviors such inattentiveness and playing with materials, in addition to blurting out when not given permission. In the future, researchers may consider incorporating a more formalized behavior management plan to ensure minimal problem behavior. On a related note, the examiners leading the groups in the current study were upper-level undergraduate psychology students, many of whom had limited prior experience delivering a scripted reading curriculum. While adequate levels of treatment integrity were confirmed for all treatment groups, it is hypothesized that larger improvement may have been achieved with more proficient and skillful examiners administering the curriculum.

Lastly, while maintenance gains were assessed and evaluated approximately one month after the conclusion of treatment, long-term gains were unfortunately out of the scope of this project. Future research with additional resources should incorporate measures that track the effects of sequential and simultaneous presentation of phonemic awareness and phonics skills over a greater length of time. Indeed, the primary goal of any educational practice is to maximize outcomes that persist as students progress through school. Incorporating other assessments of

literacy, such as a spelling measure, may also provide additional information illuminating the benefits of different instructional designs.

**Conclusion**

In summary, participants in both the sequential and simultaneous treatment conditions demonstrated substantial mean gains over time in phonemic awareness, phonics, and pseudoword reading. This finding highlights the impact that a relatively short reading intervention can have on the literacy outcomes of early elementary students. Furthermore, an examination of instructional efficiency was made possible by equating instructional time across conditions. The data revealed that when equating for time, students demonstrate relatively superior literacy ability when phonemic awareness is mastered prior to beginning extensive phonics instruction. This outcome provides further support for the necessity of teachers to frequently assess and track the phonemic awareness skills of early readers. While this process assuredly utilizes time and other resources, which are often sparse in schools, the benefits are invaluable. In addition to the contributions made by the current study to the existing literature, the results also indicate the need for further research examining the reading acquisition process. Given its multifaceted and complicated nature, it is perhaps not surprising that ambiguity remains regarding how to maximize reading attainment levels in beginning readers. Large-scale and longitudinal investigations of reading acquisition are therefore warranted, particularly when one considers the adverse ramifications that result from deficient reading skills.

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**Appendix A**
**AIMSweb Phonemic Segmentation Assessment**

Given To: _____ Given By: _____ Date: _____

| | | | | |
|---|---|---|---|---|
| winds | /w/ /i/ /n/ /d/ /z/ | few | /f/ /y/ /oo/ | / 8 (8) |
| swung | /s/ /w/ /u/ /ng/ | drive | /d/ /r/ /ie/ /v/ | / 8 (16) |
| stole | /s/ /t/ /oa/ /l/ | asked | /a/ /s/ /k/ /t/ | / 8 (24) |
| same | /s/ /ai/ /m/ | shape | /sh/ /ai/ /p/ | / 6 (30) |
| it | /i/ /t/ | fair | /f/ /ai/ /r/ | / 5 (35) |
| nap | /n/ /a/ /p/ | you | /y/ /oo/ | / 5 (40) |
| sort | /s/ /or/ /t/ | picked | /p/ /i/ /k/ /t/ | / 7 (47) |
| chest | /ch/ /e/ /s/ /t/ | paid | /p/ /ai/ /d/ | / 7 (54) |
| bit | /b/ /i/ /t/ | hug | /h/ /u/ /g/ | / 6 (60) |
| match | /m/ /a/ /ch/ | dog | /d/ /o/ /g/ | / 6 (66) |
| sign | /s/ /ie/ /n/ | can | /k/ /a/ /n/ | / 6 (72) |
| done | /d/ /u/ /n/ | be | /b/ /ea/ | / 5 (77) |
| parks | /p/ /ar/ /k/ /s/ | breathe | /b/ /r/ /ea/ /th/ | / 8 (85) |
| tracks | /t/ /r/ /a/ /k/ /s/ | oil | /oi/ /l/ | / 7 (92) |
| that | /th/ /a/ /t/ | store | /s/ /t/ /or/ | / 6 (98) |

_____/

**Appendix B**
**Examiner-Created Phonemic Segmentation Assessment**

| | | | | | | |
|---|---|---|---|---|---|---|
| bat | /b/ /a/ /t/ | hen | /h/ /e/ /n/ | me | /m/ /ee/ | / 8 (8) |
| dog | /d/ /o/ /g/ | bug | /b/ /u/ /g/ | cat | /c/ /a/ /t/ | / 9 (17) |
| hay | /h/ /ay/ | kid | /k/ /i/ /d/ | mom | /m/ /o/ /m/ | / 8 (25) |
| bus | /b/ /u/ /s/ | dad | /d/ /a/ /d/ | net | /n/ /e/ /t/ | / 9 (34) |
| lip | /l/ /i/ /p/ | mop | /m/ /o/ /p/ | key | /k/ /ee/ | / 8 (42) |
| fin | /f/ /i/ /n/ | jet | /j/ /e/ /t/ | cup | /c/ /u/ /p/ | / 9 (51) |
| day | /d/ /ay/ | fan | /f/ /a/ /n/ | pen | /p/ /e/ /n/ | / 8 (59) |
| pig | /p/ /i/ /g/ | pop | /p/ /o/ /p/ | gum | /g/ /u/ /m/ | / 9 (68) |
| hat | /h/ /a/ /t/ | ten | /t/ /e/ /n/ | be | /b/ /ee/ | / 8 (76) |
| pin | /p/ /i/ /n/ | pot | /p/ /o/ /t/ | pup | /p/ /u/ /p/ | / 9 (85) |
| it | /i/ /t/ | jam | /j/ /a/ /m/ | vet | /v/ /e/ /t/ | / 8 (93) |

**Appendix C**
**AIMSweb Letter Naming Assessment**

Given To: _____ Given By: _____ Date: _____

u o L P K b E j H h / 10 (10)

S c a U I K T N L Y / 10 (20)

k B H Y M g o Q p W / 10 (30)

U W u Q O s A n P i / 10 (40)

G o n Z I c L X U i / 10 (50)

m E d I j Y p G v B / 10 (60)

P c r H K x M i O W / 10 (70)

W A N x k I a u Q d / 10 (80)

z N X M L e g I C p / 10 (90)

A F k j H U z s I L / 10 (100)



____/____

**Appendix D**
**AIMSweb Nonsense Word Assessment**

Given To: _____ Given By: _____ Date: _____

| | | | | | |
|---|---|---|---|---|---|
| noj | vez | ruz | biv | yep | / 15 (15) |
| nof | lal | jon | duv | luk | / 15 (30) |
| sij | yuc | mod | lef | hus | / 15 (45) |
| mij | vis | kuj | jep | miz | / 15 (60) |
| wip | pez | fik | vug | az | / 14 (74) |
| non | kat | jik | pas | joz | / 15 (89) |
| nik | ret | od | lic | dop | / 14 (103) |
| kos | muv | jid | sus | tos | / 15 (118) |
| zuc | laf | het | kuc | yub | / 15 (133) |
| woj | fos | og | rev | wij | / 14 (147) |
| wef | jof | yug | iz | fav | / 14 (161) |
| muz | nav | mac | vuz | bik | / 15 (176) |
| tud | veb | pep | wal | sid | / 15 (191) |
| suz | mav | hij | yob | nov | / 15 (206) |
| vom | yec | ic | hej | hon | / 14 (220) |

____/____

**Appendix E**
**Treatment Integrity Checklist**

Data Collector: _____ Date: _____

Group Number: _____ Lesson Number: _____

_____ Therapist chooses correct lesson (as designated in lesson plan)

_____ Therapist sets timer for 25 minutes

_____ Therapist presents lesson opening to students (poem or letter names)

_____ Therapist completes lesson opening

_____ Therapist models phonemic awareness/phonics skill

_____ Therapist completes guided practice of phonemic awareness/phonics skill

_____ Therapist completes independent practice of phonemic awareness/phonics skill until timer runs out

_____ Therapist provides praise and/or corrective feedback as necessary throughout lesson

___ / 8 TOTAL

# Appendix F
# Institutional Review Board Approval

**ACTION ON EXEMPTION APPROVAL REQUEST**

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

**TO:** Elise McIver
Psychology

**FROM:** Dennis Landin
Chair, Institutional Review Board

**DATE:** September 23, 2015

**RE:** **IRB#** E9497

**TITLE:** Promoting Literacy Development in the Early Childhood Classroom: An Evaluation of Phonemic Awareness and Phonics Instruction

**New Protocol/Modification/Continuation:** New Protocol

**Review Date:** 9/22/2015

**Approved** X **Disapproved** _____

**Approval Date:** 9/22/2015 **Approval Expiration Date:** 9/21/2018

**Exemption Category/Paragraph:** 1

**Signed Consent Waived?:** No

**Re-review frequency:** (three years unless otherwise stated)

**LSU Proposal Number** (if applicable):

**Protocol Matches Scope of Work in Grant proposal:** (if applicable)

**By**: Dennis Landin, Chairman _____

**PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –**
**Continuing approval is CONDITIONAL on:**

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE:**

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

## Appendix G
## Parental Informed Consent and Student Assent Forms

| | | |
|---|---|---|
| 1. | Study Title: | Promoting Literacy Development in the Early Childhood Classroom: An Evaluation of Phonemic Awareness and Phonics Instruction |
| 2. | Performance Site: | XXXXX Elementary School |
| 3. | Investigator: | The following investigator is available for questions about this study: Elise McIver at (404) 984-9046 or Dr. George Noell at (225) 578-4119. |
| 4. | Purpose of the Study: | The purpose of this study is to systematically examine the optimal sequencing of phonemic awareness and phonics instruction. |
| 5. | Participant Inclusion: | Pre-k and K students who have not been evaluated and identified as having a disability. To further screen for study eligibility, students will be administered a phonemic awareness and phonics assessment to ensure they have not acquired foundational reading skills prior to the start of the study. |
| 6. | Study Procedures: | Over a period of one month, participants will receive direct instruction in phonemic awareness and phonics skills. Sessions will occur three days per week for 30 minutes each, and instruction will be delivered in small groups of 4-6 students. Participants will also complete literacy skill assessments weekly. |
| 7. | Benefits: | Participants will receive evidence-based instruction in literacy skills. As such, it is likely that participation in the study will provide a strong educational benefit for participants. Additionally, the study may yield valuable information that could contribute to ongoing research examining optimal instructional practices. |
| 8. | Risks: | There are no known risks associated with this study. |
| 9. | Right to Refuse: | Participation is voluntary, and a child will become part of the study only if both child and parent agree to the child's participation. At any time, either the participant may withdraw from the study or the participant's parent may withdraw the participant from the study without penalty or loss of any benefit to which they might otherwise be entitled. |
| 10. | Privacy: | Results of the study may be published, but no names or identifying information will be included for publication. Participant identity |

will remain confidential unless disclosure is required by law.

11. Consent: The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigator. If I have questions about participants' rights or other concerns, I can contact Dennis Landin, Institutional Review Board, (225) 578-8692. I will allow my child to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

_____ _____

Parent Signature Date

A researcher will read the following statement:
"Hi. My name is [*researcher's name*]. I'm a student at a college. I'm trying to learn about how children can read their best in school. Is it okay if we work on reading together?"

Participant Signature:_____ Date: _____
Students may write their name, mark an X, or give verbal consent.

Student gives verbal consent _____
Student does not give verbal consent _____

## Vita

Elise Catherine McIver is a native of Atlanta, Georgia. She graduated from the University of Georgia in 2007 with a Bachelor of Science degree in psychology. Upon graduation, she joined Teach For America as a South Louisiana Region corps member. Elise then began her graduate work in Louisiana State University's school psychology doctoral program under the supervision of Dr. George Noell. She earned her Master of Arts degree in 2014 and completed her doctoral internship at the Kennedy Krieger Institute and the Johns Hopkins University School of Medicine in Baltimore, Maryland. Elise expects to graduate with her Doctor of Philosophy degree in August 2017.