


Spring 2005

The Effects of Breakthrough to Literacy on the Phonological Awareness Skills of Students in Early Elementary School

Amy W. Woodward
Old Dominion University

Follow this and additional works at: https://digitalcommons.odu.edu/urbanservices_education_etds

 Part of the [Curriculum and Instruction Commons](#), [Elementary Education Commons](#), and the [Language and Literacy Education Commons](#)

Recommended Citation

Woodward, Amy W.. "The Effects of Breakthrough to Literacy on the Phonological Awareness Skills of Students in Early Elementary School" (2005). Doctor of Philosophy (PhD), dissertation, , Old Dominion University, DOI: 10.25777/w6t6-s809
https://digitalcommons.odu.edu/urbanservices_education_etds/67

This Dissertation is brought to you for free and open access by the College of Education & Professional Studies (Darden) at ODU Digital Commons. It has been accepted for inclusion in Theses and Dissertations in Urban Services - Urban Education by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

**THE EFFECTS OF BREAKTHROUGH TO LITERACY ON THE
PHONOLOGICAL AWARENESS SKILLS OF STUDENTS IN
EARLY ELEMENTARY SCHOOL**

By


**Amy W. Woodward
B.S. May 1990, Longwood College
M.S.Ed. December 1996, Old Dominion University**

**A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of**

DOCTOR OF PHILOSOPHY

URBAN SERVICES

**OLD DOMINION UNIVERSITY
March 2005**



Dr. Abha Gupta, (Director)

Dr. Abha Gupta, (Director)


Dr. Raymond Morgan, (Member)

Dr. Stephen Tonelson, (Member)

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION.....	1
Background to the Problem.....	6
Statement of the Problem.....	11
Methodology.....	13
Significance of the Study.....	14
Limitations of the Study.....	16
Operational Definitions.....	17
Summary.....	20
CHAPTER 2 REVIEW OF RELATED LITERATURE.....	22
Reading Problems In Young Children as an Urban Issue.....	23
The At-Risk Student and Phonological Awareness.....	24
Phonological Awareness as a Predictor of Reading Achievement.....	30
Phonological Awareness Intervention.....	36
Phonological Awareness and Reading Comprehension.....	47
Additional Phonological Awareness Interventions and Required Components.....	55
Computer-Based Intervention Research.....	65
Summary.....	67
CHAPTER 3 METHODOLOGY.....	70
General Design.....	70
Participants.....	71
Procedure.....	72

Measures.....	78
Reliability and Validity of Instruments.....	78
Phonemic Awareness Literacy Screening.....	80
Standards of Learning Reading Comprehension Test, Grade 3.....	86
Statistical Analysis.....	86
Summary.....	87
CHAPTER 4 ANALYSIS OF DATA.....	88
Research Hypotheses.....	88
Mortality Analysis.....	90
Analysis of Treatment on Dependent Variables.....	90
Analysis of PALS Kindergarten Posttest.....	91
Analysis of PALS Grade One Pretest.....	92
Analysis of PALS Grade One Posttest.....	93
Analysis of PALS Grade Two Pretest.....	94
Analysis of PALS Grade Two Posttest.....	95
Analysis of SOL Reading Comprehension Assessment.....	96
Discussion.....	97
Summary.....	98
CHAPTER 5 SUMMARY AND CONCLUSIONS.....	100
Summary.....	100
Conclusion.....	102
Recommendations.....	103
REFERENCES.....	106

APPENDICES.....	116
Appendix A. Phonological Awareness Literacy Screening Students Summary Sheet.....	117
Appendix B. Breakthrough to Literacy Professional Development Schedule.....	118
Appendix C. Breakthrough to Literacy Enrollment Checklists.....	119
Appendix D. Breakthrough to Literacy Students Activities.....	120
Appendix E. Mortality Analysis Statistics.....	121
Appendix F. MANCOVA Statistics.....	122
Appendix G. Kindergarten PALS Posttest Analysis.....	123
Appendix H. Grade One PALS Pretest Analysis.....	124
Appendix I. Grade One PALS Posttest Analysis.....	125
Appendix J. Grade Two PALS Pretest Analysis.....	126
Appendix K. Grade Two PALS Posttest Analysis.....	127
Appendix L. Grade Three SOL Reading Comprehension Analysis..	128

LIST OF TABLES

TABLE	PAGE
1. Independent and Dependent Variables.....	71
2. MANCOVA to Determine Significance Between Groups.....	91
3. ANCOVA to Determine Differences Between Groups on PALS Kindergarten Posttest.....	92
4. ANCOVA to Determine Differences Between Groups on PALS Grade One Pretest.....	93
5. ANCOVA to Determine Differences Between Groups on PALS Grade One Posttest.....	94
6. ANCOVA to Determine Differences Between Groups on PALS Grade Two Pretest.....	95
7. ANCOVA to Determine Differences Between Groups on PALS Grade Two Posttest.....	96
8. ANCOVA to Determine Differences Between Groups on SOL Grade Three Reading Comprehension Test.....	97

ABSTRACT

This study researched the effects of Breakthrough to Literacy (1998), a phonological awareness computer-based program, on elementary school students in grades kindergarten through three. The treatment group received the Breakthrough to Literacy program in kindergarten. The control group received the traditional curriculum without this program. The students were assessed on phonological awareness skills at the end of kindergarten, the fall and spring of grade one and grade two. Their reading comprehension skills were also assessed at the end of grade 3. Results indicate that Breakthrough to Literacy improved the phonological awareness skills of students who received the program in grades kindergarten and one. These improvements were no longer evident in grade two and there was no difference between the groups on the delayed measure of reading comprehension. The data suggest that Breakthrough to Literacy is an effective intervention to initially improve phonological awareness skills, but is not sufficient to provide longitudinal improvements and is not linked to an improvement in reading comprehension.

CHAPTER 1

Introduction

Phonological awareness has been a focus of research for decades. According to Busnik (1997) “phonological awareness is *the ability to segment spoken words into their constituent sounds and to manipulate these sounds*” (p. 200). A position paper from the International Reading Association ([IRA], 1998) states that phonological awareness also includes larger units of sound such as rhyme identification, segmenting and blending words, onset and rimes identification, and syllable identification. Chard and Dickson (1999) add “phonological awareness is the understanding of different ways that oral language can be divided into smaller components and manipulated” (p. 262).

Phonological awareness and phonemic awareness are often used interchangeably, although they do differ. Phonemic awareness is defined as “an understanding about the smallest units of sound that make up the speech stream: phonemes” (IRA, 1998). Therefore, phonemic awareness is a part of phonological awareness.

Reading problems effect urban populations that have pockets of poverty. These families have children who are at-risk for early school failure due to lack of resources, lack of education, minority language status, and often providing a lack of early interaction with literature. The No Child Left Behind Act of 2001 requires all subgroups including all socioeconomic groups, minority groups, minority language groups, and special education students to reach achievement levels set by the federal government.

Retrieved November 15, 2004 from

<http://www.ed.gov/nclb/overview/intro/execsumm.html> Therefore, it is crucial they receive the interventions necessary to succeed in school.

Other children who are at risk for early school failure and reading difficulties enter school without having rich language experiences. The educational levels of mothers, the age of the mother when she began having children, and the mother's language status can all play a role in the degree to which children are prepared for reading success in school (Zill, Collins, West, & Hausken, 1995; Griffin & Lundy-Ponce, 2003; Turley, 2003).

According to Adams (1990) "research shows that most children who become successful readers spend 1000 hours or more in lap reading experiences. Although it [Breakthrough to Literacy] cannot replace time spent with a caring adult, Breakthrough's software replicates the all-important rehearsals with symbols and sounds as children listen and read stories as many times as they wish." Retrieved January 13, 2004 from <http://www.earlyliteracy.com/components/essentialpractices.html> This type of interaction with text during preschool years build a foundation of literacy and prereading skills that can create higher reading achievement at school (ETS, 1992).

This study is designed to investigate if the Breakthrough to Literacy program has a significant effect on phonological awareness skills and reading achievement. Within the review of related literature, the following topics are discussed: reading problems as an urban issue, reading problems and the at-risk student, phonological awareness as a predictor of reading achievement, phonological awareness interventions and how they effect reading achievement, phonological awareness interventions and components of interventions, and research study results on Breakthrough to Literacy.

Phonological interventions have been implemented to try to improve the reading achievement of students at-risk for school failure. Results indicate that phonological awareness skills can be taught to these students, improving their skills significantly. In addition, phonological awareness training improved their reading achievement.

In the 1970's, Isabelle Liberman observed that the skills needed by children who are beginning to read included segmenting words into parts and understanding that these parts can be represented by print (Liberman, Shankweiler, Fischer, and Carter, 1974). Difficulty in reading stemmed from the fact that these parts of speech were merged in speech production and difficult for the beginning reader who is not phonologically aware to understand (Blachman, 1997). Since then, a large body of research has provided evidence that phonological awareness is needed in order for children to become successful readers and can predict reading achievement. Many researchers found that children who lack phonological awareness are likely to be poor readers (Bradley & Bryant, 1983; Fletcher et.al, 1994; Juel, 1988; Share, Jorm, Maclean, & Matthews, 1984; Vellutino & Scanlon, 1987). Concerning reading skills, phonological awareness was found to be a more powerful predictor than IQ, mental age, or perceptual ability (Adams, 1990; Stanovich, Cunningham, & Cramer, 1984). Phonological awareness measures were found to correlate with eventual reading success even after measures such as IQ were controlled (Bradley & Bryant, 1983; Lundberg, Olofsson, & Wall, 1980). Other researchers have found that the relationship between phonological awareness and reading skills persist throughout a child's school career (Calfee, Lindamood & Lindamood, 1973; Juel, 1988).

A variety of interventions have been researched in the past three decades. A meta-analysis conducted by the National Reading Panel (Ehri et al., 2000) concluded that phonological skills could be taught and students were successfully trained in preschool, kindergarten and grade one. The same meta-analysis (Ehri et al., 2000) noted that the improvement students made in phonological skills was transferred to reading and spelling achievement. The intervention research discussed in this study supports the conclusion that phonological awareness interventions improve phonological awareness skills, reading achievement and spelling achievement in students.

The research on intervention components supports the teaching of phonological awareness skills including rhyme, alliteration, segmenting, blending, letter-sound correspondence, listening comprehension, reading comprehension, vocabulary development and decoding. Dozens of interventions have been implemented to improve skill levels. They include a variety of combinations of these skills. This study will add to the gap in research as to what skills need to be taught and for what period of time to ensure optimal results.

Phonological awareness and its relationship with reading comprehension is complex. Research has suggested that phonological awareness improves decoding. Decoding along with other components of reading programs have been linked with reading comprehension. This study will investigate if this relationship is strong enough to produce an improvement in reading comprehension in grade three after a phonological awareness treatment in kindergarten.

The Breakthrough to Literacy research suggests that its program is effective in improving phonological awareness skills and reading achievement in students

prekindergarten through three. These results include assessments ranging from informal work samples to standardized measures.

This study is a quasi-experimental design using intact groups to investigate differences between those groups after a treatment. The treatment is the Breakthrough to Literacy program implemented in kindergarten classrooms. The participants attended four Title I elementary schools governed by the same school board. Two of the schools implemented the Breakthrough to Literacy program in their kindergarten classes while the other two schools did not.

The Breakthrough to Literacy program was implemented 15-20 minutes daily during the students' kindergarten year. The staff received the same materials and training from the company.

In order to measure the effects of the study, the Phonological Awareness Literacy Screening was given in the Fall and Spring of the students' kindergarten and first grade years and the Spring of their second grade year. This assessment measured phonological awareness skills. The Standards of Learning reading test was given in the Spring of the students' third grade year. This test measured reading comprehension. Both tests have provided support of reliability and validity.

A MANCOVA was performed to determine if there are significant differences between groups. The kindergarten Phonological Awareness Literacy Screening pretest will be used as the covariate to statistically equate the groups. A post hoc will be performed to determine where the difference lie.

Due to subject attrition, an Independent T Test will be performed to determine if the students lost to the study were statistically different from the students who were included in the study.

Background to the Problem

Many kindergarten students enter school without the language skills necessary to successfully meet the reading and language standards. According to Zill, et al., (1995), one way economically disadvantaged children are distinguished from their peers by their lack of phonological awareness skills. These students face an increased possibility of early school failure. Risk factors associated with fewer accomplishments and problems learning in school include: parents' educational background, low socioeconomic status, mother speaking a language other than English as her primary language, and family structure. Of these factors, low maternal education and minority language status were consistently associated with fewer signs of emerging literacy among four-year-olds (Zill et al., 1995).

Young mothers who dropped out of school may lack the skills to use language elaborately with their children. According to Griffin and Lundy-Ponce (2003), there was a significant difference in readiness skills of kindergarten students when compared by their mothers' educational levels. Of children studied with mothers who had earned less than a high school diploma, thirty-eight percent of them demonstrated proficiency in letter recognition with only nine percent demonstrating proficiency with beginning sound identification. Children from mothers who earned a bachelor's degree or higher performed much better. Eighty-six percent of the children were proficient in letter recognition and fifty-percent were proficient with beginning sounds.

Turley (2003) found that low maternal age at the time of the mother's first birth was highly correlated with low achievement in math, reading and vocabulary as well as high instances of behavior problems. Also, non teen mothers who had sisters that became teen mothers were just as disadvantaged as the teen mothers themselves, suggesting that family background plays a role in education and income of the mother as well as the education and social behavior of their children.

Allen & Sethi (2004, p.4) report that "study after study has found that school readiness is largely based on early childhood experiences within the family". Many parents engage their children in language play which develops awareness of sounds in words (Maclean, Bryant, & Bradley, 1988). "Children who learn to read early come from families where there are books, and where they are read to often (Neuman, Celano, Greco, & Shue, 2003, p.1). Children at risk for early reading failure are those without early language experiences. These experiences include being read to, engaging in language play, having parents who have adequate reading ability, and having homes with adequate levels of reading practice (Lyon, 1998). Children who have been read to in the home most likely come from literacy-rich environments which expose children to print and language (Juel & Meier, 1999). The greatest amount of didactic interaction occurs in the home; therefore, the lack of this interaction inhibits the language growth necessary for early school success (Scott-Jones, 1987). At-risk families often do not have the resources to create literacy rich environments at home, and reading at home makes for higher reading achievement at school (ETS, 1992). Yeung, Linver, and Brooks-Gunn (2002) found that a family's inability to create stimulating learning environments at home facilitated the link between poverty and achievement. Over three thousand children and

their families were studied and results indicated that the presence of toys that reinforce basic skills connected to reading increased outcomes on standardized tests that measure cognitive ability. Griffin & Lundy-Pounce (2003) state “too many of these children lack critical preliminary skills such as knowledge of letters and numbers, how to hold a book, or how to interact positively with their peers and teachers. When unaddressed early on, these deficiencies contribute to the achievement gap” (p. 20).

Since these early home experiences contribute to the degree an adequate foundation for learning is established, children are likely to come to school with varied levels of learning and thinking (Neuman, et al., 2003). Therefore, the children who have little exposure to books and print before they enter school are more likely to need more intense intervention and instruction to develop their literacy skills when they enter an educational setting (International Reading Association and National Association for the Education of Young Children, [IRA & NAEYC], 1998). Hargrave (2000) concurs by reporting an increase in vocabulary of thirty-six language delayed preschoolers after they experienced storybook reading. Also, the children’s interest in reading increased when parents participated in shared reading (Ortiz, 2001). According to Lyon (1988), “good readers are phonemically aware, understand the alphabetic principle, apply these skills in a rapid and fluent manner, possess strong vocabularies and syntactical and grammatical skills, and relate reading to their own experiences. Difficulties in any of these areas can impede reading development. Children who have had stimulating language experiences from birth have an edge on developing their reading skill” (p.17).

Hart and Risley (2003) reported on the vocabulary growth of young children and how it relates to the language skills of these same children at ages nine and ten. The

vocabulary growth of children from varied socioeconomic homes was measured at age three. Children of professional parents had acquired a vocabulary of 1,116 words while children of middle to lower class parents and parent on welfare had vocabularies of 749 words and 545 words respectively. This clearly indicates a gap in language development at a very early age. By age four these children had similar experiences when the number of words addressed to them was estimated. Children of parents on welfare had an estimated 13 million fewer words spoken to them when compared to children of working class parents. This number is approximately doubled when compared to children of professional parents. The researchers also discovered that the vocabulary development at age three related language development at ages nine and ten on two separate standardized measures and also strongly associated with reading comprehension scores on an additional standardized measure.

Low-income and disadvantaged kindergarten students are often required to repeat their kindergarten year because of their lack of language development (Karweit, 1993). A study of inner city elementary students, 96 percent of whom were African American, indicated that relationships existed between children's reading and language skills in first grade and grade retention prior to third grade, between their parents' involvement in their education during kindergarten and their grade retention prior to third grade, and their verbal performance and their grade retention by the end of their fifth grade year (Marcon, 1993). Low socioeconomic status Black and Hispanic children have been shown to have poor phonemic awareness in comparison with their white counterparts which hinders their ability to be able to decode the written word (Juel, 1988). Reading difficulties in young children tend to manifest in the most severe terms when the students are from

economically disadvantaged homes, the parents have limited resources and education, and the children enter school with limited engagement with print (IRA, 1998).

According to Juel & Meier (1999, p.186), “Without specific and serious reading interventions, a child who is behind his or her classmates in word recognition in first grade almost invariably remains a poor reader throughout the other grades”. They found a high probability that a child would remain a poor reader at the end of fourth grade if a child was a poor reader in first grade. Children who master reading skills tend to be diligent readers who process and read more. This process is cyclical as the more children read, the more their reading skills develop (Walsh, 2000). This finding was supported by Wagner and Chang (1997) who found the achievement gap between children with high and low levels of phonological awareness continued to grow without intervention. According to Fletcher et al., (1994), the most common barrier to becoming a fluent reader is lack of phonological awareness, and the researchers state that this holds true for students with and without learning disabilities.

Children in kindergarten are often expected to read sight words, phonetically decode words and perform math skills that traditionally were expected of first grade students (Plevyak & Morris, 2002). Due to this rise in academic expectations for kindergarten students, instruction in the alphabetic code is essential in developing fluency and accuracy in word identification (Adams, 1990; Chall, 1989; Vellutino, 1991). If children can segment words into phonemes and blend them to build words, they can develop fluency, and good comprehension (Chard & Dickinson, 1999; Lyon, 1998). Preschool and kindergarten children with the poorest segmentation skills were found to be the poorest readers (Ball & Blachman, 1991).

Research indicates that phonological awareness can be developed through training (O'Connor, Jenkins & Slocum, 1995). Explicit training in phonemic awareness has been found to result in an improvement in reading (Ball & Blachman, 1991; Bradley & Bryant, 1985; Cunningham, 1990; Lie, 1991; Lundberg, Frost, & Peterson, 1988). Students are also able to be taught the crucial skills of blending and segmenting words (Content, Kolinsky, Morias, & Berktelson, 1986; Elkonkin, 1963, 1973; Treiman & Baron, 1983).

Ball and Blachman (1988, 1991) found that training in segmenting words and letter to sound correspondence improved achievement on a reading measure. When segmenting was taught along with the skill of blending phonemes into words, reading achievement was increased also (Fox & Routh, 1984; Williams, 1980; Cunningham, 1990; Torgeson, Morgan & Davis, 1992; Davidson & Jenkins, 1994; Lie, 1991). Reading achievement along with spelling performance can be increased with phonological training and remains constant through grade two according to Lundberg et al. (1988). Byrne & Fielding- Barnsley (1991, 1993, 1995) concurred with their findings. After phonological awareness training, word recognition of four year olds was increased and comprehension and decoding was also increased in grade two.

Statement of the Problem

Although much research has been done indicating that well developed phonological skills are related to reading skill, researchers remain unclear about the type and frequency of phonological instruction that is needed (Chard & Dickson, 1999). The major purpose of this study is to investigate the efficacy of improving phonological awareness skills of kindergarten students in the Breakthrough to Literacy program. This

study also investigates if these effects continue to be evident through their phonological skills in their first and second grade years. Part of this investigation is to see if the positive effects from the program continue through first and second grade. This study will also investigate if the students who had the Breakthrough to Literacy program in kindergarten will have significantly higher reading comprehension scores by the time they reach grade three compared to their peers who did not experience the program. The following research questions will be investigated:

1. Is there a difference in performance on measures of phonological awareness and reading comprehension between students who had Breakthrough to Literacy in kindergarten and those who did not?
 - a. Is there a difference in performance on a posttest measure of phonological awareness in kindergarten between students who had Breakthrough to Literacy and those who did not?
 - b. Is there a difference in performance on a pretest measure of phonological awareness in grade one between students who had Breakthrough to Literacy in kindergarten and those who did not?
 - c. Is there a difference in performance on a posttest measure of phonological awareness in grade one between students who had Breakthrough to Literacy in kindergarten and those who did not?
 - d. Is there a difference in performance on a pretest measure of phonological awareness in grade two between students who had Breakthrough to Literacy in kindergarten and those who did not?

- e. Is there a difference in performance on a posttest measure of phonological awareness in grade two between students who had Breakthrough to Literacy in kindergarten and those who did not?
- f. Is there a difference in performance on a standardized measure of reading comprehension in grade three between students who had Breakthrough to Literacy in kindergarten and those who did not?

Methodology

This study was conducted as a quasi-experimental design. The sample was a cohort of students whose scores on phonological awareness and reading comprehension were tracked through their kindergarten, first, second and third grade years. No students who registered in these schools after receiving instruction from other schools were accepted into this study. Students were matched on additional reading intervention help received including Title I, reading recovery and reading resource. Students who were identified with a disability addressed with an IEP were eliminated. These schools have similar socioeconomic backgrounds. The sample came from four schools guided by the same school board, in the same county with the same curriculum, who all received federal funding through Title I. A MANCOVA was used to analyze the differences between groups on all measures of achievement with the kindergarten phonological awareness pretest scores used as the covariate. The Phonological Awareness Literacy Screenings in grades kindergarten through two and the Standards of Learning Reading Comprehension assessment in grade three were used to determine differences in phonological awareness skills in grades kindergarten, one and two and reading comprehension ability in grade three.

Significance of the Study

Children who experience reading problems early in their school careers face difficulties in school including being retained in one or multiple grades and having these reading problems persist through their schooling and beyond into adulthood. The degree to which children are supported in early reading and writing activities before they are school-age contributes to their school success or lack thereof (IRA & NAEYC, 1998). These experiences from birth combined with various personality traits interact to determine how children's literacy develops (IRA & NAEYC, 1998). Therefore, kindergarten teachers encounter classrooms where students demonstrate a range of literacy development.

An abundance of research supports that retaining children has negative effects on their perception of themselves and does not seem to improve their academic achievement. Retention of children as young as kindergarten has been found to have the same effects as retention of older students: low self-esteem, poor attitudes toward school, and increased risk of dropping out of high school (National Preschool Coordination Project, 1991). A study by Sugzda (1992) comparing two groups of urban elementary school students who were not ready for first grade by the end of kindergarten reported no significant difference in reading scores at the end of the next year between those students who were retained and those who were promoted. In this study, repeating kindergarten did not seem to benefit reading achievement. According to Jimerson and Kaufman (2003), over two million children are retained in their grade annually. These students tend to perform below expectations in reading and language. The researchers also report that low performing children who have parents involved in the education of their children are less

likely to be retained. Retained students also display inappropriate behaviors and have less confidence than low performing peers that were promoted. In addition, five percent of students that experienced academic gains during the first year they were retained, these gains did not maintain themselves over time.

According to Grossen (1997), forty percent of the children have severe reading problems that negatively effect the enjoyment of reading. These problems generally are not developmental issues and persist through adulthood without intervention. Children who experience these reading problems are often retained in their current grade early in their school career. Research indicates that this practice does not benefit children academically (Sugzda, 1992) and often negatively effects self-esteem and attitude toward school as well as increases the risk of the children becoming high school drop outs (National Preschool Coordination Project, 1991).

Outdated teaching practices also participate as a factor that is prevalent in classrooms. Practices such as whole group instruction and intensive drill and practice for a select group of underachieving students are not suitable for young children who are in very early grades (IRA & NAEYC, 1998). Their learning needs to be connected to their previous knowledge so children can make connections to new learning. This is critical especially for students with limited literacy experiences from home, and therefore, are struggling with reading in school (IRA & NAEYC, 1998).

Children must acquire knowledge of the relationship between written letters and the sounds they make in order to read words. According to Juel and Meier (1999), children need to understand the relationship between 40 phonemes of the spoken English language and the 26 letters of the alphabet. If a child does not make this connection, they

rely on context clues, picture clues and memory to identify words. This can be difficult with unpredictable text (Juel & Meier, 1999). Therefore, understanding the alphabetic code and skills related to phonological awareness is deemed necessary to assist students with early reading success.

Adams (1998) states that a young child's phonemic awareness level is the best predictor of early school reading success. In order to provide the at risk student the opportunity for success, phonological awareness interventions must be implemented.

This study is designed to contribute to the current body of research on phonological awareness instruction. Specific to this study is the use of computer-based phonological intervention which has not been fully addressed in the previous research. Also addressed in this study is the degree of correlation between phonological skills in grades K, 1 and 2 and comprehension scores on a standardized measure in grade 3.

Limitations of the Study

This study is a retrospective investigation of phonological achievement of third grade students in their kindergarten, first and second grade years and reading comprehension scores in their current grade. Thus, it was impossible to control for past instruction. At the time of the study the students already received their instruction in grades kindergarten through three. The researcher has made efforts to control for this by matching students who received Title I instruction including reading recovery and eliminating students identified with disabilities addressed with individualized education plans. This provides students for the treatment and control groups that received similar instruction throughout their school years.

Subject attrition is also a limitation of this study. The researcher could only include students who attended their school kindergarten through third grade without interruption. Because of this, students who were retained in a grade or transferred to another school were eliminated. The researcher will compare the Phonological Awareness Literacy Screening scores of the students who were lost from the study to the students who remained in the study to determine if the groups differed significantly. This limitation also has implications for external validity. Since students who were retained or transient during the study were eliminated, the scores from these students were not included. This should be considered when generalizing results of this study to other student populations.

Finally, the Breakthrough to Literacy program has staff development for teachers to try ensure proper implementation. But, since this study was done after instruction had occurred, the researcher was not able to control to what extent the teachers interacted with the program.

The schools chosen have students with similar socioeconomic backgrounds and all receive federal monies through Title I. The researcher will match students on their socioeconomic backgrounds having similar numbers of students included that are on free and reduced lunch.

Operational Definitions

For the purpose of this study, alliteration has been operationally defined as the repetition of sounds in neighboring words, such as ‘Sally sells sea shells by the sea shore’ (Virginia Department of Education, 2000).

For the purpose of this study, blending has been defined as the act of “responding to a sequence of isolated speech sounds by recognizing and pronouncing the word that they constitute” (Lewkowicz, 1980). An example of this would be providing the student with the phonemes /m/ - /a/ - /t/ and having the student blend them to create the word *mat*.

For the purpose of this study, isolated naming is defined as digits or letters that are displayed one at a time and the students must name the item as quickly as possible (Wagner, et al., 1994).

For the purpose of this study, memory is assessed through tasks including remembering sentences, recalling digits presented orally and visually and tests of working memory (Wagner, et al., 1994).

For the purpose of this study, the onset in a word is the initial sound such as /b/ in bat and the rime in a word is the /at/ in bat. This is one way words can be segmented (Lundberg, et al., 1988). This rime differs from the traditional rhyme which refers to words with the same ending but with different beginning sounds (bat/mat).

For the purpose of this study, phoneme segmentation has been defined as the ability to separately articulate or isolate all sounds in a word in the correct order (Lewkowicz, 1980). An example of this would be providing the student with the word *mat* and having the student express each sound of the word in isolation /m/ - /a/ - /t/.

For the purpose of this study, phonemic awareness has been defined as an understanding about the smallest units of sound that make up the speech stream: phonemes (IRA, 1998).

For the purpose of this study, phonological awareness has been defined as the understanding of different ways that oral language can be divided into smaller components and manipulated (Chard and Dickson, 1999). Examples of phonological awareness skills include syllable identification, rhyming word identification, concept of word (the ability to manually track words), sound identification, letter identification, blending, and segmenting,

For the purpose of this study, the Phonological Awareness Literacy Screening (PALS) has been defined as an instrument used to assess phonological awareness skills in students in grades kindergarten through three. The kindergarten test assesses rhyme identification, letter identification, individual sound production, beginning sound identification, spelling, concept of word. The test for grades one through three assesses letter recognition, letter sounds, spelling and concept of word like the kindergarten test but also has a word reading component and an oral reading component.

For the purpose of this study, phonological recoding has been defined as “a superordinate term for a complex of skills in using systematic relationships between letters and phonemes to recognize or to pronounce (i.e. retrieve the verbal language of) unknown printed strings (words or pseudowords) or to spell (Vandervelden & Siegel, 1995, p.854).

For the purpose of this study, rapid letter naming is defined as a task in which an examiner shows a student a card of letters in random order including uppercase and lowercase styles. The student must orally identify as many letters as possible within a given period of time (O’Connor, Jenkins & Slocum, 1995).

For the purpose of this study, rapid object and color naming are defined as tasks in which objects or colors are depicted on separate charts and students have to name them rapidly, attempting to name as many as possible within a given time frame (Blachman, 1984).

For the purpose of this study, serial naming has been defined as a task which requires students to rapidly name digits, letters and objects presented in rows on a card or chart (Wagner, et al., 1994).

For the purpose of this study, the Standards of Learning Reading Comprehension Test has been defined as a standardized measure developed by the Virginia Department of Education to assess the reading comprehension skills of students in grade 3.

For the purpose of this study, syllable deletion is defined as a task in which an examiner states a word such as baseball and asks the students to restate the word minus one syllable. The examiner may ask the students to say baseball minus the word base (O'Connor, Jenkins & Slocum, 1995).

For the purpose of this study, working memory was assessed by asking the student two to four simple questions to be answered by yes or no. The student was to listen to the questions, answer them all and then state the last word in each question (Wagner, et al., 1994).

Summary

Educators face the challenge of teaching all students to read by a very early age. These students vary in their previous experiences and are at various levels of readiness by the time they enter kindergarten. Regardless of this diversity, all students must meet the standards set by their individual states.

Students enter kindergarten with a variety of skills. Those students who have not had exposure to language play and reading in the home do not have the foundation necessary to meet the expectations of the kindergarten curriculum. Students with parents who have limited education are at risk for having insufficient skill development including letter and sound recognition and have a much more limited vocabulary than their counterparts with more educated parents. These students are in need of immediate interventions to assist with their phonological skill development so they can meet the curriculum standards.

In order to create good readers, schools have implemented reading programs that are supported by intervention programs for additional support. Research suggests that intervention training in phonological awareness skills can assist all students including those who are at risk for reading failure when entering school (Ehri et al., 2000). This study investigates if Breakthrough to Literacy, a computerized phonologically-based reading intervention program will correlate with improved phonological awareness skills and reading comprehension skills.

CHAPTER 2

Review of Related Literature

The research on phonological awareness and the reading achievement of young children has been discussed for decades. Phonological awareness is discussed in this chapter with regards to how these skills effect urban students, the impact on achievement of the students at-risk for reading failure, how phonological skills correlate with measures of reading achievement, and the degree to which phonological awareness interventions improve these skills. “The National Reading Panel Report (National Institute of Child Health and Human Development, 2000) concluded that instruction in systematic phonics, phonemic awareness, fluency, and comprehension strategies was important in a complete reading program” (Taylor, Peterson, Pearson, & Rodriguez, 2002, p. 270). Shanahan (2003) concurs by stating that phonemic awareness, oral reading, vocabulary development, and comprehension instruction each represent crucial elements of reading instruction. In order for students to be successful in their reading program, they need a high volume of reading experiences where they read fluently with high levels of comprehension (Allington, 2002). The conclusions indicate that phonological skills are highly correlated with standardized measures of reading achievement, that phonological training can improve these skills and reading achievement, and that without intervention, the gap between poor readers and skilled readers grows throughout early reading development and maintains itself throughout their school careers.

Also discussed in the review of related literature are comparisons of various phonological awareness interventions, components of these interventions that researchers

identify as crucial to the improvement of reading skills, and research on the effects of Breakthrough to Literacy on phonological awareness skills and reading achievement.

Reading Problems in Young Children as an Urban Issue

Good readers are phonologically aware, have an understanding of the alphabetic symbols, grasp grammatical skills, are fluent, and relate the reading to previous knowledge gaining comprehension of the text (Lyon, 1998). Children who enter kindergarten most at risk for reading failure have not had the early literacy experiences to support learning of these skills. These children generally come from homes where exposure to lap reading and language play have been limited. Consequently, they do not have the background knowledge that builds a foundation for reading. Children raised in poverty and those whose parent reading levels are low have an increased risk at reading failure (Lyon, 1998). Therefore, urban areas with pockets of poverty are at risk of producing school-age children who lack the language experiences needed to be successful readers without intervention.

Without intervention, children who are poor readers in grade one remain poor readers through grade four (Juel, 1988). According to Huffman and Spear (2000) kindergarten and first grade children attending urban schools scored significantly higher on a standardized measure of achievement when academic content was presented in developmentally appropriate manners. With the No Child Left Behind Act setting national standards that schools must meet, it is imperative all students become effective readers. The No Child Left Behind Act of 2001 contains reform initiatives that equate student achievement of all backgrounds, students of diverse ethnicity, students with varied socioeconomic status and language backgrounds, and those with and without

disabilities. All are expected to display similar achievement; therefore, closing the achievement gaps between groups. Schools receiving federal funds under Title I must assure all subgroups of students reach academic goals including those on free and reduced lunch, those with English as a second language, students of all races and ethnic backgrounds, and those in special education. Having a school as a whole meet state standards is no longer acceptable. Each of these subgroups must also meet passing requirements. Urban areas with large numbers of students included in these subgroups must ensure their instruction is accommodating for the needs of their students so they are able to assimilate new knowledge and are not “left behind”.

The At-Risk Student and Phonological Awareness

Many studies of phonological awareness have been conducted involving intellectually average and middle socioeconomic students, but few have considered phonological awareness and the at-risk student. Juel (1988) conducted a longitudinal study of 54 students from one large elementary school. This school had a substantial minority and low income population. Students were followed from first to fourth grades and assessments were given each year. A test of phonemic awareness was given twice a year in grades one through three to measure the skills of segmenting, blending, deletion of initial phonemes, and substitution of final phonemes. During the fall and spring of grades one through four an assessment was given to measure decoding skills. The test consisted of 50 pseudowords that students must decode in order to read. The students also had their ability to recognize words tested in grade one by reading a word list and in grades one through four by the IOWA Test of Basic Skills. The IOWA Test of Basic Skills was also used to measure listening comprehension and reading comprehension. To

demonstrate listening comprehension the student had to mark the picture that was described orally. Reading comprehension was assessed by having students read sentences and passages themselves and then answering questions. Spelling assessments were given to maintain information on spelling progress and writing samples were reviewed to assess content and mechanics. Finally, student IQ was measured in grade two using a standardized measure and frequency of at home reading and attitudes toward reading were measured through interviews.

Juel (1988) found that children who became poor readers entered school with little phonological awareness. Children who were poor readers in first grade remained poor readers through grade four. The main factor that inhibited reading improvement was their inability to decode. These students could not decode single syllable pseudowords by the end of grade four, which suggests they have not developed appropriate word attack skills. Although these poor readers did make phonological gains in grade one, without intervention, they never caught up to the skill level of their peers. Torgesen (2004) concurs by reporting that fourth grade students who have difficulty reading had difficulty with phonological awareness skills in kindergarten and first grade. He noted that reading difficulties build. The reader can not read words fluently enough times to make them automatic sight words so word identification growth is stunted. Consequently, vocabulary growth is delayed, and motivation to read is lost. This leads to lack of comprehension of text and the inability to maintain a reading level that is commensurate with same age peers without reading problems.

O'Connor, Jenkins, and Slocum (1995) investigated the effect of phonological training on kindergarten students with much lower skill levels than their peers. The

participants were chosen based on their pretest scores in two areas; segmenting and blending skills and onset and rime skills. Children scoring between 0% and 30% on these tasks were accepted for the study. These researchers chose their sample from a mid-sized city where 30 to 40 percent of the mostly Caucasian population qualified for free or reduced lunch (N=268). Students were assigned to a total of three groups, two experimental and one control. One of the experimental groups learned segmenting and blending skills while the other experimental group was exposed to a more global array of phonological tasks. Students in the third group, also the control group, were assigned to letter-sound training.

Results indicated that the two experimental groups significantly outperformed the control group on posttest measures including blending, segmenting, rhyme production, syllable deletion, and rapid letter naming. Additionally, these children also significantly outperformed the children in the control group on the transfer skill of word reading on a reading analog task. Although the experimental groups differed from the control group, they did not differ from each other. Again, on the reading analog task, the experimental groups did not differ, but the blend and segment treatment group learned to read the words on the reading analog task in significantly fewer trials than the other groups.

The researchers also identified students that scored above 50% on the pretest but were nonreaders at the beginning of this study to create a high-skilled group. These students represented students who acquired phonological awareness independently without direct instruction. This allowed for comparisons among children with naturally developed phonological awareness. O'Connor et al. (1995) noted that their untreated high-skilled comparison group continued to develop phonological skills whereas the

untreated low-skilled group (the letter-sound control group) showed very little progress during the five months of the study. In contrast, the children in the low-skilled groups who received phonological interventions performed similarly to the high-skilled group on the posttest measure, indicating that without intervention the skill gaps continue to grow.

The results of these studies contain crucial pieces of information when considering the phonological development of children. Much to the researchers' surprise, the children who received the intervention of more global tasks did not outperform the children who received blending and segmenting training. Actually, the blending and segmenting group solely outperformed the control group in the reading analog task, mastering the word list in fewer trials. The researchers expressed the importance of blending and segmenting being included in phonological awareness interventions. It was also noted that the experimental low-skilled groups exhibited skills equivalent to children who began the school year with highly developed phonological skills, indicating that intervention can bridge the gap of phonological skills with which children come to school. It should also be noted that the low-skilled group with no intervention showed little progress suggesting these students would continue to see the skill gap grow wider themselves and their peers. The researchers support the "Matthew effect" theory as stated by Stanovich (1986), which suggests that students who are "rich" in reading success get "richer" while the "poor get poorer", also applies to phonological awareness skills.

Phonological development as it relates to reading and spelling achievement in above and below average children was previously studied as early as 1973. Calfee et al., (1973) researched the ability for students in kindergarten through grade twelve to process

and arrange discrete and integrated phonemes from auditory stimuli. The sample represented all socioeconomic groups as well as a large African-American population. Sixty students from each grade level were selected to participate, half being identified as above average and half below average. Without specific intervention, the students remained in their respective performance ranges with the correlation between phoneme awareness and reading and spelling achievement remaining high through grade 12. Above average students in kindergarten through grade 4 performed significantly better at identifying discrete phonemes as opposed to the below average students, who as late as grade 4, were still identifying discrete phoneme sequences with less than 90 percent accuracy. The ability of these two groups to identify integrated syllables was significantly different at grade 2, and this difference remained large through grade 10. The high ability group displayed a performance increase in grade 2 but the low ability group did not. After grade 2, both groups showed slight improvements each year at about the same rate. Again, it appears that students at risk of school failure as young as kindergarten continue to perform below expected standards without specific intervention. The high and low ability children remained in their respective ability groups through grade 12, suggesting that children who have weak phonological abilities are also poor readers and remain poor readers throughout their school career.

Roberts (2003) conducted a study examining the effects of letter-rhyme instruction on word recognition of children with low socioeconomic status. The children who were given instruction in letter names had a significantly greater success rate at reading words with phonetic spellings. This reinforces the theory that reading skills can be improved with the direct instruction of phonological tasks.

Blachman (1984) studied phonological awareness in children from an inner city school system where almost all of the student population was African American (less than 1 percent Caucasian). These kindergarten and first grade students were of average cognitive ability according to the General Cognitive Index. Student abilities to identify syllables, produce rhymes, and rapidly name colors, letters, and objects were correlated to six measures of reading achievement in kindergarten and three in first grade. The measures used for kindergarten students included the Wide Range Achievement Test reading subtest, uppercase letter identification, lowercase letter recognition, sound-symbol relationships, a total score of these measures and the Metropolitan Readiness Test prereading skills composite. The reading measures of first grade students included the Wide Range Achievement Test reading subtest and the Gallistel-Ellis Test of coding skills subtests of sounds and words.

There was a significant relationship between the ability of kindergarten children to rapidly name colors and five of the six reading measures. Rapid naming of objects, syllable segmentation and the production of rhyme indicated a significant correlation to three of the six reading measures. In first grade students, rapid naming of letters and word segments were highly correlated to all three of the reading measures.

The research of phonological awareness and how it is specifically related to at risk students is brief. However, there is a large research base that analyzes the performance of students with low phonological awareness skills but with no other at-risk factors identified. Based on the research of phonological awareness and how crucial these skills are for reading success, it could be argued that poor phonological awareness is a risk factor for school failure.

Phonological Awareness as a Predictor of Reading Achievement

An abundance of research supports the theory that phonological awareness is the single best predictor of a child's early reading success (Lieberman et al., 1974; Lundberg et al., 1980; Mann & Liberman, 1984; Share et al., 1984; Stanovich et al., 1984; Tunmer & Nesdale, 1985). Adams (1998) states that a child's level of phonemic awareness at the time of school entry is the strongest predictor of whether that child will experience success or failure in reading. Yopp (1992) concurs by revealing that in order for students to benefit from formal reading instruction, they must be phonologically aware. The IRA (1998) concludes "that phonemic awareness predicts reading success is a fact. One likely explanation is that phonemic awareness supports understanding of the alphabet orthography".

In study after study, the traits and abilities that first graders possess that predict whether they will become fluent readers are phonemic awareness and knowledge of the alphabetic code (Juel & Meier, 1999). Wagner et al. (1994,1997) investigated the relationship between individual differences in phonological awareness skills, including phonological analysis, synthesis, coding in working memory, isolated naming, serial naming, and individual differences in word reading skill at each grade level. In order to assess the rate of phonological development, tasks were administered to students in the fall of their kindergarten, first and second grade years. Each task the students were required to complete were categorized into five broad categories. The scores from each individual task were combined to create a total score for the category. The categories include phonological analysis, phonological synthesis, memory, isolated naming, and serial naming.

The research indicates that there is a causal relationship between these phonological processing abilities and reading-related knowledge. These same phonological processing abilities also shared a causal relationship with word decoding skills. Other studies have also suggested there is a high correlation between phonological awareness and reading ability. Vandervelden and Siegel (1995) found phonological recoding skills were related to reading skills as well as phoneme awareness tasks. Phonological recoding is defined as "... a complex of skills in using systematic relationships between letters and phonemes to recognize or to pronounce unknown printed strings or to spell (Vandervelden & Siegel, 1995). Phonological recoding is a skill which students can use to decode unfamiliar words in text. Specifically, there was a strong relationship between speech to print matching where a child matches a spoken word to the corresponding written word, learning tasks which included reading new words, and the number of trials necessary for mastery. This study also found a relationship between pseudoword reading and high frequency word reading. Overall, there were strong and significant relationships between phoneme awareness tasks and phoneme recoding tasks. The children in this study first learned skill of recognizing individual phonemes to decipher words on the speech-to-print matching task before they mastered the skill of phonological recoding to decode strings of phonemes. The children used the skill of partial recoding before full recoding, identifying the initial consonant first, then the final consonant, and identifying the medial vowels and consonant blends last. This information is important for educators to understand when planning instruction for emergent readers. The ability to delete phonemes and tap or segment phonemes also

shared a causal relationship with reading achievement (Perfetti, Beck, Bell, & Hughes, 1987).

Additional research investigated correlations between phonological awareness skills and reading achievement. Children who enter first grade with poor phonemic awareness skills have been found to remain poor readers through fourth grade (Maclean et al., 1987). Without intervention, these students made minimal progress in their phonological skills, which never propelled them to the level of their peers. The growth in phonetic spelling of these children was delayed and never reached the levels of the average reader. The majority of these poor readers could not sound out all of the single syllable words on the assessment given in fourth grade. The primary factor hindering the reading progress for these children seemed to be their decoding abilities. (Juel, 1988). Stanovich, Cunningham and Cramer (1984) found the same correlation between phonological awareness and reading achievement to be even more robust than global measures of intelligence and standardized reading tests. Ten phonological tasks were administered to kindergarten children and were correlated to their reading ability a year later. The tasks involved rhyme skills and initial and final consonant identification.

The first two tasks measured rhyme skill. *Rhyme supply* asked students to provide words that rhymed with the word provided. *Rhyme choice* required students to choose a word from a choice bank that rhymed with a target word.

The other eight tasks involved initial and final consonant manipulation. The task of *initial consonant same* required the students to choose a provided word that begins with the same consonant as the target word. The *final consonant same* task was administered in the same manner with students matching words with the same ending

consonant. The next task, *strip initial consonant*, had students listening to a word and then producing the word without the initial consonant. *Substituting initial consonant* also required students to remove the initial consonant but then replace that sound with another, creating a new word. An example of this would be listening to the word go then replacing the first sound with /n/ to create no. The *initial consonant different* activity required students to listen to four words and choose the one word that had a different initial sound from the rest. The *initial consonant not same* task is almost identical to the *initial consonant different* task in that the students must identify the word that has a beginning sound that is different from the rest of the words. The difference between these tasks lies in the manner in which directions are given. They are stated negatively with the examiner saying “Your task is to tell me which word does not begin with the same sound as the first word” (p.181). For the task *final consonant different*, the student listened to four words and identified the one word that ended differently. The final task was *supply initial consonant*. The students were given word pairs. Each pair was identical except the initial consonant was deleted from the second word (sit/it). The students listened to the word pairs and identified the sound that was deleted from the second word. In addition, two measures of reading achievement and a measure of IQ were administered and the correlation between these measures of reading and cognitive achievement and the phonological tasks were correlated.

The rhyming tasks were mastered by the students first during their kindergarten year. The seven nonrhyming tasks used in this study were highly correlated with reading skill in first grade. All seven nonrhyming phonological tasks correlated with reading achievement more strongly than did a standardized IQ measure. A stepwise regression of

the reading achievement scores on the phonological scores indicated phonological skills were responsible for sixty-six percent of the variance in reading skill.

Correlations between specific phonological skills and reading achievement have also been researched. These skills include rhyme identification, alphabet and corresponding sound knowledge, blending, segmenting, onset and rime skills, phoneme identification, alliteration, and syllable counting. Understanding that phonological awareness does influence reading achievement, researchers have investigated the degree to which individual phonological tasks effects reading growth.

Maclean et al., (1987) studied sixty-six preschool aged children and found a correlation between rhyme knowledge to later phonological awareness development. DeMoulin (2003) states the importance of the skill of rhyming in the reading process. He emphasizes that rhyming enhances curiosity of children with its tempo and flow, the patterns of words, introduction of word families and is enjoyable to listen to. Since the skill of rhyming is often mastered by preschool children, it is suggested that potential reading difficulties could possibly be detected before formal instruction begins, providing educators opportunities for intervention before remediation is needed.

When researching reading and spelling abilities of seventy-five children in grades one, three and four, Nation and Hulme (1997) investigated which phonological awareness task was the most influential. The tasks investigated included onset and rime identification, phoneme segmentation, rhyme identification and alliteration categorization. These tasks were correlated with a standardized measure of reading achievement over the course of grades one through four. Their research indicated that the ability to segment words into phonemes was the best predictor of reading and spelling

ability. The ability to segment phonemes showed a significant correlation with reading, spelling, rhyme categorization and alliteration categorization and also predicted a significant portion of the variance in spelling. The importance of this skill was previously discussed in a study by Skjelford (1976) who commented that phoneme segmentation was not a spontaneous or developmental occurrence, but must be taught in order for students to acquire the skill and therefore be prepared to use this ability in decoding our alphabetic orthography.

Vellutino and Scanlon (1987) reached the same conclusion by studying the ability of phonological tasks including rhyme production, letter name identification, letter-sound correspondence of consonants, sound-letter correspondence of consonants, initial consonant substitution, letter-sound correspondence of vowels, and identification of sight words, to predict reading achievement. Tests of semantic, syntactic development, and intelligence were also correlated to reading achievement. Again, tasks of phoneme segmentation were a strong predictor of reading achievement, and had a more robust relationship than did IQ. Additionally, word identification, phonetic decoding and phonetic segmentation were all found to be “intrinsically related” (p. 328).

Syllable counting has also been found to correlate with reading achievement. In a study of good, average, and poor readers, 86 percent of the good readers met the criterion for a syllable counting task, 56 percent of the average readers met the same criterion and only 17 percent of the poor readers met the standard. The ability to break the word into segments including individual phonemes and syllables are correlated with reading achievement.

Phonological Awareness Intervention

Children who enter school with a high risk of reading failure either have specific phonological weaknesses, or they enter school with a variety of weakness including but not limited to phonological skills. The latter are often children with low socioeconomic backgrounds who lack phonological skills, familiarity with text, and have limited life experiences to assist them with comprehension in later grades (Torgesen, 2004). Regardless of the degree of weakness, these students require additional support when learning to read.

Research supports that instruction in the area of phonological awareness can improve these skills as well as increase reading and spelling achievement. Busnik (1997, p. 207) states that “the potential benefits for all children are considerable and the known benefits for many may spell the difference between success and persistent frustration in learning to read”. With phonological training, children who already have adequate skills far exceed the expectations of their reading program (Olofsson & Lundberg, 1983). Bradley and Bryant (1983) concur and also add that phonological intervention can improve the reading ability of potentially disabled readers as well as below level readers and students who are progressing normally.

Studies that provided phonological instruction and included the letters of the alphabet and their sounds resulted in an improvement in accuracy and fluency in reading. These studies suggest that children can be trained successfully in phonemic awareness (Yopp, 1992). Some researchers have examined the effects of phonological awareness instruction on phonological awareness, reading, spelling and comprehension, and whether these effects continue over time.

A meta-analysis from the National Reading Panel (Ehri et. al, 2001) discussed results of 52 studies that involved phonological awareness and young children. The results indicated that all children benefited from phonological awareness intervention and that the instruction improved their skills; therefore, suggesting phonological awareness can be taught. Moreover, the instruction was most effective when provided to young children. These strong gains in phonological awareness transferred to reading achievement. The treatment groups had significantly higher achievement on reading measures than the control groups. The treatment groups also outperformed the control groups on the skill of decoding. Phonological awareness instruction also transferred to reading comprehension abilities. The treatment groups outperformed the control groups in reading comprehension though the differences were much more moderate than the differences on reading and decoding. Finally, the studies used to measure spelling success indicated phonological awareness training also significantly improves spelling as well. Moreover, the instruction was most effective when provided to young children. The effect of phonological awareness training on phonological skills, reading, and spelling will be discussed in this section.

Many studies have been conducted with the hypothesis that phonological awareness can be taught. The meta-analysis (Ehri et.al, 2001) reported its findings on phonological awareness interventions of 52 studies in effect sizes. An effect size of 1, meaning the treatment group scored one standard deviation above the mean, indicating a strong effect of instruction. An effect size of 0 indicates the treatment group did not vary from the control group. The researchers found that the overall effect size of phonological instruction on the acquisition of phonological skills was $d=0.86$ for all children used in

the samples. At risk readers gained skills with $d=0.95$. When children were separated by age, preschoolers acquired phonological awareness skills with an effect size of $d=2.37$, with kindergarten and first grade outcomes at $d=0.95$ and $d=0.48$ respectively. Preschoolers who received phonological training scored over two standard deviations above the control groups with kindergarten children scoring almost one standard deviation above the controls. This suggests that phonological awareness instruction will benefit children most when provided at a young age.

Content et al., (1986) taught twenty four year olds and twenty five year olds the skill of segmenting. The training of the treatment group consisted of repeating words after the initial phoneme had been deleted. This skill was demonstrated using puppets, one who spoke incorrectly and another who corrected him. Another group received language activities as part of their instruction that included vocabulary growth, listening to stories and categorizing picture cards. The control group received no additional intervention to their regular instruction.

The ability of the treatment group to segment was poor before instruction but significantly improved after training and corrective feedback was given. The researchers noted that during the first trial it was much easier for the children to segment an initial vowel that acted as a syllable than it was to segment an initial consonant. Both the four and five year old children could segment initial vowels. However, only the five year old children successfully segmented initial consonants after corrective feedback. This corrective feedback did not improve the initial consonant segmenting skills of the four year old students. This study indicates that the crucial skill of segmenting can be taught although this specific treatment was not as successful with younger children. Treiman

and Baron (1983) also found that children taught to segment words and blend words improved in those tasks. The control group who was trained on segmenting and blending words on the syllable level only made fewer errors on this trained skill after intervention than on an untrained skill, indicating both of these skills can be improved through instruction. First and last sound identification skills along with the skill of segmenting were found to be increased when taught within meaningful literacy experiences that include shared reading. These results were true for four and five year old children with average and low average literacy levels (Ukrainetz, 2000).

Some researchers began investigating the effect of phonological awareness instruction had on reading achievement. A meta-analysis (Ehri et al., 2001) revealed that the significant improvement children experienced with phonological tasks after instruction transferred to reading and spelling. The reading effects size was significant yet moderate and remained significant after a second follow up test. This indicated that the effect of the treatment was not short lived. These effect sizes were similar for kindergarteners, first graders and second graders. Statistically, all effect sizes were greater than zero, indicating success. The effect size for preschoolers, however, was much larger. The preschool measures for reading were simplified word recognition tests and provided an effect size of $d=1.25$. The transfer of phonological awareness skills to spelling were also significant and large indicating this type of instruction benefited spelling achievement for all students. The effect of phonological awareness training on reading comprehension was assessed in twenty comparisons. The effect size was statistically different than zero but moderate, indicating phonological instruction had a slight impact on the ability to comprehend text.

Ball and Blachman (1988) investigated the effects of segmenting and letter- sound correspondence on reading success. One treatment group was given instruction on segmenting words into phonemes and on letter names and their corresponding sounds. Two control groups were established, one receiving language activities including letter name and sound training, and the other with no intervention. The experimental group outperformed both of the control groups on measures of segmenting and reading. These findings indicate that instruction on the phoneme level is not sufficient training for reading success and also reiterates the importance of segmenting instruction. Ball and Blachman (1991) conducted another study to determine the effects of segmenting and letter instruction on kindergarten reading and spelling achievement. The first group received training in segmenting words into phonemes and letters and sounds while the second received instruction in letters and sounds only. The third group received no intervention. The first experimental group that received segmenting instruction along with letter name and sound training outperformed the other two groups on the phoneme segmentation posttest. The letter group and control group did not differ from one another. There were no differences in the three groups in regards to letter name knowledge, but there were group differences on letter sound knowledge. The two treatment groups significantly outperformed the control group on the posttest measure but did not differ from each other. Children in the segmenting and letter group significantly outperformed the other two groups on the reading measure with the other two groups measuring similarly. These results were also true for the spelling measure. The results from this study indicate that letter name and sound training is insufficient instruction for reading and that segmenting instruction is beneficial to reading and spelling achievement.

Fox and Routh (1984) provided training for kindergarten children which included segmenting instruction, segmenting and blending instruction and a control group, all of which received letter-sound and word learning training. All children made improvements on separate measures of segmenting skills and blending skills. The segmenting group significantly outperformed the control group on these measures and the blending and segmenting group did better than both groups. Results also indicated that the blending and segmenting group was the only group that performed well on the word learning task. These results suggest that blending and segmenting instruction is more effective than segmenting instruction alone.

Williams (1980) provided blending and segmenting training to students with learning disabilities. This training was a supplement to their reading program. The students were taught to analyze syllables and short words into phonemes and then blend them back into words. They were also instructed in letter-sound correspondence and decoding. The program significantly improved scores on these tasks and the students were able to transfer these skills to new word reading tasks.

Cunningham (1990) studied forty-eight kindergarten children who were divided into two groups, one who received procedural knowledge of segmenting and blending phonemes, and the other which also received this instruction with an emphasis on application and value of phonological training as it relates to reading. Group one received training on the process of segmenting and blending. Group two received instruction on these tasks but also received goals and purposes of their learning, review of previous lessons and how they were connected to the new learning, examples of when to use these strategies when reading, the skills were modeled in the context of reading, and

the child then had the opportunity to practice the skills with teacher direction. The training lasted for 10 weeks. Group two performed significantly better than the other group on a transfer measure of reading achievement. Phonological awareness tasks accounted for a significant amount of variance in reading achievement when entered first or last into a multiple regression formula indicating is a powerful predictor of reading achievement. Hatcher, Hulme and Ellis (1994) investigated the effects of reading instruction with and without phonological awareness training and its effects on reading measures on one hundred twenty-eight six and seven year old poor readers. All groups had students being taught for forty sessions that lasted thirty minutes each for twenty weeks. The assessments used to compare the groups included reading, early word recognition test, word reading test, nonword reading test, spelling math, and phonological awareness skills including sound deletion, sound blending, nonword segmenting and sound categorization. The group who received phonological awareness training only displayed improvement on those measures of phonological tasks. The group with reading instruction along with phonological awareness training made significantly more progress than the control group on all testing that included early word recognition, word recognition, reading ability test, reading comprehension scores, and nonword reading. This group significantly outperformed the other experimental groups on all tests but one.

Torgesen et al., (1992) studied forty-eight nonreading kindergarten students who were at risk for reading failure by scoring below the 50th percentile in a phonological awareness pretest. The experimental groups received either blending training or blending and segmenting training. A third group received language experience activities such as listening to stories and discussing pictures and events, without phonological awareness

skill training. All groups received small group training sessions three times a week for eight weeks. Both experimental groups outperformed the control group on the blending task. The blending and segmenting group performed significantly better than the other two groups on segmenting words into phonemes. The high performance on a reading analog task by the treatment groups indicated that blending and segmenting is necessary for reading success. Their high performance was indicated by reading new words at a faster rate, requiring fewer trials to reach the criterion and making fewer total errors during those trials. The blending group was not able to generalize their knowledge of blending individual phonemes into words to the segmenting task indicating that blending training is not sufficient instruction to provide reading success.

Davidson and Jenkins (1994) randomly assigned kindergarten children to four groups: blending phonemes, segmenting phonemes, blending and segmenting phonemes, and no phoneme manipulation. The three treatment groups and the control group had ten students in each. All groups learned to associate a small group of letters to their corresponding sounds. The experimental groups were able to transfer the skill they were taught to indicate improvement in that specific skill. The segmenting only and blending and segmenting groups were able to transfer their skill to a reading analog task, outperforming the blending only and control groups. The blending only and segmenting only groups were not able to transfer their training to the opposite uninstructed task. This research supports the findings of Torgesen et al., (1992) indicating that blending only training is not sufficient instruction for reading success.

Lie (1991) studied phonological awareness training on first grade students with varying ability levels. The first experimental group, referred to as the positional group,

received instruction on phoneme isolation and phoneme position, learning to attend to individual phonemes and identify them in the initial, medial or final position. The second group, referred to as the sequential group, received instruction on segmenting words in the correct sequence and blending them correctly. The third group was a control group. Both treatments had an effect on reading and spelling. The sequential group significantly outperformed the other two groups on a standardized reading measure after grade 1. By the end of grade 2 the difference in reading scores was only marginally significant. The same trend occurred on the spelling measure. The sequential group significantly outperformed the other two groups on a standardized spelling measure by the end of grade 1. By the end of grade 2, the control group scored the lowest on the spelling measure and the experimental groups scored similarly. Finally, there was a significant interaction between IQ and the treatments, indicating that students with lower ability showed the most improvement from the phonological training. Bradley (1988) completed a three year longitudinal study to investigate the importance of phonological awareness in young children as related to their later reading success. Beginning readers who received training in sound categorization and letter recognition using plastic letters made early gains in reading text. It was noted that the level of phonological awareness when a child begins school proved to be critical for reading and spelling success.

Lundberg et al., (1988) trained 235 kindergarten children in phonemic awareness during one school year in 15 to 20 minute daily sessions. The researchers began by introducing listening games that provided exposure to sound auditorily. Next, rhymes were introduced followed by sentences and words. Finally, instruction on syllables and phonemes was provided. All of these skills were taught in a “game-like” fashion. The

treatment group outperformed the control group on phonemic tasks including letter identification, rhyme identification, segmenting sentences into words, segmenting and blending syllables into words, onset and rime identification, and phoneme segmentation. These groups were monitored as they completed grades one and two. The treatment group significantly outperformed the control group on a spelling measure given both school years. The treatment group also showed a significant increase in reading achievement as compared to the control children in grade 2. When performing a multiple regression with reading performance as the criterion variable, phonemic awareness tasks entered the equation with an R of .61, with the other measures entering as insignificant.

Castle, Riach, and Nicholson (1994) studied five year old kindergarten children who received two phonological awareness lessons per week for ten weeks. A matched group received instruction on process writing (writing using invented spelling, allowing students to independently spell words according to the sounds the students hear in the words) which is a regular component of the reading program. The intent was to see if the addition of phonological awareness instruction had an effect on spelling. The results showed that phonological awareness training had significant results in improving performance on phonological tasks, and there was also a significant difference between the two groups' spelling measures. This indicates that the addition of phonological awareness training not only increases performance on these specific tasks but also improves spelling achievement. The second experiment by these researchers trained beginning readers for fifteen weeks in phoneme analysis, synthesis skills, and letter sound correspondence. These were different students from the first experiment. The students in this sample were from middle to low socioeconomic areas and they had poorly developed

phonological skills. The experimental group scored significantly higher on measures of phonological awareness, reading pseudowords, and spelling.

Byrne and Fielding-Barnsley (1991, 1993, 1995) completed a longitudinal study, beginning with 4 year olds. Poems and other literature were used to teach initial and final sounds. Children were asked to identify pictures whose name either began or ended with the targeted sound. They then learned to recognize that letters represent each sound. The control group used the same materials, but were taught to categorize the pictures into semantic categories. Both groups received twelve 20 to 30 minute sessions over a twelve week period. At the end of the training, children in the treatment group outperformed control children on measures of phonemic identity and word recognition. Three years after the intervention, the trained children displayed a significant advantage in reading comprehension and pseudoword decoding.

Ehri et al., (2001) analyzed the results of dozens of studies according to the characteristics of the students. The students were categorized three different ways: at risk, disabled and normally progressing students. The results of phonological awareness training on phonological skills, reading and spelling were discussed by student characteristic.

The authors were investigating if there was a difference in the way these types of readers acquired phonological awareness skills. The effect sizes were significant for all three reader types. The at risk students and the normally progressing readers both had large effect sizes that did not differ from each other. This indicated that the at risk student responded as well as the normally progressing student to this type of instruction. The disabled students had a moderate effect size. This moderate reaction was explained

by the authors as having been negatively effected by the age of the disabled students. They were typically older than the students in the other two reader type groups; therefore, had mastered more of the phonological skills and had less room for improvement.

The effect of phonological awareness instruction on the reading achievement of these three types of readers was also analyzed. It was found that the transfer of phonological awareness to reading was influenced by reader type. The at risk students showed a statistically larger effect size on reading than the normally progressing readers and the reading disabled students with effect sizes of $d=.86$, $d=.47$, $d=.45$ respectively. When analyzing follow up reading measures, the authors found the effect size for at risk readers to increase to $d=1.33$ while the effect sizes for the other groups decreased. This indicates that phonological awareness instruction had a greater effect on the at risk readers than on the normally progressing students and students with disabilities, giving the at risk group an opportunity to improve their reading achievement.

Spelling achievement and its relationship with phonological awareness was also investigated. The transfer of phonological skills to spelling was significant and similar with at risk and normally progressing readers indicating there is a relationship between the two. No relationship was evident between spelling achievement and phonological awareness with students with disabilities.

Phonological Awareness and Reading Comprehension

Researchers have advocated for phonological awareness to be an integral part of reading instruction. The goal of reading is to receive meaning from text; therefore, researchers have also investigated how beginning reading instruction influences reading comprehension.

Schieffer, Marchand-Martella, Martella, Simonsen, & Waldron-Soler, (2002) include phonological awareness instruction in their focal areas of effective reading instruction. Well developed oral language is a prerequisite to being able to develop reading skills, and these contribute to reading comprehension.

Blending, segmenting, rhyming and letter-sound correspondence should be taught explicitly to accelerate reading acquisition. In order for students to decode words, students need a program that teaches phonological awareness. These skills must be taught with direct instruction on how spoken sounds correlate to print. Letter-sound correspondence should also be taught. This skill will facilitate the skill of blending. These skills will then promote accuracy and fluency which will allow students to comprehend text (Schieffer, et al., 2002).

Schieffer, et al., (2002) indicate that oral language skills, including receptive and expressive language, benefit vocabulary growth and listening and reading comprehension and are necessary components to add to a phonological program. Text that young children can read has repetitive simple vocabulary and is not sufficient for establishing the vocabulary needed to understand text (Beck, McKeown, & Kucan, 2003). Students with underdeveloped vocabulary can begin kindergarten with a two year gap between themselves and advanced children and a one year gap between themselves and average children (Biemiller, 2003). This gap will continue to grow unless vocabulary is developed using listening comprehension. Students need oral exposure to text that is above their reading level in order to add to their vocabulary knowledge. These exposures should be focused on hearing, recognizing and understanding the meaning of words on and above their reading level (Biemiller, 2003).

Finally, Schieffer, et al., (2002) report that reading comprehension should be explicitly and systematically taught just like phonological awareness skills are and is a focal area of effective reading instruction. Comprehension instruction should include preteaching vocabulary words that will be encountered within text, providing background information that will be need to make inferences and completely understand the text, and providing models and opportunities for practice.

Good readers were reported to have strategies that enhance their abilities to comprehend text. They are able to focus their attention on important information quickly, attend to and use context clues, use a repertoire of strategies to understand text and show flexibility when using these strategies, and increased their comprehension when aware of what strategies they were using (Reynolds, 2000). Poor readers require most of their attention to word recognition; therefore, they have little attention left to implement various comprehension strategies. These readers must develop their automaticity in word identification in order to simultaneously attend to word meaning (Reynolds, 2000; Greer, 2004).

Fluency, vocabulary and domain knowledge all contribute to comprehending text (Hirsch, 2003). These three factors are intertwined skills which, if lacking in children, amplify their reading difficulties. Fluency is the ability to read text quickly and accurately. Students need to be taught the phonological skills to decode words efficiently so working memory can be allocated to comprehension. When students are exposed to words repeatedly, they not only recognize it but define its meaning (Stahl, 2003). This improves fluency and builds a student's vocabulary. As word fluency is mastered, sentence fluency evolves. Students are able to "chunk" words into phrases which

facilitate comprehension even further. Fluency and vocabulary are interrelated. Students with a large vocabulary are able to read text with ease and comprehend meaning. The children referred to at the beginning of this chapter in the Hart and Risley (2003) study were exposed to far fewer words before entering school than their more economically advantaged peers. These students are far less able to fluently read text and understand words and phrases presented to them. Finally, domain knowledge is an important factor in understanding how students comprehend text. Domain knowledge refers to the information students bring from previous life experiences. With limited life experiences and exposures, contextualizing information and making inferences as to meaning is impossible (Hirsch, 2003).

Educators have struggled for years with teaching students to read and comprehend the meaning of text. Researchers have implemented various reading programs to improve reading comprehension and studied the components of reading programs which correlate to increased comprehension.

Meta-analyses of studies reported by Schieffer, et al., (2002) analyzed results of reading interventions that implemented direct instruction including the Reading Mastery program and whole school reform models to determine their effects on reading and comprehension. Thirty- four studies were examined to determine the effectiveness of direct instruction curricula. In eighty percent of the studies, students in the direct instruction groups scored higher than the control or comparison groups. Sixty-four percent of the differences in scores were statistically significant in favor of direct instruction. In the meta-analysis of direct instruction curricula (Adams & Engleman,

1996), there were medium to large effect sizes indicating the effectiveness of direct instruction (Schieffer, et al., 2002).

Schieffer, et. al., (2002) also reported on research completed by the American Institutes of Research (Olson, 1999) and evaluated twenty-four whole school reform models. Direct instruction was one of only two models which received a rating of strong.

Twenty-five studies specifically compared the Reading Mastery program to other reading programs. The Reading Mastery program includes direct instruction on decoding, phonemic awareness, letter-sound correspondence, blending, preteaching vocabulary, literal comprehension strategies, interpretive comprehension strategies and reasoning skills. The two studies that compared Reading Mastery and a basal series reported that students receiving Reading Mastery had higher vocabulary, comprehension, and language scores for students in the general education population. Eight studies examined the effects of Reading Mastery on the remedial reader. Six of the eight studies reported this program was more effective at improving the skills of word recognition, decoding, word and passage comprehension, phonological awareness, fluency and letter and word identification. These results indicate that teaching phonological awareness along with reading comprehension strategies improves both skills.

Two studies using the same sample of students from kindergarten through grade three were performed to investigate relationships between phonological skills, word reading and reading comprehension. The first was to determine if phonological awareness and the skill of rapid naming would have an immediate effect on word decoding and, if so, would that effect last through grade 2 (de Jong & van der Leij, 1999). The results showed that phonological awareness and rapid naming had a significant effect

on the ability to decode words in kindergarten. The effects were limited and no longer evident at the end of grade 1.

The same group of students was used to investigate the relationship between phonological abilities and word decoding speed on reading comprehension in grade 3 (de Jong & van der Leij, 2002). At the end of first grade, students were given cognitive ability measures to determine vocabulary knowledge, listening comprehension, phonological skills and articulation speed. These same students were given a test for word decoding and reading comprehension at the end of grade one and grade three.

Two set of analyses were performed to determine the factors that were accountable for the variance with Grade 3 comprehension as the dependent variable. Grade 1 reading comprehension accounted for forty percent of the variance of grade 3 reading comprehension when entered into the regression model first. Grade 1 word decoding was entered second and had an additional effect. Finally, word knowledge and listening comprehension had additional effects when entered in steps three and four. When the order was reversed, word knowledge had no additional effect when listening comprehension was controlled for.

Next, grade 1 reading comprehension was added into the regression model. Grade 1 word decoding was accountable for the greatest variance of grade 3 reading comprehension. Word knowledge added additional variance only when entered before listening comprehension. Finally, the data revealed that word decoding and listening comprehension at the end of first grade accounted for all of the variance of grade 3 reading comprehension (de Jong & van der Leij, 2002).

A study using similar variables was performed by Joshi and Aaron (2000) who investigated the relationship between decoding and listening comprehension on reading comprehension. Forty-two children in grade 3 were used for the sample. Subjects were given a word attack and listening comprehension subtest. Two theories were tested. One, developed by Hoover and Gough (1990) and the other developed by Dreyer and Katz (1992). Hoover and Gough (1990) suggest that decoding and listening comprehension work in a multiplicative manner with reading comprehension being the product. This would mean that zero decoding skills or zero listening comprehension would produce a nonreader. Dreyer and Katz (1992) suggest that the formula is additive, with reading comprehension being the sum of the two addends decoding and listening comprehension. The product of decoding and listening comprehension accounted for about 48% of the variance of reading comprehension and the sum of decoding and listening comprehension accounted for 46 % of the variance. Both were statistically significant. In addition, decoding and listening comprehension significantly impacted reading comprehension when entered individually, but not to as great an extent (Joshi & Aaron, 2000).

Reading comprehension is a difficult skill that must be mastered by students who are at risk for reading failure. Chall and Jacobs (2003) and Torgesen (2004) investigated the relationship between at risk students and reading comprehension.

Chall and Jacobs (2003) followed ten students each from grade 2, 4, and 6 for two years. All of the students were classified with low-income status due to their free and reduced lunch status. The students were measured on six subtest areas of reading

including word recognition, word analysis, oral reading, word meaning, reading comprehension and spelling.

The low-income children in this study achieved as well as their peers on all six subtests in grades 2 and 3. By grade 4 scores on the word meaning subtest decreased. These students had great difficulty defining more abstract and less common words. They were one year behind the larger population in this area by grade 4. The decline of understanding more complex words would suggest a direct effect on the ability to comprehend text as it becomes more difficult (Chall & Jacobs, 2003).

In a study performed by Torgesen, Rashotte, Mathes, Menchetti, Grek, Robinson, et al. (2003) twenty percent of first grade children who were most at risk for reading failure were given an intensive intervention to attempt to improve their reading and comprehension abilities. These children received systematic daily intervention for thirty-five to forty-five minutes. All of the children scored below the 25th percentile for word reading before the intervention. By the end of first grade, only eight percent of these students scored below the 30th percentile on a word reading test. These same children were assessed at the end of second grade. They had received no additional intervention, and they maintained their word reading skill with a 1.6% failure rate. However, on a silent reading comprehension measure, the failure rate increased to 4.1%. Torgesen (2004) predicts the failure rate on a silent reading comprehension measure in grade 3 will yield an even larger failure rate due to the increased complexity of the text.

The spiral effect of at risk students and reading can predetermine their educational path without intervention. Preschool children without a stimulating learning environment at home, enter kindergarten without the vocabulary and life experiences to begin learning

to read. Without phonological intervention, these students slip further behind their peers and eventually cannot comprehend text within two years of their grade level. Research indicated that phonological awareness intervention, vocabulary development, listening comprehension and reading comprehension strategies need to be taught in a systematic curriculum to improve the reading achievement of at risk readers.

Additional Phonological Awareness Interventions and Components of Interventions

The intervention studies discussed include a variety of activities used to teach and assess an array of phonological awareness skills. Although there are a large number of different activities used by various researchers, the Handbook of Reading Research (2000) included a review of several reading interventions in classrooms, what activities were contained within these interventions, and what effects were significant.

Four reading intervention programs designed specifically for kindergarten students were compared by Hiebert and Taylor (2000). Durkin (as cited in Hiebert and Taylor, 2000) implemented an intervention with three components: reading stories aloud, writing and displaying words, and learning about letters and sounds in relationship to words that were important in the student's lives. The intervention took place during the students' preschool and kindergarten years and the students reading ability was assessed at the end of kindergarten. Durkin included measures of word reading and a standardized test of reading ability to assess reading ability. The relationship between the treatment and these measures were significant and strong through grade two.

Hansen and Farrell (as cited in Hiebert and Taylor, 2000) assessed the achievement of students who had the Beginning Reading Program (BRP) during the 1970's. This program used a set of fifty-two books that were read to students at school

and at home. The vocabulary within the books was used by teachers to teach word recognition and word decoding. Each book also included questions for adults to use after the book was read. These activities were implemented 20-30 minutes a day during the students' kindergarten year. These students were assessed by the researchers during their senior year in high school using standardized measures of reading. There was a significant difference in reading comprehension, reading vocabulary, illiteracy rates, and remediation rates of students who received the treatment and those who did not.

Ayers (as cited in Hiebert and Taylor, 2000) compared reading skill of students in grade one after having direct instruction, indirect instruction or a combination of instruction types on phonological awareness in kindergarten. The direct instruction of phonemic awareness included activities with puppets, word games, magnetic letters, story mapping, and retelling stories. Indirect instruction of phonemic awareness used poems and books to model rhyme, alliteration, sounds, words, syllables and sentences. Some students received a combination of these two interventions. Writing activities were included in both models. A standardized measure of reading achievement showed the most significant growth within the group that had the combination approach.

The final intervention reviewed was implemented by Phillips, Norris, and Mason (as cited in Hiebert and Taylor, 2000). The intervention supplemented an existing kindergarten reading curriculum with a set of twenty-four story books. These stories had texts that were repetitive and familiar, and the text was supported with illustrations. The students were given a copy to take home each week and the same book was used in class for 10-15 minutes daily. The success of this intervention was assessed by a standardized

measure of basic skills given in grades one through four. The effects were significant for the treatment group through grade 2.

Although these interventions vary in the type of activities provided, they all had a significant effect on reading that lasted for at least two years. This research still leaves educators questioning what activities should be included within reading interventions and for how long a period of time to produce optimal results. Some researchers have commented on the type of instruction that should be included in phonological awareness training.

A position statement presented by the IRA (1999) stated what a child needs to be able to do in order to read and acquire meaning from that reading. These requirements are: “the development and maintenance of a motivation to read, the development of appropriate active strategies to construct meaning from print, sufficient background information and vocabulary to foster reading comprehension, the ability to read fluently, the ability to decode unfamiliar words, and the skills and knowledge to understand how phonemes or speech sounds are connected to print” (IRA, 1999).

According to the Virginia Department of Education (2000) there are several components of phonological awareness that must be included in phonological awareness instruction. Children first must be able to attend to spoken sounds. “Listening includes the following auditory abilities: awareness of sound, discrimination between sounds, remembering what is heard, sequencing sounds, isolating one sound from many and attaching a label/symbol to a sound” (p.1). This prepares students to listen to sounds and discriminate between them. The next component of phonological awareness instruction should include rhyme. Students should be taught to hear and generate rhyme sets.

Children should also be taught to hear and produce alliteration sets and begin hearing and producing identical initial consonants. The next skill, segmentation, has been discussed in depth in the research. Students begin by segmenting sentences into words, words into syllables, onset and rimes, final consonants, and then all sounds in words including vowels. Finally, in addition to segmenting words, students should be able to perform phonemic synthesis by blending the sounds back together to make a word and manipulate individual phonemes through additions, deletions, and reversals (VA DOE, 2000).

Busnik (1997) concurs by stating that rhyme identification and segmenting words are crucial skills that should be taught through phonological awareness training. She elaborates by stating that the segmenting training should involve syllable segmentation and onset and rime separation. The researcher states that students should be able to manipulate the sounds in words beyond segmenting by changing a word by manipulating the sounds and comparing it to the original. An example of this would be reversing the consonants in tub to create but and comparing these words. Students should have the awareness that words are “sound objects apart from their meaning” taught through language play (Busnik, 1997, p. 207).

Beck and Juel, (1995) suggest that rather than separating words from their meaning, children need to be taught that printed words carry messages. They also suggest that segmenting skills along with letter-sound relationships should be taught to beginning readers. Yopp (1992) suggests teaching initial sound matching and initial sound substitution along with segmenting and blending words while Blachman (1997) adds sight word vocabulary, reading stories with phonetically controlled text and writing to letter-sound relationships and segmenting and blending to her suggestions of effective

phonological training program components. Jerger (1996) lists activities that make up a comprehensive phonological program. These skills include rhyme identification, alliteration skills, blending and segmenting syllables, and are congruent with the previously mentioned researchers.

In a joint position statement from the IRA and the NAEYC (1998), these experts concur that letter-sound relationships and segmenting words are important skills to be taught to beginning readers along with daily writing opportunities, a strong sight word vocabulary and an environment that engages students in reading and writing.

Adams, Foorman, Lundberg, and Beeler (1998) divided phonological awareness training into seven sets of skills. Many of these skills have been previously mentioned by other researchers including listening, segmenting, and letter-sound relationships, but they elaborate on segmenting training. They state that segmenting should begin with segmenting sentences into words, then words into syllables, segmenting initial and final sounds in words, and finally, segmenting all phonemes in words.

Neuman, et al. (2003) suggests ten components of early literacy development in their book *Access for All: Closing the Book Gap for Children in Early Education*. The authors begin by stating that listening comprehension should be emphasized with preschool aged children to begin the interaction with books. They continue by stating that young children should hear speech to assist in producing and discriminating between sounds. Young children should also be given opportunities to develop their vocabulary and communicate orally in order to use these words. Phonological awareness along with awareness of print and letter and early word recognition are also listed as critical skills young children should experience in order to build a foundation for literacy. Finally,

children should be allowed to develop a motivation to read, knowledge of literary forms, and knowledge and practice of written expression (Neuman et al., 2003).

Experiences with technology can also provide critical skills to young children including the ability to gather information solve problems and communicate with others (Neuman et al., 2003). Children should be able to use software programs, use devices attached to the computer as well as accurate terminology, and enjoy interacting with the learning programs (Neuman et al., 2003).

Simmons and Kame'enui (2000) wrote *A Consumer's Guide to Evaluating a Core Reading Program Grades K-3: A Critical Elements Analysis* which explains skills that should be included in reading programs for each of these grade levels. The authors emphasize the following elements in a kindergarten reading program: phonemic awareness instruction, letter-sound association, decoding, irregular word instruction, listening comprehension, and vocabulary development.

Within phonemic awareness instruction, activities should progress from easiest to hardest. These activities should begin with large units of speech and progress to smaller units. Words of two or three phonemes should be introduced with instruction focusing on identifying beginning sounds, then ending sounds, and then medial vowels. Students should then be instructed on how to segment and blend these sounds to decode the word. Finally letter and letter sound instruction should occur. This portion of the reading program should be taught in short fifteen to twenty minute daily sessions (Simmons & Kame'enui, 2000).

Letter-sound association should be taught beginning with the most frequently used letters being addressed first. Short vowel sounds should also be taught so short

words can be created. Sounds of letter should be modeled with frequent review (Simmons & Kame'enui, 2000).

Simmons and Kame'enui (2000) provide strategies for decoding instruction that directly relate to letter-sound knowledge. Students should be provided with regular word types that have letter sounds that students have already learned. Students need to be provided strategies for sounding out words and provided practice in the form of word lists or controlled text. Irregular words should also be taught, introducing high frequency words first.

Finally, Simmons and Kame'enui (2000) provide guidelines for listening comprehension instruction. Skills including literal comprehension, main idea, retelling, and summarizing should be modeled and reviewed often. Student practice should be provided per page instead of for the entire text for practice. A variety of type of text should be used with opportunities for interactive discussion.

As students become more efficient readers, they are expected to read text independently and comprehend the meaning of that text. Pressley (2000) discusses what children need in order to be efficient at comprehending text. He includes skills that effect comprehension at the word level for the beginning reader and skill that are needed above the word level. Comprehension at the word level involves skills that produce the recognition of words. Comprehension above the word level involves skills that produce meaning for those words (Pressley, 2000).

Decoding and vocabulary are identified as two main skills students need to comprehend text at the word level which affects the recognition of individual words. To decode words is to produce the sounds in words in order to identify them. Children with

more developed decoding skills are able to sound out words in letter groups as opposed to letter by letter. This provides a more automatic decoding of words and leaves more short term memory available to process its meaning (Pressley, 2000).

Vocabulary also effects comprehension. Students who have limited vocabulary must rely completely on picture or context clues in order to comprehend the word and the sentence. Vocabulary development can be taught with word lists that are relevant to the story the student is reading, but mostly derives from experiences the child has had with that word in context (Pressley, 2000).

Skills that effect comprehension of text above the word level include relating text to prior knowledge and “conscious-controllable processing” (Pressley, 2000, p. 550). Relating text to prior knowledge is directly related to vocabulary development discussed earlier. Readers who have life experiences to relate to text are able to comprehend that text because it is familiar. With limited life experiences, most text is foreign to the reader and comprehension is much more difficult and less meaningful (Pressley, 2000).

Pressley (2000) explains “conscious-controllable processing” as the manner in which readers process the meaning of text (p. 550). Several examples of how text is processed and therefore understood are provided. Readers should be aware of their purpose for reading. They should overview the text before reading to identify possible themes or important information. Associations to previous knowledge should be made. The reader should evaluate and revise their reaction that they had as they previewed the text as they read the text in more detail. The reader should take time to figure out the meaning of unfamiliar words especially if they are crucial to the meaning of the overall text. While reading, the reader should use strategies to remember points made in the text

and interpret the text. After the text is read, the reader should evaluate the quality, review the information, and think about how the information could be used in the future (Pressley 2000).

In order to provide students the skills needed to comprehend their reading, Pressley (2000) suggests specific skills that should be included in the instruction of reading. Decoding skills should be taught including the decoding of words in “chunks” (p.551). The development of sight words should also be emphasized. Students should be taught to use context clues to evaluate whether the decoding and vocabulary skills are correct. Vocabulary should be taught with emphasis on word meanings and extensive reading should be encouraged to expand vocabulary and provide background knowledge. Finally, students should be given opportunities to discuss the meaning of text, and they should be taught to regulate their own use of these various strategies to enhance comprehension.

Torgesen (2004) provides framework of a reading program that specifically addresses what weak readers need to be successful. Strong core classroom instruction that includes phonological skills, fluency, word recognition, comprehension strategies, vocabulary development and spelling and writing are essential elements. Students then need to be screened for possible reading failure. Younger students should be assessed by identifying their knowledge of letters, phonemic skills, and vocabulary. Older elementary students should be assessed by their abilities to read words. Once students are identified as being at risk for reading failure, additional instruction should be provided. This instruction should be designed to address the individual strengths and weaknesses of each student. Torgesen (2004) notes that this additional instruction should

be explicit, teaching direct connections between print and speech without assumptions. Students also need to be provided more intensive instruction. At-risk children need more time to learn reading skills that their average peers. Finally, these students need additional reading instruction that is supportive and scaffolded. Educators need to create an emotional supportive environment in which these students can take risks and be successful. Their learning needs to be scaffolded, or carefully sequenced, so skills are built upon one another and new learning is connected to previous knowledge.

The practice of screening children to identify possible reading difficulties and providing direct, explicit and systematic additional instruction to prevent early reading failure are also components of a program implemented in Bethel School District in Eugene, Oregon. Before reforming their reading program, fifteen percent of kids left first grade unable to read and the referrals to special education of second grade students were escalating. Bethel's approach to reading is referred to as a prevention model rather than an instructional model. Some of its components include frequent assessment, research-based curricula, protected time for reading instruction, differentiated small group instruction, and teacher training (Paglin, 2004). Within the first two weeks of kindergarten, students are assessed using DIBELS (Dynamic Indicators of Basic Early Literacy Skills). This assessment uses a set of indicators to identify beginning sound ability and letter name knowledge. Students are then placed in three categories with the students in the at-risk category receiving additional thirty minutes of reading instruction daily. They are also monitored with DIBELS bimonthly to assess progress. With at-risk students receiving more time during the instructional day learning to read and the teachers monitoring their progress and adjusting instruction accordingly, only two

percent of students leaving first grade are considered nonreaders according to the DIBELS assessment (Paglin, 2004).

In summary, there are various activities and programs that are provided to students in order to enhance their reading skills. Heibert and Taylor (2000) discussed several of them and how they could improve reading achievement. Researchers in this field have also commented on the components that are essential to success of these interventions. These intervention components include teaching phonological skills including rhyme, alliteration, blending, segmenting, listening comprehension, reading comprehension, and letter-sound relationships. Also discussed were student motivation and the importance of background knowledge on reading achievement. Combinations of these skills have been used to instruct children and have proved to be effective in improving their ability to read.

Computer-Based Intervention Research

The Breakthrough to Literacy organization reports that their program has produced increased student performance with children in grades prekindergarten through one. Prekindergarten students who participated in the Breakthrough to Literacy program outperformed their peers who had not had the program in an assessment of work samples. The percentage of students who performed work samples proficiently was higher in all categories compared to their peer group who had not had the program. The work samples included activities involving listening, predicting stories, retelling stories, recognizing associations between spoken and written words and writing. Another data collection indicates that a classroom that had Breakthrough to Literacy made more gains than a

classroom that did not have the program on the Peabody Picture Vocabulary Test. These gains were measured by percentile rankings.

More comparisons have been made using kindergarten students. Student performance on the Metropolitan Achievement Test was reported after an intervention with Breakthrough to Literacy. From pretest to posttest, the percentage of students who performed in the below average range was reduced from 59 percent to 21 percent and the students who performed in the above average category increased from 3 percent to 36 percent. Another report using the Metropolitan Readiness Test indicates that four classrooms that used Breakthrough to Literacy increased their national percentile rank in beginning reading skills, story comprehension, and a prereading composite from pretest and posttest. Entering first grade students who had Breakthrough to Literacy used the TerraNova assessment (CTB/McGraw-Hill) to assess reading and math knowledge. Students who had Breakthrough to Literacy had a higher percentage correct in all areas. Students in kindergarten increased their percentile rank on the Peabody Picture Vocabulary Test from pretest to posttest after having Breakthrough to Literacy as an intervention. Title I students increased their performance on the Yopp-Singer Test of Phonemic Segmentation after having Breakthrough to Literacy. Kindergarten students also increased their scores on the Brigance Screen after using the program.

First grade students who had Breakthrough to Literacy also showed gains on pretests and posttests. One group of first graders improved their scores on an assessment of vocabulary, listening and language from pretest to posttest of the Iowa Test of Basic Skills. Another group of first grade students improved their national percentile rank on the TerraNova more than their counterparts who had not had the program. Finally, a

group of first grade students increased the percentage of students who met the benchmark on the Phonological Awareness Literacy Screening from pretest to posttest.

Some longitudinal data has been reported on the website. Students who had Breakthrough to Literacy either in kindergarten and/or first grade improved their performance on the TerraNova in second grade. In 1997, students who had never used the program had 36 percent of their students in the bottom quartile and 13 percent of students scoring in the highest quartile. In 1999, of students who had the program, 14 percent scored in the bottom quartile while 26 percent scored in the highest quartile. Students who had Breakthrough to Literacy in kindergarten had a higher percent of students passing the Virginia Standards of Learning Test than those students who had not had Breakthrough to Literacy. Finally, beginning third grade students who had Breakthrough to Literacy had a higher percentage of students passing the Indiana Statewide Testing for Educational Progress in language arts and math.

Although these results indicate that Breakthrough to Literacy positively affects student performance, this study will confirm its effect on phonological awareness and address future effects on reading comprehension using sound statistical procedures.

Retrieved February 8, 2003, from <http://www.earlyliteracy.com.html>

Summary

Reading problems in young children have been researched for decades. There have been studies that predict characteristics or precursors for reading failure as well as research on interventions that compensate for the lack of skill and enable students to experience success. With all of this research, questions remain about the type of

intervention and the quantity of time delegated to intervention would be needed to show marked improvement in the reading success of young school-aged children.

Young children in urban areas can be at-risk for reading problems. Urban areas have pockets of poverty, and the parents raising children in these areas often have limited education and resources to provide their children with literacy-rich environments during their early years (Lyon, 1998). Research studies have targeted these at-risk students and found that many of these children enter school without phonological awareness skills and are poor readers. These children remain poor readers throughout elementary school (Juel, 1988).

There have been many studies regarding phonological awareness and whether it is a predictor of reading achievement. Studies suggest that phonological awareness has a causal relationship with reading-related knowledge and decoding skills (Wagner et al., 1994, 1997). It was also suggested that phonological awareness predicts reading achievement, and that without intervention, poor readers in grade one will remain poor readers throughout their school careers (Maclean et al., 1987). The correlation between phonological awareness and reading achievement was even stronger than the correlation between IQ and reading achievement (Stanovich, Cunningham, & Cramer, 1984).

Many studies have investigated the effects of interventions on phonological awareness and other reading skills. It has been noted that intervention can improve phonological awareness skills including letter and sound identification, blending and segmenting, reading achievement, and spelling. These studies suggest that phonological awareness is important for students as it is a predictor of reading success. It is also suggested that interventions can be put in place to compensate for the lack of these skills.

Several reading interventions have been compared and their results discussed. Research indicates that interventions can positively effect reading achievement. Researchers also suggest specific skills that should be taught within these interventions in order to maximize student performance.

The Breakthrough to Literacy literature reports that the components and structure of their program along with the training that accompanies the program benefits the reading success of children. This program includes most of the components suggested by researchers to produce the largest growth in reading skill among young children.

CHAPTER 3

Methodology

This study was designed to investigate the effects of a computer-based phonologically based reading intervention on phonological skills and reading comprehension. It is a quasi-experimental design. The participants are students from four Title I schools from the same school district. Two of the schools provided Breakthrough to Literacy in their kindergarten classrooms and two did not. The treatment involves students interacting with the computer program for fifteen minutes daily. The effects of this program on phonological skills including rhyme identification, initial sound identification, lower-case alphabet recognition, letter sound knowledge, spelling, and concept of word will be measured. The effect of this program on the comprehension skills of third grade students will also be investigated.

General Design

This study is a quasi-experimental design. The purpose of the study is to determine if training students on phonological awareness skills in kindergarten with the Breakthrough to Literacy program increases their skills on an initial measure of phonological awareness, two delayed measures of phonological awareness, and a delayed standardized measure of reading comprehension. Table 1 provides information on the independent and dependent variables in this study.

Table 1

Independent Variable	Dependent Variables
<p>Treatment: Breakthrough to Literacy Program</p> <p>Levels: Students who had the program during kindergarten Students who did not have the program during kindergarten</p>	<p>Covariate: Kindergarten PALS pretest</p> <p>Measures: Kindergarten PALS posttest Grade one PALS pretest Grade one PALS posttest Grade two PALS pretest Grade two PALS posttest Grade three SOL Reading test</p>

Participants

Students from four mid-Atlantic suburban elementary schools were used for the study. All schools were governed by the same school board and adhered to the same curriculum. The schools all received federal funding in accordance with Title I due to their similar population of students receiving free and reduced lunch. They all provided Title I services in reading to those kindergarten and first grade students who did not meet the fall benchmark on the Phonological Awareness Literacy Screening. All of the schools also provided Reading Recovery services to first grade students who qualified. A reading specialist was also employed at every school to provide remedial services in reading to students in all grades who were performing below grade level expectations. Two of the schools implemented the Breakthrough to Literacy program in their kindergarten classrooms while the other two schools did not.

The four schools used in the study have between 15 and 25 percent of their students receiving free and reduced lunch, therefore entitling them to federal funds through Title I. All four schools average between eighteen and twenty-five students in each class. One of the treatment schools has between three and four sections of each

grade and the other treatment school and the two control schools have between five and seven sections of each grade. All of the schools service grade kindergarten through five, with one of the treatment schools serving grades kindergarten through two while their students in grades three through five receive instruction in another building. These two buildings, although physically separate, are treated by the county as one school when analyzing achievement and providing services.

The students who attended the four schools from kindergarten through grade three without transferring or being retained in a grade were chosen. Students who received an Individual Education plan during these four years were excluded from this study.

Procedure

The students attended four separate suburban elementary schools. Two of these schools provided instruction on the Virginia Standards of Learning instruction with the computer based phonological awareness program (Breakthrough to Literacy), while the other two schools provided traditional Standards of Learning instruction without the program. Students who attended schools with the Breakthrough to Literacy program were used as the treatment group while subjects that attended the matched schools without the program were used as the control group.

This study investigates a program designed to teach phonological skills using daily instruction with computers and its effect on phonological awareness of kindergarten students. Technology as a teaching tool, gives teachers the opportunity to reach students with diverse backgrounds and needs and to differentiate instruction for the benefit of all (Firek, 2003). Swaminathan & Yelland (2003) elaborate, encouraging educators to teach using technology instead of teaching about technology in order to enhance learning. The

program, Breakthrough to Literacy, was designed to teach students phonological awareness skills in order to improve their reading achievement. The program has several instructional components.

1. Listening to Stories is the first component introduced to students. This activity is designed to emulate lap reading, providing students who have not had literacy rich experiences at home before they attended school the opportunity to hear the spoken word while being exposed to its text.

2. The next activity is Explore Words. This component introduces students to larger parts of text, then that text is broken down into smaller parts. Sentences are introduced, followed by words, syllables, onset and rime, initial consonants, final consonants, vowels and blends. Sentences are segmented into words, and words are segmented into syllable and then blended back into the word. Words are segmented and blended by their onset and rime. Initial and final consonants are introduced as well as vowels and blends. The activities progress in order of difficulty. Students must identify targeted words and sounds consistently. After the student has mastered a skill, the next skill is introduced.

3. The next component introduced is Explore Alphabet. This activity emphasizes letter recognition and sound/symbol relationships.

4. Finally, the Tell Stories component is introduced. Students are allowed to read familiar stories using the skills that have been introduced with the previous activities. Because this is a computer based program, students are able to track text using the mouse and check individual word pronunciation if necessary. Another engaging feature allows children to read the story into the computer microphone and hear themselves read the stories.

Before beginning the program, the students are preassessed by their teachers using guidelines provided by Breakthrough to Literacy, and their knowledge level is entered into the computer. They are placed in one of four developmental categories: Language Acquisition, Early Emergent, Upper Emergent, and Early Fluency. There are various skills and skill levels introduced in each category. Students in the language acquisition category are just becoming engaged with print. They need basic instruction on text and are provided activities that involve sentences, words and then syllables. Students in the early emergent stage of reading are more familiar with text but remain at a beginning level of instruction that contains activities with words, syllables, and onset and rime. The upper emergent level of development involves connections being made between speech and print and activities involving words, syllables, onset and rime and individual sounds are provided. Finally, students in the early fluency stage of reading are actually able to read some print and receive instruction in the form of word and syllable review, onset and rime activities, and sound instruction including initial and final consonants and vowels and blends. The computer then provides activities for the student based on their knowledge level. Retrieved February 2, 2003, from <http://www.earlyliteracy.com/components.html>

In order to enroll students into the Breakthrough to Literacy program, teachers identify student characteristics on a computer checklist. They identify student levels in the areas of receptive language, expressive language, print experience, and writing. After the checklist is complete, the computer determines which stage the student is in and provides activities on the appropriate level.

Written examples of the checklists are included in the Teacher Connections book provided to all teachers and are included in this study within the appendices section (Breakthrough to Literacy, 1999). Specific behavioral examples are provided for each category and the teacher rates the students.

The first category is receptive language. A rating of 0 indicates that the student is a non-English speaker. A rating of 1 indicates that the student has low receptive vocabulary, that language input must be simple, and that the student cannot follow oral directions. If a student has normal receptive vocabulary, understands multi-word sentences, follows 2-3 step oral directions, and can sequence 3-4 pictures in logical order, the student would receive a rating of 2. A rating of 3 requires the student demonstrates a high receptive vocabulary, understand complex language structure, understand humor, can sequence 5-6 pictures in logical order, and can understand cause and effect and intentionality.

The next category is expressive language. A rating of 0 again implies the student is a non-English speaker. A rating of 1 indicates that the student has low expressive vocabulary, uses 1-2 word sentence with limited language structure, and seldom initiates conversation. A rating of 2 suggests the student has good expressive vocabulary, good sentence structure, demonstrates purposeful use of language, and takes turns in conversation. A rating of 3 requires the student have a high expressive vocabulary, used 7-10 word sentences, uses a variety of language forms, takes multiple turns in conversations, and integrates and expresses ideas.

The next checklist addresses print experience. A rating of 0 suggests the student has no experience with books or print. A rating of 1 suggests the student knows how to

hold a book appropriately and turn the pages. A rating of 2 requires the student to tell stories using pictures as guides, connect pictures with print and memorize stories. Rating 3 suggests the student discriminate between words and sentences, recognizes some letters of their name, recognizes common words and signs and has the concept of directionality of print. A rating of 4 requires the student to have phonemic awareness, good alphabet knowledge, and the ability to sound out some words. Finally, a rating of 5 requires the student has the ability to read.

The final checklist assesses writing ability. A rating of 0 means the student has no experience with writing. A rating of 1 suggests the student scribbles and hold the pencil correctly. A rating of 2 requires the student draw pictures to tell a story, produce horizontally oriented shapes on a page, and writes repetitive shapes. Rating 3 indicates that the student writes a series of letters for purposeful communication, writes common words, names and signs, and writes letter to stand for words or thoughts. A rating of 4 means the student uses phonetic spelling, inserts spaces between words, and spells some words correctly. Finally, a rating of 5 indicates the student writes continuous sentences.

(Breakthrough to Literacy, 1999)

After these ratings are complete, the computer then determines if the students is in the Language Acquisition, Early Emergent, Upper Emergent, or Early Fluency stage.

The computer then generates activities for the student based on the generated information.

All students in the treatment group received fifteen minutes daily on the computer program for eight months during their kindergarten year.

The teachers are provided ongoing staff development in order to implement the program appropriately. Teachers are provided three one day training sessions the first year of implementation. For continued support, the teachers are visited by a representative from the Breakthrough to Literacy organization five times during the first year. The second year of implementation is accompanied by one training day and a minimum of four classroom visits. Teachers are provided with resource materials that include a curriculum guide, teacher guide, teacher and student connections, book-of-the-week connections, home connections and curriculum connections. Students are provided with big books, small books, and take home books that match the stories students read on the computer along with writing journals. Teachers are also provided with a toll free number for technical support.

Implementation of this program involved the use of two classroom computer workstations per classroom. The teacher entered the students reading level on to the computer. The students were assigned their own sign-on symbol. Each student used the workstations fifteen minutes daily. The teacher was able to monitor the activities the students had completed at the workstation, the assessments completed, and the number of stories read.

Children were assessed on their phonological awareness skills in the fall and spring of their kindergarten year using the Phonological Awareness Literacy Screening (PALS). Their phonological awareness skills were also assessed the fall and spring of their first grade year and the spring of their second grade year using this same measurement. The reading comprehension of these same students was assessed the

spring of their third grade year using the Virginia Standards of Learning Assessment. Relationships between the treatment and these measures will be investigated.

Measures

In order to examine the impact of the treatment, pretesting and posttesting were used. The pretest and posttest assessments measure the phonological awareness of kindergarten and first grade students. The Phonemic Awareness Literacy Screening is given to all kindergarten, first grade, and second grade students in the Fall to identify the degree of phonological awareness students possess and then given again in the Spring to determine progress. The students who do not meet the Fall summed score benchmark receive an additional 30 minutes of phonological awareness instruction daily from the classroom teacher.

Reliability and Validity of Instrument

The internal consistency of the PALS assessment was determined using Cronbach's alpha. Entry level task reliability across demographic categories including gender, socioeconomic status, location, and ethnicity yielded alpha coefficients that were acceptable and stable across a two year testing period. Reliability coefficients were also assessed for pilot samples also yielding acceptable alpha coefficients. Finally, inter-rater reliability coefficients suggested raters were scoring items in the same manner.

(Invernizzi & Meier, 2002)

Content and construct validity were addressed with this instrument. According to Gronlund (1985) "content validity is the degree to which the sample items and tasks provides a relevant and representative sample of the content addressed". In designing this test, appropriate activities and items for each grade level were included necessary for

the development of fluent reading (Invernizzi & Meier, 2002). Construct validity refers to the degree to which the instrument reflects the theory on which it was based. The PALS assessment was based on the theory that sound and print intersect and create reading, and the assessment adequately reflects this theory (Invernizzi & Meier, 2002).

According to the Virginia Department of Education (1999), the Standards of Learning (SOL) tests were assessed to ensure their validity and reliability. This was accomplished using a Content Review Committee, outside review, comparison of scores to other standardized measures, and statistical analysis.

To establish content validity, a Content Review Committee was established to assist the Virginia Department of Education and the testing contractor in reviewing each test item. Each question was required to meet four criteria as assessed by the team. First, it was established that each item measured the standard it was designed to address. Next, the item must measure either the content or skill that the student was expected to master by the spring of that particular grade level. The difficulty of the item also must be deemed appropriate by the team. Finally, the item must be free of stereotypes and bias based on personal characteristics including gender, race, religion, and socioeconomic status. These procedures were then reviewed by consultants outside of the Virginia Department of Education to ensure appropriate testing practices. The results of the SOL assessments were also compared to other standardized measures of achievement such as the Stanford 9 and the Literacy Passport Test. Each school's pass rate on the SOL tests was statistically correlated with these measures to show similar results.

Statistical analysis was also conducted to ensure test reliability. This process is important to ascertain whether the SOL tests are accurate measures of student knowledge.

The developers of the SOL tests used the Kuder-Richardson Formula #20 to statistically measure test reliability. The reliability statistics were strong with a range of .80 to .92.

Retrieved January 12, 2004, from

<http://www.pen.k12.va.us/VDOE/Assessment/validity.PDF>

Phonemic Awareness Literacy Screening (PALS)

The Phonemic Literacy Screening (PALS) assesses the phonological awareness of students in grade kindergarten through two. Kindergarten and first grade students have assessments twice a year, once in the fall and again in the spring. The second grade assessment is given in the spring of that year. Specific information on the contents of these tests were gathered from the PALS 1-3 administration and scoring guide (Invernizzi & Meier, 2002).

Kindergarten Pretest

The PALS kindergarten pretest administration begins with a group assessment of rhyme awareness. Students are tested in small groups of no more of five students. The test examiner asks the students to touch four pictures as she says their names. The students are asked to circle the picture that rhymes with the first. For example, the administrator says “Put your finger on the rock. Touch each picture as I name it: rock, clock, game, fruit. Let’s listen for the picture that rhymes with rock: rock-clock, rock-game, rock-fruit”. Students who score 0-4 out of 10 must take the individual rhyme assessment. Students who score 5 or more do not. The individual rhyme assessment is given to students in a one-on-one setting and is administered the same as the group rhyme assessment.

The next group subtest assesses beginning sound identification. The test is administered as the rhyme test. There are 10 items and students must correctly answer 5 or more or they must take the individual beginning sound assessment. If the students must take the individual beginning sound assessment, they are required to categorize picture cards by their beginning sound. The examiner of the test introduces the “header” cards, each with different beginning sounds. The students must then place picture cards under the “header” picture with the same beginning sound. The test examiner is able to say each picture name before the students place them. This test assesses the students’ ability to discriminate between beginning sounds, determining if they are the same or different.

Then the students are asked to recognize letters written in lower case form. Lower case letters are arranged in random order. The examiner points to each letter and students name it.

Next, the students are asked to produce letter sounds after seeing the letter in upper case form. The examiner is scripted to give the students an example with the letter /M/. The letter /M/ is excluded from the test as it is used as the example. Added to the rest of the alphabet are the blends /Sh/ and /Th/.

The next subtest assesses the ability to blend phonemes and spell C-V-C words. The examiner asks the students to spell [mat] as the sample. The examiner says the word slowly, /MMM-AAA-TTT/. She then shows the students how to listen to each sound and write the corresponding letter. The students are then asked to spell five words. Letter reversals are not counted as errors and points are given for each sound the student represented.

The PALS test also assesses the students' concept of word. The students are given a word list and asked to point to each word and read it if they can. Otherwise, they are asked to skip it. They are then taught a poem to memorize verbatim. The examiner points to pictures and recites the poem. The students say the rhyme with the examiner, echo the recitation and then say the rhyme alone. The examiner then reads the rhyme while pointing to the words. The student then repeats this process sentence by sentence, tracking each word. The examiner then points to the target words and asks the students to say the words. The examiner then returns to the original word list and asks the student to read each word. The students are scored on reading the pretest word list, pointing to words while they recite the rhyme, identifying target words in context and reading the word list after these activities.

Finally, students are asked to recognize words in isolation. Preprimer, primer, and first grade words lists are provided for the examiner. The score for each list is tallied for a summed score in this subtest. This activity is optional for the PALS pretest and will not be used for the purposes of this study.

Kindergarten Posttest

The PALS posttest assesses identical skills as the pretest. The PALS test provides a scoring sheet for each student and a class summary sheet to record the subtest scores and total summed score for each student. The total pretest summed score is used to determine if a student has a low degree of phonological awareness skills. The students who do not meet the pretest benchmark receive an additional thirty minutes of phonological awareness instruction daily during the school year. The students who meet the benchmark are not targeted for additional assistance. The posttest score is used to

monitor progress and assist in making decisions for future instruction during the next school year.

Grade One Pretest

The first grade test begins with a spelling inventory. The administrators are instructed to present words orally to students including the word in a sentence that is provided for them in their administration manual. Students are given points for correctly spelling the entire word. Students are also given partial credit for getting specific word features correct even if the entire word is not spelled correctly. These features include initial sounds, final sounds, short medial vowel sounds, diagraphs, blends and silent e.

The next subtest is a word list. Students are given a preprimer word list first. If they read the minimum number of words required they are then given a first grade word list and then a second grade word list if applicable. If a student does not meet the minimum requirement on one of these lists, the administration of this subtest is stopped.

The next subtest is a letter sound test. Students are asked to produce the sound for the letters of the alphabet and the diagraphs /sh/, /th/, and /ch/. These three tests produce the summed score for the first grade PALS pretest.

The students are then asked to read passages. The passages range from the readiness level and increase to a mid third grade reading level. The students' initial passage is based on their score from the word list subtest. If students score 98 percent or greater on the passage reading, they are allowed to read the passage from the next level. The passages are scored using a running record that records errors for accuracy and with a fluency guide. The PALS test also includes comprehension questions for each passage. This subtest is optional.

If a first grade student does not read at least 15 words on the preprimer word list, they are required to proceed to the level B tests. The first is the alphabet recognition subtest which requires them to identify individual letters. They are required to take the concept of word subtest which requires students to echo read, track words, and then identify words within the text. If the student does not meet this summed score they must move to the level C tests.

Within the level C tests, the student must first take the blending subtest. The student is required to blend sounds the administer segments orally. The second and final test in level C is the sound-to-letter test which requires the student to identify the initial sound they hear in a word presented orally. Students that do not meet the initial summed score benchmark and must proceed to level B and/or level C tests must receive an additional thirty minutes of instruction daily.

Grade One Posttest

The first grade posttest is given in May every year. This test begins with the spelling inventory similar to the pretest. Students are scored in the same manner on the same spelling features with the additional features of long vowels and /r/ and /l/ controlled vowels.

The next test is the word list. Students are provided with word lists ranging in levels from preprimer to grade three. The administration is the same as the pretest. These two tests make up the summed score for the spring test. This differs from the pretest which had the letter sound production score contributing to the summed score.

All students then complete the passage reading subtest as they did on the pretest. The accuracy score is monitored through a running record. Any child scoring 98 percent

accuracy should read the passage from the next level. The comprehension questions are optional.

If a student does not read at least 15 words on the preprimer word list, they are required to take the subtests on level B. The alphabet recognition test and the concepts of word test remain the same from the pretest and the letter sound subtest is added. If the student does not meet the summed score, they must proceed to the tests on level C.

The level C subtest are the same as on the pretest. They include a blending test and a sound to letter test.

Grade Two Pretest

The second grade PALS pretest is administered in the Fall. The components are similar to the first grade posttest with different benchmarks. The test begins with a spelling inventory where students are scored on spelling features including all of the grade one features and adding ambiguous vowels such as /au/, /ou/, /oi/, and /oo/.

Second grade students are administered the word recognition test. They are given lists ranging from preprimer to grade three also. These two subtests are combined to create the summed score for the grade two test.

The students are expected to complete the passage reading test. Their beginning passage level is also based on the score they received from the word list test. The comprehension questions are optional.

The level B and level C tests are also offered to students who do not meet the minimum requirements from the first set of tests.

Grade Two Posttest

The grade two posttest is given to second grade students in the month of May. The summed score is calculated in the same manner as on the pretest with students completing the spelling inventory and the word list. The passage reading is completed but the comprehension questions are optional.

Standards Of Learning Reading Comprehension Test, Grade 3

The Standards of Learning Reading Comprehension Test was developed by the Virginia Department of Education and tests reading comprehension skills. Students are provided with several passages followed by comprehension questions in a multiple choice format. This test assesses the standards set by the state of Virginia in reading for grade kindergarten through three (Retrieved May 27, 2003, from <http://www.penk12.va.us/VDOE/instruction/English/ElemEnglishCF.doc>).

Statistical Analysis

A MANCOVA was used to analyze all measures. The kindergarten fall pretest scores on the Phonological Awareness Literacy Screening was used as the covariate in order to statistically equate the groups. The F scores produced from the subsequent Phonological Awareness Literacy Screening measures and the reading comprehension measure were analyzed to determine if any significant differences between the scores of the treatment and control groups exist. Multiple ANCOVAs were performed to determine on which dependent variables the groups differ. Due to subject attrition, an Independent T Test will be used to compare the kindergarten fall pretest scores on the Phonological Awareness Literacy Screening of those students who remained in the study

and those who were lost to determine if there are significant differences between those groups.

Summary

In order to investigate the effects of Breakthrough to Literacy on the phonological awareness skills of children, this study chose students from four elementary schools all governed by the same county school board. The Phonological Awareness Literacy Screening measures skills important to the reading success of elementary school age children and reflects the skills practiced within the Breakthrough to Literacy program. The researcher also recognized the importance to reading comprehension in the academic lives of these children and chose to measure this skill with the Standards of Learning assessment to determine if phonological awareness training is beneficial. The results of the treatment will be reviewed and discussion of the results will contain information relevant to the reading instruction of young children.

CHAPTER 4

Analysis of Data

This research was designed to study the effects of Breakthrough to Literacy on the phonological skills of kindergarten, first and second grade students as well as the reading comprehension skills of students in grade three. This study responds to research which indicates that phonological awareness can be taught to elementary students and that the mastery of these skills is crucial in the development of reading. The subjects of this study were students who had attended elementary schools within the same school division that received Title I funding. These students must have attended the same elementary school from kindergarten through grade three. Students who transferred or were retained during this time were excluded from the study. Students who received an Individualized Education Plan during this time were also excluded due to the possible interaction between their disability and the treatment. The control group contained sixty-four students from two schools which did not implement the Breakthrough to Literacy program in their kindergarten classes, while the treatment group contained eighty-five students from two schools which did implement the program.

The following research hypotheses were developed:

1. There is no significant difference in performance on phonological awareness and reading comprehension measures between students who had Breakthrough to Literacy in kindergarten and those who did not.
 - a. There is no significant difference in performance on a posttest measure of phonological awareness in kindergarten between students who had Breakthrough to Literacy and those who did not.

- b. There is no significant difference in performance on a pretest measure of phonological awareness in grade one between students who had Breakthrough to Literacy in kindergarten and those who did not.
- c. There is no significant difference in performance on a posttest measure of phonological awareness in grade one between students who had Breakthrough to Literacy in kindergarten and those who did not.
- d. There is no significant difference in performance on a pretest measure of phonological awareness in grade two between students who had Breakthrough to Literacy in kindergarten and those who did not.
- e. There is no significant difference in performance on a posttest measure of phonological awareness in grade two between students who had Breakthrough to Literacy in kindergarten and those who did not.
- f. There is no significant difference in performance on a measure of reading comprehension in grade three between students who had Breakthrough to Literacy in kindergarten and those who did not.

An Independent T Test was performed to determine if there was a significant difference on the kindergarten PALS pretest measure between students who were used in the study and those who were excluded. Null hypothesis 1 was analyzed using a MANCOVA. A One way ANCOVA (Analysis of Variance with a Covariate) was used to analyze null hypotheses a-f. If significant differences were found between groups at the .05 level, the null hypothesis was rejected.

Mortality Analysis

The results of the Independent T Test indicate there is no significant difference on the pretest measure of phonological awareness between the subjects who were chosen for the study and the ones who were excluded with $p > .05$. Additional descriptive statistics can be found in Appendix E. The subjects used in the study attended the same elementary school kindergarten through grade three without interruption. These students had no disabilities and had not been retained in any grade.

Analysis of Treatment on all Dependent Variables

A MANCOVA was performed to determine if there was a significant difference between the treatment and control groups on all of the dependent variables. The dependent variables included the PALS kindergarten posttest, PALS grade one pretest, PALS grade one posttest, PALS grade two pretest, PALS grade two posttest, and SOL grade three reading comprehension assessment. The PALS kindergarten pretest was used as the covariate. The results are presented in Table 2. The analysis indicates a significant difference between the control and the treatment groups on the dependent variables at the .05 level with a p value of .003. The null hypothesis 1 is rejected with data indicating that the implementation of Breakthrough to Literacy did have a significant effect on student achievement on the above mentioned measures.

Table 2

MANCOVA to Determine Significance Between Groups

Multivariate Tests						
Effect		Value	F	Hypothesis df	Error df	Sig.
GROUP	Pillai's Trace	.128	3.439	6.000	141.000	.003
	Wilks' Lambda	.872	3.439	6.000	141.000	.003
	Hotelling's Trace	.146	3.439	6.000	141.000	.003
	Roy's Largest Root	.146	3.439	6.000	141.000	.003

a Exact statistic

b Design: Intercept+PALSKPRE+GROUP

The observed power for the independent variable was equal to .937 indicating a high probability that significant differences would be found within a sample drawn from a similar population. Levene's Test of Equality of Error Variances was performed. This test showed no significant differences of variance on any of the dependent variables.

This information is included within Appendix F.

Since the results of the MANCOVA indicated significance, an ANCOVA was used to test each null hypothesis a-f. Each ANCOVA will provide statistics on performance on the dependent variables individually. The PALS pretest for kindergarten was used as the covariate for each ANCOVA.

Analysis of PALS Kindergarten Posttest

An ANCOVA was performed to determine if the difference in achievement between the control and treatment groups on the PALS kindergarten posttest was significant. The results are provided in Table 3. The null hypothesis a stated that there was no significant difference on the PALS kindergarten posttest between students who had Breakthrough to Literacy and those who did not. In comparing the two groups, there

was a significant difference in the achievement at the .05 level. The mean score for the treatment group was 86.02 with a standard deviation of 4.96. The control group had a mean score of 84.70 with a standard deviation 5.44 (Appendix G). Levene's test for homogeneity of variance indicates that there is no significant variance between the scores on this measure with $P = .662$. The null hypothesis 2 was rejected indicating that the treatment had a significant effect on phonological awareness.

Table 3

ANCOVA to Determine Differences Between Groups on PALS Kindergarten Posttest

Dependent Variable: PALSPOS					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	832.195	2	416.098	19.208	.000
Intercept	94625.071	1	94625.071	4368.087	.000
PALSKPRE	768.541	1	768.541	35.477	.000
GROUP	83.135	1	83.135	3.838	.052
Error	3162.771	146	21.663		
Total	1092111.000	149			
Corrected Total	3994.966	148			

a R Squared = .208 (Adjusted R Squared = .197)

Analysis of PALS Grade One Pretest

The null hypothesis b stated there was no difference on a pretest measure of phonological awareness between the treatment and control groups. An ANCOVA was performed to determine if the difference between achievement on the PALS pretest in grade one was significant. The results of the ANCOVA are reported in Table 4. The difference between the groups was significant at the .05 level with $p = .007$. The mean score for the control group was 33.23 with a standard deviation of 12.47. The treatment group had a mean score of 37.27 with a standard deviation of 11.60. The Levene's test of homogeneity of variance was not significant at the .05 level with $P = .074$. This data

indicates that the null hypothesis can be rejected with the treatment group performing significantly better on a measure of phonological awareness than the control group.

Additional statistical information can be found in Appendix H.

Table 4

ANCOVA to Determine Differences Between Groups on the Grade One Pretest

Dependent Variable: PALS1PRE					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6876.194	2	3438.097	33.869	.000
Intercept	3953.460	1	3953.460	38.945	.000
PALSKPRE	6281.408	1	6281.408	61.878	.000
GROUP	764.220	1	764.220	7.528	.007
Error	14820.853	146	101.513		
Total	209865.000	149			
Corrected Total	21697.047	148			

a R Squared = .317 (Adjusted R Squared = .308)

Analysis of PALS Grade One Posttest

An ANCOVA was performed to determine if the difference between the control and treatment groups was significant on the PALS posttest given in the spring of the student's first grade year. This test was performed to test null hypothesis c which states that there was no significant difference on the PALS posttest in grade one between students who had Breakthrough to Literacy in kindergarten and those who did not. The Levene's test of homogeneity of variance indicates no significant variance between scores. The difference between groups was significant at the .001 level with $p = .001$. The mean of the control group was 55.66 with a standard deviation of 9.63, and the mean of the treatment group was 60.19 with a standard deviation of 8.41. The null hypothesis 4 is rejected. These results are presented in Table 5 and additional statistics can be found in Appendix I.

Table 5

ANCOVA to Determine Differences Between Groups on the Grade One Posttest

Dependent Variable: PALS1POS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2598.199	2	1299.100	19.095	.000
Intercept	34538.822	1	34538.822	507.663	.000
PALSKPRE	1848.323	1	1848.323	27.167	.000
GROUP	849.031	1	849.031	12.479	.001
Error	9933.103	146	68.035		
Total	517952.000	149			
Corrected Total	12531.302	148			

a R Squared = .207 (Adjusted R Squared = .196)

Analysis of PALS Grade Two Pretest

The null hypothesis H_0 states that there is no significant difference on the PALS pretest in grade two between students who had Breakthrough to Literacy in kindergarten and those who did not. An ANCOVA was performed to determine statistical differences. These results indicate that the no significant difference is evident between the two groups with $p = .100$. Again, the Levene's test of homogeneity of variance was not significant at the .60 level. The mean for the control group was 28.22 with a standard deviation of 10.89. The mean for the treatment group was 30.75 with a standard deviation of 10.99. With this data, the null hypothesis H_0 cannot be rejected. Additional statistics are available in Appendix J and the results are provided in Table 6.

Table 6

ANCOVA to Determine Differences Between Groups on the PALS Grade Two Pretest

Dependent Variable: PALS2PRE					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2183.922	2	1091.961	10.178	.000
Intercept	5407.826	1	5407.826	50.407	.000
PALSKPRE	1949.450	1	1949.450	18.171	.000
GROUP	293.268	1	293.268	2.734	.100
Error	15663.299	146	107.283		
Total	148964.000	149			
Corrected Total	17847.221	148			

a R Squared = .122 (Adjusted R Squared = .110)

Analysis of PALS Grade Two Posttest

Null hypothesis e states that there is no significant difference on the PALS posttest in grade two between the treatment and control groups. An ANCOVA was performed on this PALS measure to determine if these differences were evident. This test was given in the spring of the student's second grade year. No significant variance between scores was indicated with $P = .571$. Again, there were no significant differences between groups on this measure with $p = .202$. The mean scores were 63.77 for the control group and 65.66 for the treatment group. The standard deviations were 11.03 and 9.98 respectively. This data suggests the effect of the treatment is not evident; therefore, the null hypothesis cannot be rejected. These results are presented within Table 7 with additional statistical information included in Appendix K.

Table 7

ANCOVA to Determine Differences Between Groups on the PALS Grade Two Posttest

Dependent Variable: PALS2POS					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1370.597	2	685.298	6.765	.002
Intercept	48296.315	1	48296.315	476.796	.000
PALSKPRE	1239.737	1	1239.737	12.239	.001
GROUP	166.036	1	166.036	1.639	.202
Error	14788.853	146	101.294		
Total	642698.000	149			
Corrected Total	16159.450	148			

a R Squared = .085 (Adjusted R Squared = .072)

Analysis of SOL Reading Comprehension Assessment in Grade 3

An ANCOVA was performed to determine if the implementation of Breakthrough to Literacy in kindergarten effected the students' reading comprehension abilities in grade 3. Null hypothesis f states that there was no significant difference on the SOL Reading Comprehension Assessment in grade three between students who had Breakthrough to Literacy in kindergarten and those who did not. The Levene's test of homogeneity of variance indicates no significant differences in the variance of the scores with $P = .396$. There was no significant difference between groups on this measure with $p = .319$ indicating the treatment did not result in a difference in reading comprehension achievement. The control group had higher scores on this measure with a mean of 35.80 with the treatment group performing with a mean of 34.66. Although the control group did have a higher mean, the difference in scores was not statistically significant. This information supports the null hypothesis can not be rejected. The results of this

ANCOVA are presented in Table 8 with additional statistical information presented in Appendix L.

Table 8

ANCOVA to Determine Differences Between Groups on the SOL Grade 3 Reading Comprehension Test

Dependent Variable: SOL3					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1000.762	2	500.381	15.993	.000
Intercept	11783.940	1	11783.940	376.633	.000
PALSKPRE	953.476	1	953.476	30.475	.000
GROUP	31.291	1	31.291	1.000	.319
Error	4567.989	146	31.288		
Total	189637.000	149			
Corrected Total	5568.752	148			

a R Squared = .180 (Adjusted R Squared = .168)

Discussion

In order to determine if the group who was used in the study was significantly different in the area of phonological awareness from the group who was eliminated from the study, an ANOVA was used to compare PALS kindergarten pretest scores. The results indicated that the two groups did not differ significantly on this measure. This information implies that mortality did not skew the results of this study.

The results of the MANCOVA indicated that the treatment, Breakthrough to Literacy, had a significant effect on the dependent variables. The students performed significantly better on the dependent variables which were analyzed as a whole. The data indicated that the Breakthrough to Literacy program had a positive effect on reading skills. That enabled null hypothesis 1 to be rejected and required additional analysis to determine the specific measures on which the students differed.

The results of the ANCOVA provided data to determine which of the dependent variables were affected by the treatment. Statistics indicate that Breakthrough to Literacy had a significant effect on phonological awareness skills in grades kindergarten and one. The kindergarten skills included rhyming, identification of beginning sounds in words, identification of letters, individual sound production, spelling, and concept of word. The first grade skills included spelling, word reading, and individual sound production. These skills were measured to be significantly higher for those students who had the Breakthrough to Literacy program. This information indicates that these phonological awareness skills can be taught and that they are enhanced by this specific program.

The performance of students who had Breakthrough to Literacy in kindergarten did not differ from students who did not have the program when measuring phonological awareness and reading comprehension in grade two and three. The phonological skills measured in grade two include spelling and word reading. In grade three, reading comprehension is measured with a standardized assessment of passage reading with comprehension questions. The data indicates that the effects of the treatment were no longer evident after grade one. This suggests that the effects of the treatment were evident during and soon after the treatment was implemented but did not last.

Summary

Seven null hypotheses were formulated that stated there would be no significant differences on phonological awareness and reading comprehension between students who had Breakthrough to Literacy in kindergarten and those who did not. Results from an ANCOVA were used to determine if the PALS pretest scores of kindergarten students used in the study were significantly different from PALS pretest scores of kindergarten

students who were eliminated from the study. A MANCOVA was performed to analyze student achievement on the dependent variables which included the PALS assessment given as a posttest in kindergarten, a pretest and posttest in grade one, a pretest and posttest in grade two and the SOL assessment of reading comprehension. The PALS kindergarten pretest was given in the fall of the students' kindergarten year and these scores were used as the covariate. An ANCOVA was performed for each dependent variable to determine if there was a significant difference in student achievement.

The results of the ANOVA suggested that there were no significant differences between the PALS kindergarten pretest scores of students who were used in the study and those who were eliminated. The results of the MANCOVA indicated that there was a significant difference between the treatment and control groups on all of the dependent variables. This data suggests that the Breakthrough to Literacy program had a significant effect on achievement in the area of phonological awareness when compared to students who did not have the program. The researcher was able to reject null hypothesis 1.

Since the results of the MANCOVA indicated a significant difference in achievement between the treatment and control groups, the ANCOVA was performed for each individual dependent variable. The results indicated that significant differences in phonological awareness achievement between the treatment and control groups were evident in kindergarten and grade one. The differences in phonological awareness were not present in grade two and there were no differences in reading comprehension in grade three. After reviewing the data, null hypotheses a, b, and c were rejected and null hypotheses d, e, and f were not rejected.

CHAPTER 5

Summary and Conclusions

Summary

Extensive research has been completed that suggests a relationship between strong phonological awareness skills and achievement in reading. This study was designed to add to that research by investigating if having the Breakthrough to Literacy program in kindergarten improved phonological skills and to determine if the effect of having this program continued to be evident on phonological awareness through grade two. This research also investigated if having the Breakthrough to Literacy program in kindergarten would have an effect on reading comprehension as measured in grade three.

The risk factors children face from birth can contribute to a lack of school success when entering kindergarten. These risk factors include being economically disadvantaged, low maternal education, and having English as a second language (Zill, 1995). At-risk families often do not have the resources to provide literacy rich environments within their homes which would cultivate early literacy (ETS, 1992). Mothers without the benefit of a high school education sent their children to kindergarten with a significantly lower degree of readiness skills than mothers with bachelor degrees (Griffin & Lundy-Ponce, 2003). Children with these risk factors then enter kindergarten without the literacy skills to meet school standards and therefore need interventions to raise their achievement (IRA & NAEYC, 1998).

Without intervention, children who are poor readers in grade one remain poor readers through grade four (Juel, 1988). Researchers have studied the effects of phonological awareness intervention on the improvement of those skills and reading

achievement. A meta-analysis of phonological awareness research reported that phonological awareness interventions improved those skills, implying that they can be taught. These interventions included teaching the skills of segmenting words, blending words, rhyme identification, onset and rime identification, letter identification, letter and sound correspondence, and syllable segmentation (Ehri et. al, 2001).

Children who received phonological interventions also performed significantly better on measures of reading achievement. Ehri et. al (2001) reported that the significant improvement children experienced with phonological skills after intervention transferred to reading achievement. There were significant differences between groups of children who had these phonological interventions and those who did not on reading achievement. These children ranged in age from preschool to grade two. The differences were most evident with children of preschool age, and they were moderate but significant as the children became older.

The major purpose of this study was to determine if participation with a specific phonological intervention, Breakthrough to Literacy, would significantly improve phonological awareness skills and reading comprehension skills. The treatment group participated in the traditional kindergarten curriculum along with the Breakthrough to Literacy program during their kindergarten year. The control group participated in the traditional district curriculum without the Breakthrough to Literacy program.

In order to answer the research questions, a quasi-experimental design was developed. The study involved a treatment group (N = 85) and a control group (N = 64) chosen from four schools receiving Title I federal funding within the same school division. This sample was a cohort of children whose scores on phonological awareness

measures and reading comprehension were tracked through their kindergarten, first, second, and third grade years. Students who transferred in or out of these schools during this time were eliminated from the study. Students who were identified with a disability were also eliminated from the study.

The students were given the Phonological Awareness Literacy Screening (PALS) assessment as a pretest and posttest in kindergarten, first and second grade. They were also given the Standards of Learning (SOL) test of reading comprehension in grade three. A MANCOVA was performed on the outcome measures on all of the PALS assessments and the SOL reading comprehension assessment on the students who had the Breakthrough to Literacy program and those who did not. An ANCOVA was performed on the PALS kindergarten, grade one and grade two measures to determine significant differences in phonological awareness between students who had the Breakthrough to Literacy program and those who did not. An additional ANCOVA was performed on the outcome measure of the SOL reading comprehension assessment to determine if Breakthrough to Literacy had a significant effect on comprehension.

Conclusions

It appears that Breakthrough to Literacy provided effective instruction in the area of phonological awareness. The students who interacted with this program had significantly stronger phonological awareness skills because of it. The program requires 15 minutes daily on the computer in order to interact with learning activities that are programmed to each child's individual learning level. This supports research of alternative interventions which implied that 15-20 minutes of phonological instruction daily was enough to improve skills. This research also supports the theory that young

students react positively to this kind of instruction. Kindergarten students were able to learn skills from this program and perform better on assessments. According to the data, educators who are investigating programs to teach phonological awareness skills to young children could use this program to achieve that goal.

The results of the MANCOVA indicated that there was a significant difference on the scores on the dependent variables between the students who had Breakthrough to Literacy and those who did not. This prompted additional statistical analysis. Upon review of each individual dependent variable, it was discovered that the students in the treatment group performed significantly better than the students in the control group on measures of phonological awareness in grades kindergarten and one. The groups did not differ on measures of phonological awareness in grade two or on a measure of reading comprehension in grade three.

These findings suggest that the implementation of Breakthrough to Literacy can improve phonological awareness skills. It supports the research that stated phonological skills can be taught. Phonological awareness skills remained significantly higher through grade one even though the program was only implemented in kindergarten. It is also important to note that the significant differences in phonological awareness skills between the groups was nonexistent by grade two, and there was also no difference in reading comprehension achievement by grade three.

Recommendations

There are several recommendations for further research that arose from this study. Breakthrough to Literacy improved phonological awareness skills of students in kindergarten and grade one, so therefore could be used as an intervention program for

kindergarten students at risk for reading failure. At risk students enter school without the exposure to lap reading, complex language and language play and require an intervention so they can function successfully in the academic setting.

The data suggests that the effects of this intervention are no longer evident after grade one. It is concluded that one academic year of phonological intervention with this program is not enough to sustain these skills. Additional research is required to determine if extended instruction with Breakthrough to Literacy is required to maintain these skills or if alternative phonological awareness programs would have a more longitudinal effect on skills.

Also, more research could continue to investigate links between phonological awareness and reading comprehension. Students who had Breakthrough to Literacy in kindergarten did not differ in their reading comprehension skills in grade three from the students in the control group. This suggests that one year of instruction with this intervention is not enough instruction to make students effective readers. Although Breakthrough to Literacy can improve letter and sound identification, spelling, concept of word, word reading, and rhyme and beginning sound identification initially, early readers need instruction in additional areas to be able to comprehend complex text.

The research reviewed suggests that listening comprehension, vocabulary development, and the explicit instruction of comprehension strategies are necessary components of a reading program if students are to be able to read and comprehend more complex text. Students can comprehend text orally that is more difficult than what they can comprehend through reading. Because of this, listening comprehension can build domain knowledge and a student's repertoire of vocabulary. Phonological awareness

instruction focuses on decodable words, the text is simple and does not contribute to enhancing the student's domain knowledge or vocabulary. Due to this simplicity of text, students are not able to practice literal or inferential comprehension strategies either.

Due to the limitations of this study, students with Individualized Education Plans, students who were retained in a grade and students who withdrew from the sample schools were excluded from the study. The effects of Breakthrough to Literacy on students with special needs, transient students, and students who have been retained in a grade could be investigated in order to understand the full scope of the program on all students.

References

- Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.
- Adams, M. J., Foorman, B. R., Lundberg, I., & Beeler, T. (1998). The elusive phoneme: Why phonemic awareness is so important and how to help children develop it. *American Educator, Spring/Summer, 34*(5), 18-22.
- Allen, L. & Sethi, A. (2004). Bridging the gap between poor and privileged. *American Educator, Summer*. Retrieved on March 8, 2005 from http://www.aft.org/pubs_reports/american_educator/issues/summer04/gap.htm
- Allington, R. (2002). What I've learned about effective reading instruction. *Phi Delta Kappan*, June, 740-747.
- Ball, E. W., & Blachman, B. A. (1988). Phoneme segmentation training: Effect on reading readiness. *Annals of Dyslexia, 38*, 208-225.
- Ball, E. W., & Blachman, B. A. (1991). Does phoneme awareness training in kindergarten make a difference in word recognition and developmental spelling? *Reading Research Quarterly, 26*(1), 49-66.
- Beck, I. L., & Juel, C. (1995). The role of decoding and learning to read. *American Educator, 19*(2), 8, 21-25, 39-42.
- Beck, I., McKeown, M., & Kucan, L. (2003). Taking delight in words: Using oral language to build young children's vocabularies. *American Educator, Spring*. Retrieved on March 8, 2005 from http://www.aft.org/pubs-reports/american_educator/spring2003/words.html
- Biemiller, A. (2003). Oral comprehension sets the ceiling on reading comprehension. *American Educator, Spring*. Retrieved on March 8, 2005 from http://www.aft.org/pubs-reports/american_educator/spring_2003/biemiller.html
- Blachman, B. (1984). Relationship of rapid naming ability and language analysis skill to kindergarten and first grade reading achievement. *Journal of Educational Psychology, 76*, 610-622.
- Blachman, B. (1997b). Early intervention and phonological awareness: A cautionary tale. In B. A. Blachman (Ed.), *Foundations of reading acquisition and dyslexia: Implications for early intervention* (p. 409-430). Mahwah, NJ: Lawrence Erlbaum Associates.

- Bradley, L. (1988). Making connections in learning to read and spell. *Applied Cognitive Psychology*, 2, 3-18.
- Bradley, L., & Bryant, P. (1983). Categorizing sounds and learning to read: A causal connection. *Nature*, 30, 419-421.
- Bradley, L., & Bryant, P. (1985). *Rhyme and reason in reading and spelling*. International Academy for Research in Learning Disabilities Monograph Series, No.1. Ann Arbor: University of Michigan Press.
- Breakthrough to Literacy. (1999). *Teacher Connections*. Washington: Wright Group Publishing, Inc.
- Breakthrough to Literacy (n.d.). Retrieved February 2, 2003, from <http://www.earlyliteracy.com/components.html>.
- Breakthrough to Literacy (n.d.). Retrieved February 8, 2003, from <http://www.earlyliteracy.com/results.html>.
- Busnik, R., (1997). Reading and phonological awareness: What we have learned and how we can use it. *Reading Research and Instruction: Spring*, 36(3), 199-215.
- Byrne, B., & Fielding-Barnsley, R. (1991). Evaluation of a program to teach phonemic awareness to young children. *Journal of Educational Psychology*, 83, 451-455.
- Byrne, B., & Fielding-Barnsley, R. (1993). Evaluation of a program to teach phonemic awareness to young children: A 1 year follow-up. *Journal of Educational Psychology*, 85, 104-111.
- Byrne, B., & Fielding-Barnsley, R. (1995). Evaluation of a program to teach phonemic awareness to young children: A 2- and 3-year follow-up and a new preschool trial. *Journal of Educational Psychology*, 87, 488-503.
- Calfee, R. C., Lindamood, P., & Lindamood, C. (1973). Acoustic-phonetic skills and reading-Kindergarten through 12th grade. *Journal of Educational Psychology*, 64, 293-298.
- Castle, J. M., Riach, J., & Nicholson, T. (1994). Getting off to a better start in reading and spelling: The effects of phonemic awareness instruction within a whole language program. *Journal of Educational Psychology*, 86, 350-359.
- Chall, J. S. (1989). Learning to read: The great debate 20 years later: A response to "debunking the great phonics myth." *Phi Delta Kappan*, 70, 521-538.

- Chall, J. S. & Jacobs, V. (2003). Poor children's fourth-grade slump. *American Educator, Spring*. Retrieved on March 8, 2005 from http://www.aft.org/pubs-reports/american_educator/spring2003/chall.html
- Chard, D. & Dickson, S. (1999). Phonological awareness: Instructional and assessment guidelines. *Intervention in School and Clinic, 34*(5), 261-270.
- Content, A., Kolinsky, R., Morias, J., & Bertelson, P. (1986). Phonemic segmentation in prereaders: Effect of corrective information. *Journal of Experimental Psychology, 42*, 49-72.
- Cunningham, A. E. (1990). Explicit versus implicit instruction in phonemic awareness. *Journal of Experimental Child Psychology, 50*, 429-444.
- Davidson, M., & Jenkins, J. (1994) Effects of phonemic processes on word reading and spelling. *Journal of Educational Research, 87*(3), 148-156.
- de Jong, P. & van der Leij, A. (1999). Specific contributions of phonological abilities to early reading acquisition: Results from a Dutch latent longitudinal study. *Journal of Educational Psychology, 91*, 450-476.
- de Jong, P. & van der Leij, A. (2002). Effects of phonological abilities and linguistic comprehension on the development of reading. *Scientific Studies of Reading, 6, 1*, 51-77.
- DeMoulin, D. (2003). Getting kids hooked on reading-early! *Education, 123, 4*, 663-664.
- Dryer, L. & Katz, L. (1992). An examination of the "Simple View of Reading". *Yearbook of the National Reading Conference, 41*, 169-176.
- Educational Testing Service. (1992). America's smallest school: The family. Princeton: Author.
- Ehri, L. C., Nunes, S. R., Willows, D. M., Schuster, B. V., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis. *Reading Research Quarterly, 36*(3), 250-287.
- Elkonkin, D. B. (1963). The psychology of mastering the elements of reading. In B. Simon & J. Simon (Eds.), *Educational Psychology in the U.S.S.R.* (p. 165-179). London: Routledge & Kegan Paul.
- Elkonkin, D. B. (1973). U.S.S.R. In J. Downing (Ed.), *Comparative Reading* (p. 551-580). New York: Macmillan.

- Fletcher, J. M., Shaywitz, S. E., Shankweiler, D. P., Katz, L., Liberman, I. Y., Stuebing, K. K., et al. (1994). Cognitive profiles of reading disability: Comparisons of discrepancy and low achievement definitions. *Journal of Educational Psychology, 86*, 6-23.
- Firek, H. (2003). One order of ed tech coming up . . . you want fries with that? *Phi Delta Kappan*, April, 596-597.
- Fox, B., & Routh, D. K. (1984). Phonemic analysis and synthesis as word-attack skills: Revisited. *Journal of Educational Psychology, 76*, 1059-1061.
- Greer, M. (2004). Bridging a reading gap: Research using a computer model aims to unify dueling theories on how people read. *Monitor, 35*, 11. Retrieved March 8, 2005 from <http://www.apa.org/monitor/dec04/reading.html>
- Griffin, D., & Lundy-Ponce, G. (2003). At the starting line: Early childhood programs in the 50 states. *American Educator*, Summer, 20-45.
- Grossen, B. (1997). 30 years of research: What we know now about how children learn to read. Santa Cruz, CA: Center for the Future of Teaching and Learning. (ERIC Document Reproduction Service NO. ED 415492).
- Hargrave, A., & Senechal, M. (2000). A book reading intervention with preschool children who have limited vocabularies: The benefits of regular reading and Dialogic reading. *Early Childhood Research Quarterly, 15*, 75-90.
- Hart, B. & Risley, T. (2003). The early catastrophe: The 30 million word gap by age 3. *American Educator*, Spring, 4-9.
- Hatcher, P. J., Hulme, C., & Ellis, A. W. (1994). Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. *Child Development, 65*, 41-57.
- Heibert, E., & Taylor, B. (2000). Beginning reading instruction: Research on early interventions. In Kamil, M., Mosenthal, P., Pearson, P., & Barr, R. (Ed.), *Handbook of Reading Research, Volume II* (p. 455-481). New Jersey: Lawrence Earlbaum Associates, Publishers.
- Hirsch, E. (2003). Reading comprehension requires knowledge-of words and the world. *American Educator, Spring*, 10-29.
- Hoover, W. & Gough, P. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 7*, 6-10.

- Huffman, L. & Speer, P. (2000). Academic performance among at-risk children: The role of developmentally appropriate practices. *Early Childhood Research Quarterly, 15*, 167-184.
- Hunter, R., & Bartee, R. (2003). The achievement gap: Issues of competition, class, and race. *Education and urban society, 35*, 2, 151-160.
- International Reading Association. (1998). *Phonemic awareness and the teaching of reading. A position statement from the board of directors of the International Reading Association* [Brochure]. Newark, DE.
- International Reading Association. (1999). *Using multiple methods of beginning Reading instruction. A position statement of the International Reading Association* [Brochure]. Newark, DE.
- International Reading Association & National Association for the Education of Young Children. (1998). Learning to read and write: Developmentally appropriate practices for young children. *The Reading Teacher, 52*(2), 193-213.
- Invernizzi, M. & Meier, J. (2002). *PALS 1-3 Phonological Awareness Literacy Screening Administration and Scoring Guide*. University of Virginia, Curry School of Education.
- Invernizzi, M. & Meier, J. (2002). *PALS 1-3 Phonological Awareness Literacy Screening Technical Reference*. University of Virginia, Curry School of Education.
- Jerger, M. (1996). Phoneme awareness and the role of the educator. *Intervention in School and Clinic, 32*(1), 5-13.
- Jimerson, S., & Kaufman, A. (2003). Reading, writing, and retention: A primer on grade retention. *The Reading Teacher, 56*, 7, 622-635.
- Joshi, R., Aaron, P. (2000). The component model of reading: Simple view of reading made a little more complex. *Reading Psychology, 21*, 2, 85-97.
- Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology, 80*(4), 437-447.
- Juel, C. & Meier, J. (1999). Teaching content and form through balanced instruction. *Teaching and Change, 6*(2), 183-196.

- Karweitk, N. (1993). Effective preschool and kindergarten programs for students at risk. In B. Spodek (Ed.), *Handbook of Research on the Education of Young Children* (p. 385-411). New York: Macmillan.
- Lewkowicz, N. K. (1980). Phonemic awareness training: What to teach and how to teach it. *Journal of Educational Psychology, 72*, 686-700.
- Liberman, I. Y., Shankweiler, D., Fischer, F. W., & Carter, B. (1974). Explicit syllable and phoneme segmentation in the young child. *Journal of Experimental Psychology, 18*, 201-212.
- Lie, A. (1991). Effects of a training program for stimulating skills in word analysis in first-grade children. *Reading Research Quarterly, 26*(3), 234-250.
- Lundberg, I., Frost, J., & Petersen, O. (1988). Effects of an extensive program for stimulating phonological awareness in preschool children. *Reading Research Quarterly, 23*(3), 263-284.
- Lundberg, I., Olofsson, A., & Wall, S. (1980). Reading and spelling skill in the first school years predicted from phonemic awareness skills in kindergarten. *Scandinavian Journal of Psychology, 21*, 159-173.
- Lyon, G. R., (1998). Why reading is not a natural process. *Educational Leadership, March*, 27-31.
- Maclean, M., Bryant, P., & Bradley, L. (1987). Rhymes, nursery rhymes, and reading in early childhood. *Merrill Palmer Quarterly, 33*, 255-281.
- Mann, V. A., & Liberman, I. Y. (1984). Phonological awareness and verbal short-term memory: Can they presage early reading problems. *Journal of Learning Disabilities, 17*, 592-599.
- Marcon, R. A. (1993). *At-risk preschoolers: Early predictors of future grade retention*. Paper presented at the Annual Meeting of the Southeastern Psychological Association, Atlanta, GA. (ERIC Document Reproduction Service No. ED35780).
- McBride-Chang, C., Wagner, R. K., & Chang, L. (1997). Growth modeling of phonological awareness. *Journal of Educational Psychology, 89*, 621-630.
- Nation, K., & Hulme, C. (1997). Phonemic segmentation, not onset-rime segmentation, predicts early reading and spelling skills. *Reading Research Quarterly, 32*, 154-167.

- National Preschool Coordination Project. (1991). *Kindergarten retention. Burning issue*. San Diego, CA: Author. (ERIC Document Reproduction Service No. ED334056).
- Neuman, S., Celano, D., Greco, A., Shue, P. (2003). *Access for all: Closing the book Gap for children in early education*. Newark, Delaware: International Reading Association.
- O'Connor, R. E., Jenkins, J. R., & Slocum, T. A. (1995). Transfer among phonological tasks in kindergarten: Essential instructional content. *Journal of Educational Psychology*, 87, 202-217.
- Olofsson, A., & Lundberg, I. (1983). Can phonemic awareness be trained in kindergarten? *Scandinavian Journal of Psychology*, 24, 35-44.
- Ortiz, C., Stowe, R., & Arnold, D. (2001). Parental influence on child interest in shared picture book reading. *Early Childhood Research Quarterly*, 16, 263-281.
- Paglin, C. (2004). Practicing prevention: One district's success. *American Educator, Fall*. Retrieved on March 8, 2005 from http://www.aft.org/pubs-reports/american_educator/issues/fall04/prevention.htm
- Perfetti, C. A., Beck, I., Bell, L., & Hughes, C. (1987). Phonemic knowledge and learning to read are reciprocal: A longitudinal study of first grade children. In K. Stanovich (Ed.), *Children's reading and the development of phonological awareness* [Special issue]. *Merrill Palmer Quarterly*, 33(3). 283-320.
- Plevyak, L., & Morris, K. (2002). Why is kindergarten an endangered species? *Education Digest*, 23-25.
- Pressley, M. (2000). What should comprehension instruction be the instruction of? In Kamil, M., Mosenthal, P., Pearson, P., & Barr, R. (Ed.), *Handbook of Reading Research, Volume II* (p.545-561). New Jersey: Lawrence Earlbaum Associates, Publishers.
- Reynolds, R. (2000). Attentional resource emancipation: Toward understanding the interaction of word identification and comprehension processes in reading. *Scientific Studies of Reading*, 4, 3, 169-195.
- Roberts, T. (2003). Effects of alphabet-letter instruction on young children's word recognition. *Journal of Educational Psychology*, 95, 1, 41-51.
- Schieffer, C., Marchand-Martella, N., Martella, R., Simonsen, F., & Waldron-Soler, K. (2002). An analysis of the reading mastery program: Effective componets and research review. *Journal of Direct Instruction*, 2, 2, 87-119.

- Scott-Jones, D. (1987). Mother-as-teacher in the families of high and low-achieving low-income black first graders. *Journal of Negro Education*, 56, 21-34.
- Shanahan, T. (2003). Research-based reading instruction: Myths about the national reading panel report. *The Reading Teacher*, 56, 7, 646-655.
- Share, D. L., Jorm, A. F., Maclean, R., & Matthews, R. (1984). Sources of individual differences in reading achievement. *Journal of Educational Psychology*, 76(6), 1309-1324.
- Simmons, D., & Kame'enui, E. (2000). A consumer's guide to evaluating a core Reading program grades K-3: A critical elements analysis. Retrieved on January 13, 2004 from <http://www.pen.k12.va.us/VDOE/Instruction/Reading/ConsumerGuideReading.pdf>
- Skjelford, V. J. (1976). Teaching children to segment spoken words as an aid in learning to read. *Journal of Learning Disabilities*, 9, 297-306.
- Stahl, S. (2003). Words are learned incrementally over multiple exposures. *American Educator*, Spring. Retrieved on March 8, 2005 from http://www.aft.org/pubs-reports/american_educator/spring2003/stahl.html
- Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21, 360-407.
- Stanovich, K. E., Cunningham, A. E., & Cramer, B. B. (1984). Assessing phonological awareness in kindergarten children: Issues of task comparability. *Journal of Experimental Child Psychology*, 38, 175-190.
- Sugzda, D. (1992). *The effect of retention on kindergarten children*. (ERIC Document Reproduction Service No. ED 341972).
- Swaminathan, S. & Yelland, N. (2003). Global perspectives on educational technology. *Childhood Education*, Annual Theme, 258-260.
- Taylor, B., Peterson, D., Pearson, P., & Rodriguez, M. (2002). Looking inside classrooms: Reflecting on the "how" as well as the "what" in effective reading instruction. *The Reading Teacher*, 56, 3, 270-279.
- Torgesen, J. K. (2004). Preventing early reading failure. *American Educator*, Fall. Retrieved on March 8, 2005 from http://www.aft.org/pubs-reports/american_educator/issues/fall04/reading.htm

- Torgesen, J. K., Morgan, S. T., & Davis, C. (1992). Effects of two types of phonological awareness training on word learning in kindergarten children. *Journal of Educational Psychology, 84*, 364-370.
- Treiman, R., & Baron, J. (1983). Phonemic-analysis training helps children benefit from spelling-sound rules. *Memory and Cognition, 11*, 382-389.
- Tunmer, W. E., & Nesdale, A. R. (1985). Phonemic segmentation skill and beginning reading. *Journal of Educational Psychology, 77*, 417-527.
- Turley, R. (2003). Are children of young mothers disadvantaged because of their mother's age or family background? *Child Development, 74*, 2, 465-474.
- Ukrainetz, T., Cooney, M., Dyer, S., Kysar, A., & Harris, T. (2000). An investigation into teaching phonemic awareness through shared reading and writing. *Early Childhood Research Quarterly, 15*, 331-355.
- United States Department of Education. (2004). No Child Left Behind Act of 2001, Retrieved November 5, 2004 from <http://www.ed.gov/nclb/overview/intro/execsumm.html>
- Vandervelden, M. C., & Siegel, L. S. (1995). Phonological recoding and phoneme awareness in early literacy: A developmental approach. *Reading Research Quarterly, 30*(4), 854-875.
- Vellutino, F. R. (1991). Introduction to three studies on reading acquisition: Convergent findings on theoretical foundations of code-oriented versus whole-language approaches to reading instruction. *Journal of Educational Psychology, 83*, 427-443.
- Vellutino, F. R., & Scanlon, D. M. (1987). Phonological coding, phoneme awareness, and reading ability: Evidence from a longitudinal and experimental study. *Merrill Palmer Quarterly, 33*(3), 321-363.
- Virginia Department of Education. (n.d.). Retrieved May 27, 2003, from <http://www.pen.k12.va.us/VDOE/Instruction/English/ElemEnglishCF.doc>
- Virginia Department of Education, (1999). Standards of learning (SOL) tests validity and reliability information. Retrieved January 12, 2003, from <http://www.pen.k12.va.us/VDOE/Assessment/validity.PDF>
- Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (1994). Development of reading-related phonological processing abilities: New evidence of bidirectional causality from a latent variable longitudinal study. *Developmental Psychology, 30*(1), 73-87.

- Wagner, R. K., Torgesen, J. K., Rashotte, C. A., Hecht, S. A., Barker, T. A., Burgess, S. R., et al. (1997). Changing relations between phonological processing abilities and word-level reading as children develop from beginning to skilled readers: A 5-year longitudinal study. *Developmental Psychology, 33*, 468-479.
- Walsh, D. (2002). Kids don't read because they can't read. *Education Digest, 29-30*.
- Williams, J. P. (1980). Teaching decoding with an emphasis on phoneme analysis and phoneme blending. *Journal of Educational Psychology, 72*, 1-15.
- Yeung, J., Linver, M., & Brooks-Gunn, J. (2002). How money matters for young children's development: Human capital and family process. *Child Development, 73*, 1861-1879.
- Yopp, H. K. (1992). Developing phonemic awareness in young children. *The Reading Teacher, 45*(9), 696-703.
- Zill, N., Collins, M., West, J., & Hausken, E. G. (1995). Approaching kindergarten: A look at preschoolers in the United States. *Young Children, 51*(1), 35-38.

APPENDICES

APPENDIX A

Student (first & last): _____ Date: _____

Section I

Part A: Group Rhyme Awareness

1. man	five	bed	can	+/-	_____
2. sail	whale	tree	cow	_____	_____
3. coat	duck	hand	goat	_____	_____
4. bug	hat	rug	tape	_____	_____
5. frog	net	log	boy	_____	_____
6. ball	tent	pig	wall	_____	_____
7. cat	bat	horse	saw	_____	_____
8. lock	boat	sock	pie	_____	_____
9. house	mouse	bike	fan	_____	_____
10. box	leaf	gas	fox	_____	_____

Benchmark: 5 Score: _____/10

STOP If student scores below the benchmark:
Administer Individual Rhyme Awareness and include individual score in Summed Score.
Record both scores on Class Summary Sheet.

Section I

Part C: Individual Rhyme Awareness

1. top	mop	swim	car	+/-	_____
2. sled	kite	bed	run	_____	_____
3. sheep	skate	rain	jeep	_____	_____
4. rake	bell	snake	fruit	_____	_____
5. lip	ship	well	nose	_____	_____
6. fox	paint	wall	box	_____	_____
7. sun	mop	run	tag	_____	_____
8. shoe	two	flag	pen	_____	_____
9. pig	road	wig	sail	_____	_____
10. tray	ball	cap	hay	_____	_____

Benchmark: 5 Score: _____/10

Section I

Part B: Group Beginning Sound Awareness

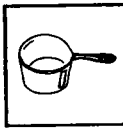
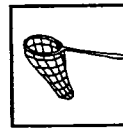
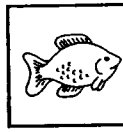




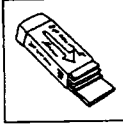



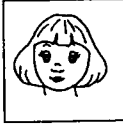
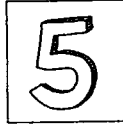
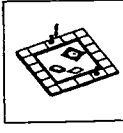
1. bat	bird	lips	ring	+/-	_____
2. rain	bus	foot	rake	_____	_____
3. sun	door	seal	car	_____	_____
4. cup	cone	six	belt	_____	_____
5. hat	mop	hose	bell	_____	_____
6. van	hay	vine	comb	_____	_____
7. deer	leaf	sink	doll	_____	_____
8. sheep	shoe	kite	wheel	_____	_____
9. well	bee	nose	watch	_____	_____
10. paint	gum	pen	key	_____	_____

Benchmark: 5 Score: _____/10

STOP If student scores below the benchmark:
Administer Individual Beginning Sound Awareness and include individual score in Summed Score.
Record both scores on Class Summary Sheet.

Section I

Part D: Individual Beginning Sound Awareness

Benchmark: 5 Score: _____/10

► **Section II: Alphabet Knowledge**
Lower-Case Alphabet Recognition

m	g	i	z	r
v	h	b	w	c
x	l	s	d	n
e	j	u	t	q
f	a	k	p	o
y				

Benchmark: 12

Score: ____/26

► **Section III: Letter-Sound Knowledge**
A: Letter Sounds

B	S	R	F	W
T	O	J	A	H
K	Sh	V	I	P
Z	L	C	Th	U
E	D	Y	G	N
Ch				

Benchmark: 4

Score: ____/26

► **Section III: Letter-Sound Knowledge**
B: Spelling

1. fan	<table border="1"><tr><td>f</td><td>a</td><td>n</td></tr><tr><td>v</td><td>e</td><td></td></tr></table>	f	a	n	v	e		_____ # Checked	_____ Bonus Point			
f	a	n										
v	e											
2. pet	<table border="1"><tr><td>p</td><td>e</td><td>t</td></tr><tr><td>b</td><td>a</td><td>d</td></tr></table>	p	e	t	b	a	d	_____ # Checked	_____ Bonus Point			
p	e	t										
b	a	d										
3. rug	<table border="1"><tr><td>r</td><td>u</td><td>g</td></tr><tr><td>w</td><td>o</td><td>k</td></tr><tr><td>y</td><td></td><td>c</td></tr></table>	r	u	g	w	o	k	y		c	_____ # Checked	_____ Bonus Point
r	u	g										
w	o	k										
y		c										
4. sit	<table border="1"><tr><td>s</td><td>i</td><td>t</td></tr><tr><td>c</td><td>e</td><td>d</td></tr></table>	s	i	t	c	e	d	_____ # Checked	_____ Bonus Point			
s	i	t										
c	e	d										
5. mop	<table border="1"><tr><td>m</td><td>o</td><td>p</td></tr><tr><td></td><td>i</td><td>b</td></tr></table>	m	o	p		i	b	_____ # Checked	_____ Bonus Point			
m	o	p										
	i	b										

Benchmark: 2

Score: ____/20

► **Section IV: Concept of Word**

Concept of Word in Text			COW Word List
	Pointing	Word ID	
Rain on the <u>green</u> grass.	(1)	(2)	green
Rain <u>on</u> the <u>tree</u> .	(1)	(2)	the
Rain on <u>the</u> <u>rooftop</u> .	(1)	(2)	on
<u>But</u> not on <u>me</u> !	(1)	(2)	rain
Score:	/4	/8	me
Pointing	_____	_____	tree
Word ID	_____	_____	not
COW Word List	_____	_____	grass
COW Total Score	_____	/22	rooftop
Pointing Benchmark: 2			but
Word ID Benchmark: 2			_____/10
COW Word List Benchmark: 0			

► **Section V: Word Recognition in Isolation** (optional)

Preprimer	Primer	First Grade
cat	bird	hand
see	cut	girl
red	home	shadow
my	into	off
is	pat	garden
big	from	bed
will	mother	again
yes	come	walk
the	lake	time
it	eat	colors
but	they	dance
and	good	long
run	now	wet
dog	help	five
we	live	step
by	that	hills
she	saw	someday
you	feet	bag
get	jump	glad
did	may	pony

Score: ____/20

Score: ____/20

Score: ____/20

Summed Score

Rhyme Awareness + Beginning Sound Awareness + Alphabet Recognition
+ Letter Sounds + Spelling + COW Word List

--



Name: _____

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

1. _____

2. _____

3. _____

4. _____

5. _____

Teacher: _____ Assessment Date: _____

Student Name (first & last): _____

Birth Date: ____/____/____ ID #: _____ Gender (circle): M / F

Ethnicity* 1 2 3 4 5 6

Services (circle all that apply)*: N TI SP LD DD ED MR ESL LEP Tutor O: _____

* See the Administration and Scoring Guide for description of codes.

► Step 1: Calculate Fall Entry Level Summed Score

First Grade Entry Level Sum	
<input type="text"/>	Total Spelling Score
+	<input type="text"/> Preprimer Word List
+	<input type="text"/> Letter Sounds
=	<input type="text"/> Entry Level Summed Score
First Grade Fall Entry Level Summed Score Benchmark = 39	

Second Grade Entry Level Sum	
<input type="text"/>	Total Spelling Score
+	<input type="text"/> First Grade Word List
=	<input type="text"/> Entry Level Summed Score
Second Grade Fall Entry Level Summed Score Benchmark = 35	

Third Grade Entry Level Sum	
<input type="text"/>	Total Spelling Score
+	<input type="text"/> Second Grade Word List
=	<input type="text"/> Entry Level Summed Score
Third Grade Fall Entry Level Summed Score Benchmark = 54	

► Step 2: Record Scores For Additional Tasks (Use pages 4-6)

Other Word Lists Given						Level B: Alphabets			Level C: Phonemic Awareness		
PP	P	1st	2nd	3rd	4th	ABC	LS	COW		Blending	Sound-to-Letter

► Step 3: Record Level A Scores (Oral Reading in Context) (Use Running Record Forms)

Text Level	Passage Title*	# of Oral Reading Errors	Frustration / instructional / Independent / (circle level)	FLUENCY RATING (1-3)	TOTAL TIME min : sec	# Comprehension Questions Correct
Readiness	Run, Mouse, Run		Frust. / Inst. / Ind.			
Preprimer A	Big and Little		Frust. / Inst. / Ind.			
Preprimer B	The Rain Is Coming		Frust. / Inst. / Ind.			
Preprimer C	What Is In My Box?		Frust. / Inst. / Ind.			
Primer	Baby Elephant		Frust. / Inst. / Ind.			/6
First Grade	Turtles		Frust. / Inst. / Ind.			/6
Second Grade	Birds Take a Fall Trip		Frust. / Inst. / Ind.			/6
Third Grade	Remarkable Reptiles		Frust. / Inst. / Ind.			/6
Fourth Grade	All About Elephants' Trunks		Frust. / Inst. / Ind.			/6

* If DRA, QRI, PM Benchmark, or Stieglitz passages were used for Level A, please have the # of oral reading errors on-hand for the score entry process. For any other passages, you will need the passage level, # of words in the passage, and # of oral reading errors.

	beginning sounds	ending sounds	digraphs	blends	short vowels	nasals	CVCe		Correct Word
1. mop	<u>m</u> op	mop <u>o</u>			o <u>p</u>				1.
2. wig	<u>w</u> ig	wig <u>i</u>			w <u>i</u> g				2.
3. net	<u>n</u> et	net <u>t</u>			n <u>e</u> t				3.
4. cub	<u>c</u> ub	cu <u>b</u>			c <u>u</u> b				4.
5. chin			<u>ch</u> in						5.
6. went						<u>w</u> ent			6.
7. this			<u>th</u> is						7.
8. bump						<u>b</u> ump			8.
9. trap				<u>t</u> rap	tr <u>a</u> p				9.
10. hunt						<u>h</u> unt			10.
11. wish			<u>w</u> ish						11.
12. slide				<u>s</u> lide	sl <u>i</u> de		<u>s</u> lide		12.
13. brave				<u>b</u> rave	br <u>a</u> ve		<u>b</u> rave		13.
14. sink						<u>s</u> ink			14.
15. drive				<u>d</u> rive	dr <u>i</u> ve		<u>d</u> rive		15.
16. shade			<u>sh</u> ade				<u>sh</u> ade		16.
FEATURE SCORES	beginning sounds	ending sounds	digraphs	blends	short vowels	nasals	CVCe	TOTAL Feature Score	TOTAL Words Correct
	(4)	(4)	(4)	(4)	(4)	(4)	(4)		

Fall 2003 Benchmark: Spelling

Grade 1

9

Spelling Words 1-16

Calculate Total Spelling Score

Total Feature Score + Total Words Correct

= First Grade Total Spelling Score

transfer score to page F, Step 1

Interpreting Feature Scores

0-1	absent
2-3	used but confused
4	correct

Teach these features

Entry Level Task 1: Spelling Inventory (Grades 2 and 3)

Fall 2003

	beg/end sounds	digraphs	blends	short vowels	nasals	CVCe	long vowels	r- and l-controlled		Correct Word
1. mop	<u>m</u> op			mop						1.
2. wig	w <u>i</u> g			wig						2.
3. net	<u>n</u> et			net						3.
4. cub	<u>c</u> ub									4.
5. chin		<u>ch</u> in								5.
6. went					went					6.
7. this		<u>th</u> is								7.
8. bump					bump					8.
9. trap			<u>tr</u> ap	trap						9.
10. hunt					hunt					10.
11. wish		<u>wi</u> sh								11.
12. slide			<u>sl</u> ide			slide				12.
13. brave			<u>br</u> ave			brave				13.
14. sink					sink					14.
15. drive			<u>dr</u> ive			drive				15.
16. shade		<u>sh</u> ade				shade				16.
17. boat							boat			17.
18. clean							clean			18.
19. paint							paint			19.
20. light							ligh			20.
SECOND GRADE STOP HERE										
21. start								start		21.
22. hurt								hurt		22.
23. milk								milk		23.
24. short								short		24.
THIRD GRADE STOP HERE										
FEATURE SCORES	beg/end sounds	digraphs	blends	short vowels	nasals	CVCe	long vowels	r- and l-controlled	TOTAL Feature Score	TOTAL Words Correct
	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)		

Fall 2003 Benchmarks: Spelling	
Grade 2	Grade 3
20	39
Spelling Words 1-20	Spelling Words 1-24

Interpreting Feature Scores
 0-1 absent
 2-3 used but confused
 4 correct
Teach these features

Calculate Total Spelling Score

Total Feature Score + Total Words Correct = Total Spelling Score

Transfer score to page 1 Step 7

► **Entry Level Task 2: Word Recognition in Isolation**

Fall 2003

Preprimer	+/-	Primer	+/-	First Grade	+/-	Second Grade	+/-	Third Grade	+/-	Fourth Grade	+/-
1. cat		1. bird		1. hand		1. candy		1. forget		1. disease	
2. see		2. cut		2. girl		2. bone		2. toast		2. although	
3. red		3. home		3. shadow		3. party		3. bucket		3. groan	
4. my		4. into		4. off		4. because		4. alarm		4. period	
5. is		5. pat		5. garden		5. family		5. juice		5. mounds	
6. big		6. from		6. bed		6. breakfast		6. bowl		6. jealous	
7. will		7. mother		7. again		7. hurt		7. swallow		7. tough	
8. yes		8. come		8. walk		8. country		8. matter		8. starve	
9. the		9. lake		9. time		9. band		9. taste		9. opinion	
10. it		10. eat		10. colors		10. stone		10. cheese		10. legend	
11. but		11. they		11. dance		11. easy		11. lesson		11. avoid	
12. and		12. good		12. long		12. second		12. worse		12. cabbage	
13. run		13. now		13. wet		13. tomorrow		13. moment		13. sweet	
14. dog		14. help		14. five		14. grown		14. squeeze		14. glare	
15. we		15. live		15. step		15. reach		15. banana		15. leather	
16. by		16. that		16. hills		16. dinner		16. parent		16. voyage	
17. she		17. saw		17. someday		17. listen		17. hammer		17. uniform	
18. you		18. feet		18. bag		18. dear		18. repair		18. sauce	
19. get		19. jump		19. glad		19. both		19. needle		19. ridge	
20. did		20. may		20. pony		20. great		20. daughter		20. explode	
Score:		Score:		Score:		Score:		Score:		Score:	

(Transfer scores to page 1, Steps 1 and 2)

► **Entry Level Task 3:
Letter Sounds (First Grade only)**

B	S	R	F	W
T	O	J	A	H
K	Sh	V	I	P
Z	L	C	Th	U
E	D	Y	G	N
Ch				

Fall 2003 Benchmarks: Word Recognition in Isolation		
Grade 1	Grade 2	Grade 3
10	15	15
Preprimer Word List	First Grade Word List	Second Grade Word List

Fall 2003 Benchmark: Letter Sounds
Grade 1
20

Letter Sounds Score: (26 possible)

► **Level B Alphabetics Task 1: Alphabet Recognition**

m	g	i	z	r
v	h	b	w	c
x	l	s	d	n
e	j	u	t	q
f	a	k	p	o
y				

Alphabet Recognition Score: (26 possible)

► **Level B Alphabetics Task 2: Letter Sounds**

B	S	R	F	W
T	O	J	A	H
K	Sh	V	I	P
Z	L	C	Th	U
E	D	Y	G	N
Ch				

Letter Sounds Score: (26 possible)

*First Grade Teachers: Use student's score from Entry Level, Task 3: Letter Sounds (do not readminister task)

► **Level B Alphabetics Task 3: Concept of Word**

CONCEPT OF WORD IN TEXT

	Pointing	Word ID	COW Word List	+ / -
<u>Humpty</u> Dumpty sat on a <u>wall</u>	(1)	(2)	on	
Humpty <u>Dumpty</u> had a great <u>fall</u>	(1)	(2)	Humpty	
<u>All</u> the <u>king's</u> horses	(1)	(2)	put	
<u>And</u> all the king's <u>men</u>	(1)	(2)	horses	
Couldn't <u>put</u> Humpty <u>together</u> again.	(1)	(2)	sat	
			men	
			king's	
			wall	
			had	
			fall	
Scores:	(5)	(10)		(10)

Calculate Concept of Word Total Score

Pointing

+ Word ID

+ COW Word List

= Concept of Word Total Score

Transfer score to Calculate Level B Summed Score

Calculate Level B Summed Score

Alphabet Recognition

+ Letter Sounds

+ Concept of Word Total Score

= Level B Summed Score

Transfer score to page 7, Step 2

Fall 2003 Benchmarks: Level B			
	Grade 1	Grade 2	Grade 3
ABC Recognition	24	26	26
Letter Sounds	20	24	26
Concept of Word	21	25	25
Level B Summed Score	65	75	77

► **Level C Phonemic Awareness Task 1: Blending**

Fall 2003

Target Word	You Say	Correct Answer	Points (0 or 1)
1. my	m-ī	my	
2. say	s-ā	say	
3. eat	ē-t	eat	
4. show	sh-ō	show	
5. new	n-ōō	new	
Subtotal:			

Target Word	You Say	Correct Answer	Points (0 or 1)
11. stick	s-t-ī-k	stick	
12. flag	f-l-ā-g	flag	
13. stop	s-t-ō-p	stop	
14. freeze	f-r-ē-z	freeze	
15. space	s-p-ā-s	space	
Subtotal:			

Target Word	You Say	Correct Answer	Points (0 or 1)
6. sad	s-ā-d	sad	
7. fat	f-ā-t	fat	
8. sick	s-ī-k	sick	
9. mean	m-ē-n	mean	
10. fish	f-ī-sh	fish	
Subtotal:			

Target Word	You Say	Correct Answer	Points (0 or 1)
16. fast	f-ā-s-t	fast	
17. left	l-ē-f-t	left	
18. just	j-ū-s-t	just	
19. soft	s-ō-f-t	soft	
20. rest	r-ē-s-t	rest	
Subtotal:			

Blending Total Score: (20 possible)

(Transfer score to page 1, Step 2)

► **Level C Phonemic Awareness Task 2: Sound-to-Letter**

BEGINNING

You Say	Correct Answer	Student's Response	*Points: (0, 1, or 2)
1. top	t		
2. man	m		
3. face	f		
4. boy	b		
5. pig	p		
Subtotal:			

MIDDLE

You Say	Correct Answer	Correct Sound	Student's Response	*Points: (0, 1, or 2)
11. cake	a	long a		
12. fun	u	short u		
13. light	i	long i		
14. red	e or a	short e		
15. coat	o	long o		
16. kick	i or e	short i		
17. back	a	short a		
18. keep	e	long e		
19. tub	u	short u		
20. hot	o	short o		
Subtotal:				

ENDING

You Say	Correct Answer	Student's Response	*Points: (0, 1, or 2)
6. bus	s		
7. mad	d		
8. car	r		
9. gym	m		
10. bell	l		
Subtotal:			

Sound-to-Letter Total Score: (40 possible)

(Transfer score to page 1, Step 2)

*1 = Correct Word or Sound, 2 = Correct Letter

Fall 2003 Benchmarks: Level C			
	Grade 1	Grade 2	Grade 3
Blending	8	12	14
Sound-to-Letter	16	28	34

APPENDIX B



BREAKTHROUGH TO LITERACY™ Partners for Results

[Home](#) > [Components](#) > [Professional Development](#)

[Home](#)

[Overview](#)

- [Tools That Work](#)
- [Partners for Results](#)

[Results](#)

- [Pre-Kindergarten](#)
- [Kindergarten](#)
- [First Grade](#)
- [Writing](#)
- [ESL](#)
- [Longitudinal Results](#)
- [Discussion & Conclusions](#)

[Research](#)

- [Case Study](#)
- [Process](#)

[Components](#)

- [Essential Practices](#)
- [Professional Development](#)
- [Software](#)
- [System Requirements](#)
- [Print Materials](#)
- [Take-Home Materials](#)
- [Package Contents](#)

[Questions & Answers](#)

- [General](#)
- [Technical](#)

[In the News](#)

[Teacher Resources](#)

- ["You Asked For It" Q & A](#)
- [Newsletter](#)
- [Teacher Discussion](#)
- [Book Level Lists](#)
- [Language Unit Activities](#)
- [Take-Home Book Ideas](#)
- [Sample Classroom Schedules](#)

[Events](#)

[Praise from Educators](#)

[Contact Information](#)

- [Employment](#)

Professional Development

[Teacher Tools](#) | [Parent Resources](#) | [Training Schedule](#)

The teacher is the most crucial part of the education equation. *Breakthrough* supports the teacher's role by providing comprehensive professional development. Teachers receive both in-service workshops and follow-up classroom support. A certified *Breakthrough* literacy coach is on-site at the beginning, providing step-by-step support to ensure that the classroom runs smoothly in the first week of implementation. Follow-up visits and on-site training are built into the program. When necessary, technical support can be accessed through the toll-free help line (1-800-874-2851 or at btlsupport@mcgraw-hill.com).

Teacher Tools

Getting Started Guide: Pictures each deliverable and briefly describes its purpose and use.

Teacher Guide: Includes program overview, description of components, and program objectives.

Teacher Connections: Assists with classroom set-up; offers instruction in classroom management and assessment reports.

Curriculum Connections: Provides ideas and activities for each Book-of-the-Week title; integrates themes across the curriculum.

Student Connections: Introduces the software features to students.

Curriculum Reference Guide: Lists curriculum objectives and sequences to facilitate each child's placement in the individualized, instructional software.

Story Reference Guide Posters: Guides students to find particular titles in the software and theme book boxes.

Blackline Masters: Provide many program illustrations in a reproducible format for student to color and use in writing assignments.

Story Cards, Story Cloth, and Story Cards Teacher Guide (pre-K only): Used in language-building activities and for story recall, etc.

Literacy Coaches

Breakthrough to Literacy
2662 Crosspark Rd.
Coralville, IA 52241
319-665-3000
800-874-2851
E-mail:
btlparkers@mcgraw-hill.com

- [Terms of Use](#)
- [Privacy Policy](#)

Copyright © 2000 Wright Group/McGraw-Hill. All rights reserved.

Breakthrough to Literacy Newsletter: Provides timely information for teachers and administrators about ways to maximize classroom success with Breakthrough. Teacher tips give ideas from colleagues across the nation.

Parent Resources

Home Connections: Provides parents with ways to help their children develop language and literacy skills (pre-K and K only). Easy-to-manage, computer-generated, on-going *reports* and *parent letters* keep parents informed of their child's progress.

Take-Me-Home Books: Allow children to share their reading success with their parents.

Book-of-the-Week Connections: Provides activities for children to do with their families for each Book-of-the-Week. Story posters and stickers help children and parents track the books they have read.

Training Schedule

Administrator's Overview (2 hours)

Administrators have a critical role, supporting their teachers in the *Breakthrough to Literacy* process. A two-hour session gives administrators a broad overview of the process. Essential classroom practices are stressed; administrators are provided with recommendations on how they can take an active role in developing early literacy in their schools. Principals are invited and welcomed to each full day of teacher professional development as well.

Getting Started Meeting

A part- or full-day meeting during which the literacy coach explains the use and purpose of each deliverable item and helps teachers begin to enroll the children in the software.

Level I Training: Initial Implementation

(full-day workshop scheduled immediately prior to implementation)

The Level I professional development day provides an overview and introduction to the *Breakthrough to Literacy* program. Elements of the day include:

- Discussions about language development, the *Breakthrough to Literacy* developmental model, and building a literacy environment in the classroom;
- An explanation of the receptive-expressive language observation tool used to enroll students in the program;
- Hands-on practice with the *Breakthrough to Literacy* software and tools;
- suggestions for introducing *Breakthrough to Literacy* to students and parents;
- Ideas for turn-taking management;
- A review of the *Breakthrough to Literacy* books and resources; and
- Uses of the Big Books, pupil books, and Take-Me-Home Books.

Level II Training: Classroom Integration

(full-day workshop scheduled four to six weeks after implementation)

The Level II professional development day focuses on the phonological journey each child makes to become a comfortable, confident reader. Elements of the day include:

- A detailed look at the *Explore Words* component of the *Breakthrough to Literacy* program, as well as the scope and sequence of the curriculum;
- Instruction on how to determine the language units and skill levels appropriate for each child's needs;
- A review of children's writing samples to link them with curriculum placement;
- Use of *Breakthrough to Literacy "Reports"* to plan flexible small groups; and
- Sample activities for small-group instruction.

Level III Training: Reports

(full-day workshop scheduled six to eight weeks after Level II Training)

The goal of the Level III professional development day is to build the teacher's observation and assessment skills. Elements of the day include:

- A focus on the *Breakthrough to Literacy* "reports" application;
- Detailed explanation and analysis for each of the report options;
- Hands-on activities related to analyzing student report data and planning appropriate activities for focused instruction; and
- An explanation of the process for customizing student placement.

Year Two Training: Synthesis

The full day (or two half days) on-site workshop scheduled for the second year is customized to the needs of individual campuses. Training provides teachers a practical approach to analyze the relationship between Breakthrough to Literacy and district and state objectives. Teachers will map out a plan to incorporate Breakthrough to Literacy into district language arts objectives.

Classroom Follow-up Visits

In addition to formal training days, 5-9 visits, spaced through the first year of implementation, allow literacy coaches to work one-on-one with teachers and their students. At least four visits are scheduled for the second year. Literacy coaches help teachers by modeling strategies, working with individual children or small groups, and serving as a resource. In place of a follow-up visit, districts may plan a two hour team meeting, which provides opportunities for small group discussion on topics of greatest interest to the group.

Continue to '[Software](#)'

APPENDIX C



Receptive Language Options

Don't know

0 - Non-English speaker

1 - Low receptive vocabulary
- Language input must be simple
- Cannot follow oral directions

2 - Has normal receptive vocabulary
- Understands multi-word sentences
- Follows oral directions (2-3 step)
- Sequences 3-4 pictures in logical order

3 - Has high receptive vocabulary
- Understands complex language structure
- Understands humor
- Sequences 5-6 pictures in logical order
- Understands cause and effect and intentionality

Expressive Language Options

Don't know

0 - Non-English speaker

1 - Has low expressive vocabulary
- Uses 1-2 word sentences; limited language structure
- Seldom initiates conversation

2 - Has good expressive vocabulary
- Has good sentence structure
- Purposeful use of language
- Takes turns in conversations

3 - Has high expressive vocabulary
- 7 to 10 word grammatical sentences
- Uses a variety of language forms
- Takes multiple turns in conversations
- Integrates and expresses ideas

Print Experience Options

Don't know

0 - No experience with books or print

1 - Holds book appropriately
- Turns pages

2 - Tells story; uses picture as guide
- Connects pictures with print generally
- Memorizes stories

3 - Discriminates between words and sentences
- Recognizes some letters of name
- Recognizes common words and signs
- Has concept of directionality of print

4 - Has phonemic awareness
- Has good alphabet knowledge
- Sounds out some words

5 - Reads

Writing Options

Don't know

0 - No experience with writing

1 - Scribbles
- Holds pencil correctly

2 - Draws pictures to tell story
- Produces horizontally oriented shapes on page
- Writes repetitive shapes

3 - Writes series of letters for purposeful communication
- Writes common words/names/signs
- Writes letters to stand for words or thoughts

4 - Uses phonetic spelling
- Inserts spaces between words
- Spells some words correctly

5 - Writes continuous sentences

APPENDIX D

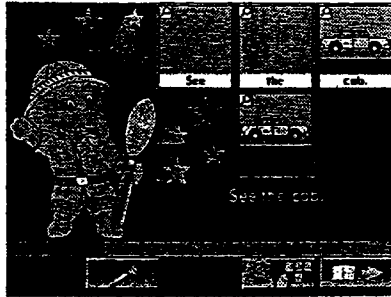
Skill Levels

Language Unit

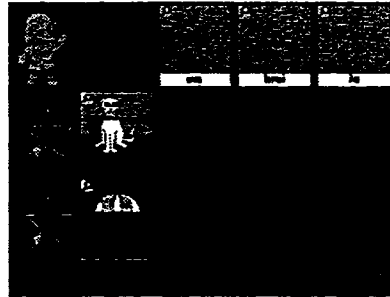
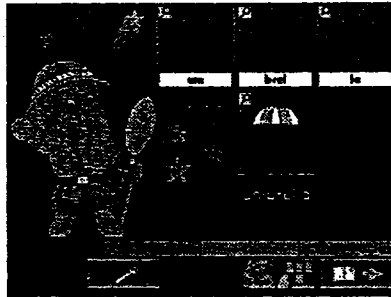
Practice

Matching (Level 4)

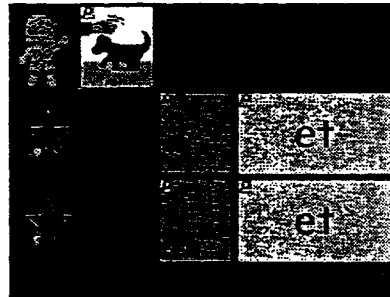
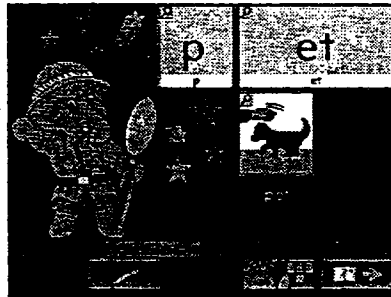
Words in Sentences



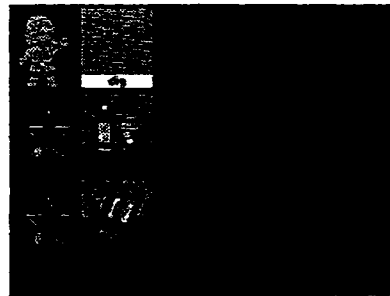
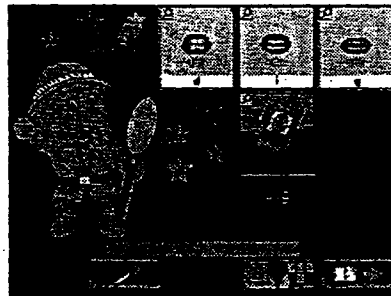
Syllables



Onset/Rime



Sounds



9 = clues

Auditory/Visual Levels (AVL)

Practice

Listen

AVL 1 Listen practice card. It features a cartoon character on the left and three rows of images and text. The first row shows a beetle and the text "Eat the beet." The second row shows a car and the text "See the cab." The third row shows a beetle and the text "Eat the beet." There are two stars on the left side of the card.

AVL 1

Practice

Blending/Segmenting

AVL 1 Blending/Segmenting practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a cat and the word "cat" segmented into 'c', 'a', and 't'. The second row shows three boxes with the letters 'a', 'b', and 'c'. The third row shows three boxes with the letters 'a', 'b', and 'c'. There are two stars on the left side of the card.

AVL 1

Practice

Word Recognition

AVL 1 Word Recognition practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a group of people and the word "people". The second row shows three boxes with the letters 'p', 'e', and 'e'. The third row shows three boxes with the letters 'p', 'e', and 'e'. There are two stars on the left side of the card.

AVL 1

AVL 2 Listen practice card. It features a cartoon character on the left and three rows of images and text. The first row shows a red object and the text "It is red." The second row shows a red object and the text "It is red." The third row shows a lime and the text "Eat the lime." There are two stars on the left side of the card.

AVL 2

AVL 2 Blending/Segmenting practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a red object and the word "red" segmented into 'r', 'e', and 'd'. The second row shows three boxes with the letters 'r', 'e', and 'd'. The third row shows three boxes with the letters 'r', 'e', and 'd'. There are two stars on the left side of the card.

AVL 2

AVL 2 Word Recognition practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a red object and the word "red". The second row shows three boxes with the letters 'r', 'e', and 'd'. The third row shows three boxes with the letters 'r', 'e', and 'd'. There are two stars on the left side of the card.

AVL 2

AVL 3 Listen practice card. It features a cartoon character on the left and three rows of images and text. The first row shows a lime and the text "Eat the lime." The second row shows a red object and the text "It is red." There are two stars on the left side of the card.

AVL 3

AVL 3 Blending/Segmenting practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a lime and the word "lime" segmented into 'l', 'i', 'm', and 'e'. The second row shows three boxes with the letters 'l', 'i', and 'm'. The third row shows three boxes with the letters 'l', 'i', and 'm'. There are two stars on the left side of the card.

AVL 3

AVL 3 Word Recognition practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a lime and the word "lime". The second row shows three boxes with the letters 'l', 'i', and 'm'. The third row shows three boxes with the letters 'l', 'i', and 'm'. There are two stars on the left side of the card.

AVL 3

AVL 4 Listen practice card. It features a cartoon character on the left and three rows of images and text. The first row shows a car and the text "See the cab." The second row shows a beetle and the text "Eat the beet." There are two stars on the left side of the card.

AVL 4

AVL 4 Blending/Segmenting practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a car and the word "cab" segmented into 'c', 'a', and 'b'. The second row shows three boxes with the letters 'c', 'a', and 'b'. The third row shows three boxes with the letters 'c', 'a', and 'b'. There are two stars on the left side of the card.

AVL 4

AVL 4 Word Recognition practice card. It features a cartoon character on the left and a grid of boxes. The first row shows a car and the word "cab". The second row shows three boxes with the letters 'c', 'a', and 'b'. The third row shows three boxes with the letters 'c', 'a', and 'b'. There are two stars on the left side of the card.

AVL 4

Auditory/Visual Support





Full Auditory/Visual Support (Pocket Chart)

Words in Sentences

Syllables

Onset & Rime

Sounds

	See	my	umbrella.)))
	um	brel	la)))
	c	at)))
	c	a	t)))

)))

)))

)))

)))

Visual
Print
Auditory

Reduced Visual Support

See	my	umbrella.)))
um	brel	la)))
c	at)))
c	a	t)))

)))

)))

)))

)))

No Visual
Print
Auditory

Reduced Auditory/Visual Support

See	my	umbrella.	
um	brel	la	
c	at		
c	a	t	

No Visual
Print
No Auditory

APPENDIX E

MORTALITY ANALYSIS

Descriptives

PALSKPRE

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	149	48.97	16.69	1.37	46.27	51.67	8	85
1	294	48.16	23.28	1.36	45.49	50.83	2	92
Total	443	48.43	21.27	1.01	46.45	50.42	2	92

Test of Homogeneity of Variances

PALSKPRE

Levene Statistic	df1	df2	Sig.
33.058	1	441	.000

ANOVA

PALSKPRE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	65.407	1	65.407	.144	.704
Within Groups	199945.38	441	453.391		
Total	200010.79	442			

APPENDIX F

General Linear Model MANCOVA STATISTICS

Between-Subjects Factors

	Value Label	N
group 0	control	64
1	treatment	85

Descriptive Statistics

group	Mean	Std. Deviation	N
PALSKPOS control	84.70	5.44	64
treatment	86.02	4.96	85
Total	85.46	5.20	149
PALS1PRE control	33.23	12.47	64
treatment	37.27	11.60	85
Total	35.54	12.11	149
PALS1POS control	55.66	9.63	64
treatment	60.19	8.41	85
Total	58.24	9.20	149
PALS2PRE control	28.22	10.89	64
treatment	30.75	10.99	85
Total	29.66	10.98	149
PALS2POS control	63.77	11.03	64
treatment	65.66	9.98	85
Total	64.85	10.45	149
SOL3 control	35.80	6.22	64
treatment	34.66	6.06	85
Total	35.15	6.13	149

Multivariate Tests^b

Effect	Value	F	Hypothesis df	Error df	Sig.	
Intercept	Pillai's Trace	.981	1236.117 ^a	6.000	141.000	.000
	Wilks' Lambda	.019	1236.117 ^a	6.000	141.000	.000
	Hotelling's Trace	52.601	1236.117 ^a	6.000	141.000	.000
	Roy's Largest Root	52.601	1236.117 ^a	6.000	141.000	.000
PALSKPRE	Pillai's Trace	.340	12.126 ^a	6.000	141.000	.000
	Wilks' Lambda	.660	12.126 ^a	6.000	141.000	.000
	Hotelling's Trace	.516	12.126 ^a	6.000	141.000	.000
	Roy's Largest Root	.516	12.126 ^a	6.000	141.000	.000
GROUP	Pillai's Trace	.128	3.439 ^a	6.000	141.000	.003
	Wilks' Lambda	.872	3.439 ^a	6.000	141.000	.003
	Hotelling's Trace	.146	3.439 ^a	6.000	141.000	.003
	Roy's Largest Root	.146	3.439 ^a	6.000	141.000	.003

a. Exact statistic

b. Design: Intercept+PALSKPRE+GROUP

Multivariate Tests^c

Effect		Noncent. Parameter	Observed Power ^a
Intercept	Pillai's Trace	7416.702	1.000
	Wilks' Lambda	7416.702	1.000
	Hotelling's Trace	7416.702	1.000
	Roy's Largest Root	7416.702	1.000
PALSKPRE	Pillai's Trace	72.759	1.000
	Wilks' Lambda	72.759	1.000
	Hotelling's Trace	72.759	1.000
	Roy's Largest Root	72.759	1.000
GROUP	Pillai's Trace	20.635	.937
	Wilks' Lambda	20.635	.937
	Hotelling's Trace	20.635	.937
	Roy's Largest Root	20.635	.937

a. Computed using alpha = .05

b. Exact statistic

c. Design: Intercept+PALSKPRE+GROUP

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	PALSKPOS	832.195 ^a	2	416.098	19.208	.000
	PALS1PRE	6876.194 ^b	2	3438.097	33.869	.000
	PALS1POS	2598.199 ^c	2	1299.100	19.095	.000
	PALS2PRE	2183.922 ^d	2	1091.961	10.178	.000
	PALS2POS	1370.597 ^e	2	685.298	6.765	.002
	SOL3	1000.762 ^f	2	500.381	15.993	.000
Intercept	PALSKPOS	94625.071	1	94625.071	4368.087	.000
	PALS1PRE	3953.460	1	3953.460	38.945	.000
	PALS1POS	34538.822	1	34538.822	507.663	.000
	PALS2PRE	5407.826	1	5407.826	50.407	.000
	PALS2POS	48296.315	1	48296.315	476.796	.000
	SOL3	11783.940	1	11783.940	376.633	.000
PALSKPRE	PALSKPOS	768.541	1	768.541	35.477	.000
	PALS1PRE	6281.408	1	6281.408	61.878	.000
	PALS1POS	1848.323	1	1848.323	27.167	.000
	PALS2PRE	1949.450	1	1949.450	18.171	.000
	PALS2POS	1239.737	1	1239.737	12.239	.001
	SOL3	953.476	1	953.476	30.475	.000
GROUP	PALSKPOS	83.135	1	83.135	3.838	.052
	PALS1PRE	764.220	1	764.220	7.528	.007
	PALS1POS	849.031	1	849.031	12.479	.001
	PALS2PRE	293.268	1	293.268	2.734	.100
	PALS2POS	166.036	1	166.036	1.639	.202
	SOL3	31.291	1	31.291	1.000	.319
Error	PALSKPOS	3162.771	146	21.663		
	PALS1PRE	14820.853	146	101.513		
	PALS1POS	9933.103	146	68.035		
	PALS2PRE	15663.299	146	107.283		
	PALS2POS	14788.853	146	101.294		
	SOL3	4567.989	146	31.288		
Total	PALSKPOS	1092111.0	149			
	PALS1PRE	209865.00	149			
	PALS1POS	517952.00	149			
	PALS2PRE	148964.00	149			
	PALS2POS	642698.00	149			
	SOL3	189637.00	149			
Corrected Total	PALSKPOS	3994.966	148			
	PALS1PRE	21697.047	148			
	PALS1POS	12531.302	148			
	PALS2PRE	17847.221	148			
	PALS2POS	16159.450	148			
	SOL3	5568.752	148			

a. R Squared = .208 (Adjusted R Squared = .197)

b. R Squared = .317 (Adjusted R Squared = .308)

c. R Squared = .207 (Adjusted R Squared = .196)

d. R Squared = .122 (Adjusted R Squared = .110)

e. R Squared = .085 (Adjusted R Squared = .072)

f. R Squared = .180 (Adjusted R Squared = .168)

Tests of Between-Subjects Effects

Source	Dependent Variable	Noncent. Parameter	Observed Power ^a
Corrected Model	PALSKPOS	38.416	1.000
	PALS1PRE	67.737	1.000
	PALS1POS	38.189	1.000
	PALS2PRE	20.357	.985
	PALS2POS	13.531	.914
	SOL3	31.986	.999
Intercept	PALSKPOS	4368.087	1.000
	PALS1PRE	38.945	1.000
	PALS1POS	507.663	1.000
	PALS2PRE	50.407	1.000
	PALS2POS	476.796	1.000
	SOL3	376.633	1.000
PALSKPRE	PALSKPOS	35.477	1.000
	PALS1PRE	61.878	1.000
	PALS1POS	27.167	.999
	PALS2PRE	18.171	.989
	PALS2POS	12.239	.935
	SOL3	30.475	1.000
GROUP	PALSKPOS	3.838	.495
	PALS1PRE	7.528	.778
	PALS1POS	12.479	.939
	PALS2PRE	2.734	.376
	PALS2POS	1.639	.246
	SOL3	1.000	.168
Error	PALSKPOS		
	PALS1PRE		
	PALS1POS		
	PALS2PRE		
	PALS2POS		
	SOL3		
Total	PALSKPOS		
	PALS1PRE		
	PALS1POS		
	PALS2PRE		
	PALS2POS		
	SOL3		
Corrected Total	PALSKPOS		
	PALS1PRE		
	PALS1POS		
	PALS2PRE		
	PALS2POS		
	SOL3		

- a. Computed using alpha = .05
- b. R Squared = .208 (Adjusted R Squared = .197)
- c. R Squared = .317 (Adjusted R Squared = .308)
- d. R Squared = .207 (Adjusted R Squared = .196)
- e. R Squared = .122 (Adjusted R Squared = .110)
- f. R Squared = .085 (Adjusted R Squared = .072)
- g. R Squared = .180 (Adjusted R Squared = .168)

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PALS1POS	Intercept	79.411	1.220	65.117	.000	77.001	81.821
	PALSKPRE	.137	.023	5.956	.000	9.133E-02	.182
	[GROUP=0]	-1.510	.771	-1.959	.052	-3.034	1.337E-02
	[GROUP=1]	0 ^b	.	.	.	.	.
PALS1PRE	Intercept	18.367	2.640	6.957	.000	13.150	23.584
	PALSKPRE	.391	.050	7.866	.000	.293	.489
	[GROUP=0]	-4.579	1.669	-2.744	.007	-7.877	-1.281
	[GROUP=1]	0 ^b	.	.	.	.	.
PALS1POS	Intercept	49.934	2.161	23.105	.000	45.663	54.205
	PALSKPRE	.212	.041	5.212	.000	.132	.292
	[GROUP=0]	-4.826	1.366	-3.533	.001	-7.527	-2.126
	[GROUP=1]	0 ^b	.	.	.	.	.
PALS2PRE	Intercept	20.222	2.714	7.451	.000	14.858	25.586
	PALSKPRE	.218	.051	4.263	.000	.117	.319
	[GROUP=0]	-2.837	1.716	-1.653	.100	-6.227	.554
	[GROUP=1]	0 ^b	.	.	.	.	.
PALS2POS	Intercept	57.261	2.637	21.714	.000	52.049	62.473
	PALSKPRE	.174	.050	3.498	.001	7.553E-02	.272
	[GROUP=0]	-2.134	1.667	-1.280	.202	-5.429	1.160
	[GROUP=1]	0 ^b	.	.	.	.	.
SOL3	Intercept	27.294	1.466	18.623	.000	24.397	30.190
	PALSKPRE	.152	.028	5.520	.000	9.774E-02	.207
	[GROUP=0]	.927	.927	1.000	.319	-.905	2.758
	[GROUP=1]	0 ^b	.	.	.	.	.

Parameter Estimates

Dependent Variable	Parameter	Noncent. Parameter	Observed Power ^a
PALSPOS	Intercept	65.117	1.000
	PALSKPRE	5.956	1.000
	[GROUP=0]	1.959	.495
	[GROUP=1]	.	.
PALS1PRE	Intercept	6.957	1.000
	PALSKPRE	7.866	1.000
	[GROUP=0]	2.744	.778
	[GROUP=1]	.	.
PALS1POS	Intercept	23.105	1.000
	PALSKPRE	5.212	.999
	[GROUP=0]	3.533	.939
	[GROUP=1]	.	.
PALS2PRE	Intercept	7.451	1.000
	PALSKPRE	4.263	.989
	[GROUP=0]	1.653	.376
	[GROUP=1]	.	.
PALS2POS	Intercept	21.714	1.000
	PALSKPRE	3.498	.935
	[GROUP=0]	1.280	.246
	[GROUP=1]	.	.
SOL3	Intercept	18.623	1.000
	PALSKPRE	5.520	1.000
	[GROUP=0]	1.000	.168
	[GROUP=1]	.	.

a. Computed using alpha = .05

b. This parameter is set to zero because it is redundant.

Estimated Marginal Means

group

Dependent Variable	group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
PALSKPOS	control	84.595 ^a	.582	83.444	85.745
	treatment	86.105 ^a	.505	85.107	87.103
PALS1PRE	control	32.925 ^a	1.260	30.434	35.415
	treatment	37.504 ^a	1.093	35.343	39.664
PALS1POS	control	55.488 ^a	1.032	53.450	57.527
	treatment	60.315 ^a	.895	58.546	62.084
PALS2PRE	control	28.046 ^a	1.295	25.486	30.606
	treatment	30.883 ^a	1.124	28.662	33.104
PALS2POS	control	63.628 ^a	1.259	61.140	66.116
	treatment	65.762 ^a	1.092	63.604	67.921
SOL3	control	35.676 ^a	.700	34.294	37.059
	treatment	34.750 ^a	.607	33.550	35.949

a. Evaluated at covariates appeared in the model: PALSKPRE = 48.97.

APPENDIX G

Univariate Analysis of Variance

KINDERGARTEN POSTTEST ANALYSIS

Between-Subjects Factors

	Value Label	N
group 0	control	64
1	treatment	85

Descriptive Statistics

Dependent Variable: PALSPOS

group	Mean	Std. Deviation	N
control	84.70	5.44	64
treatment	86.02	4.96	85
Total	85.46	5.20	149

Levene's Test of Equality of Error Variances^a

Dependent Variable: PALSPOS

F	df1	df2	Sig.
.192	1	147	.662

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+PALSPPRE+GROUP

Tests of Between-Subjects Effects

Dependent Variable: PALSPOS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	832.195 ^a	2	416.098	19.208	.000
Intercept	94625.071	1	94625.071	4368.087	.000
PALSPPRE	768.541	1	768.541	35.477	.000
GROUP	83.135	1	83.135	3.838	.052
Error	3162.771	146	21.663		
Total	1092111.0	149			
Corrected Total	3994.966	148			

a. R Squared = .208 (Adjusted R Squared = .197)

APPENDIX H

Univariate Analysis of Variance

GRADE ONE PALS PRETEST

Between-Subjects Factors

	Value Label	N
group 0	control	64
1	treatment	85

Descriptive Statistics

Dependent Variable: PALS1PRE

group	Mean	Std. Deviation	N
control	33.23	12.47	64
treatment	37.27	11.60	85
Total	35.54	12.11	149

Levene's Test of Equality of Error Variances^a

Dependent Variable: PALS1PRE

F	df1	df2	Sig.
3.233	1	147	.074

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+PALSKPRE+GROUP

Tests of Between-Subjects Effects

Dependent Variable: PALS1PRE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6876.194 ^a	2	3438.097	33.869	.000
Intercept	3953.460	1	3953.460	38.945	.000
PALSKPRE	6281.408	1	6281.408	61.878	.000
GROUP	764.220	1	764.220	7.528	.007
Error	14820.853	146	101.513		
Total	209865.00	149			
Corrected Total	21697.047	148			

a. R Squared = .317 (Adjusted R Squared = .308)

APPENDIX I

Univariate Analysis of Variance

GRADE ONE PALS POSTTEST

Between-Subjects Factors

	Value Label	N
group 0	control	64
1	treatment	85

Descriptive Statistics

Dependent Variable: PALS1POS

group	Mean	Std. Deviation	N
control	55.66	9.63	64
treatment	60.19	8.41	85
Total	58.24	9.20	149

Levene's Test of Equality of Error Variances^a

Dependent Variable: PALS1POS

F	df1	df2	Sig.
.036	1	147	.850

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+PALSKPRE+GROUP

Tests of Between-Subjects Effects

Dependent Variable: PALS1POS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2598.199 ^a	2	1299.100	19.095	.000
Intercept	34538.822	1	34538.822	507.663	.000
PALSKPRE	1848.323	1	1848.323	27.167	.000
GROUP	849.031	1	849.031	12.479	.001
Error	9933.103	146	68.035		
Total	517952.00	149			
Corrected Total	12531.302	148			

a. R Squared = .207 (Adjusted R Squared = .196)

APPENDIX J

Univariate Analysis of Variance

GRADE TWO PALS PRETEST

Between-Subjects Factors

	Value Label	N
group 0	control	64
1	treatment	85

Descriptive Statistics

Dependent Variable: PALS2PRE

group	Mean	Std. Deviation	N
control	28.22	10.89	64
treatment	30.75	10.99	85
Total	29.66	10.98	149

Levene's Test of Equality of Error Variances^a

Dependent Variable: PALS2PRE

F	df1	df2	Sig.
.268	1	147	.605

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+PALSKPRE+GROUP

Tests of Between-Subjects Effects

Dependent Variable: PALS2PRE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2183.922 ^a	2	1091.961	10.178	.000
Intercept	5407.826	1	5407.826	50.407	.000
PALSKPRE	1949.450	1	1949.450	18.171	.000
GROUP	293.268	1	293.268	2.734	.100
Error	15663.299	146	107.283		
Total	148964.00	149			
Corrected Total	17847.221	148			

a. R Squared = .122 (Adjusted R Squared = .110)

APPENDIX K

Univariate Analysis of Variance

GRADE TWO PALS POSTTEST

Between-Subjects Factors

	Value Label	N
group 0	control	64
1	treatment	85

Descriptive Statistics

Dependent Variable: PALS2POS

group	Mean	Std. Deviation	N
control	63.77	11.03	64
treatment	65.66	9.98	85
Total	64.85	10.45	149

Levene's Test of Equality of Error Variances^a

Dependent Variable: PALS2POS

F	df1	df2	Sig.
.323	1	147	.571

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+PALSKPRE+GROUP

Tests of Between-Subjects Effects

Dependent Variable: PALS2POS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1370.597 ^a	2	685.298	6.765	.002
Intercept	48296.315	1	48296.315	476.796	.000
PALSKPRE	1239.737	1	1239.737	12.239	.001
GROUP	166.036	1	166.036	1.639	.202
Error	14788.853	146	101.294		
Total	642698.00	149			
Corrected Total	16159.450	148			

a. R Squared = .085 (Adjusted R Squared = .072)

APPENDIX L

Univariate Analysis of Variance

GRADE THREE SOL READING COMPREHENSION ANALYSIS

Between-Subjects Factors

	Value Label	N
group 0	control	64
group 1	treatment	85

Descriptive Statistics

Dependent Variable: SOL3

group	Mean	Std. Deviation	N
control	35.80	6.22	64
treatment	34.66	6.06	85
Total	35.15	6.13	149

Levene's Test of Equality of Error Variances^a

Dependent Variable: SOL3

F	df1	df2	Sig.
.724	1	147	.396

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+PALSKPRE+GROUP

Tests of Between-Subjects Effects

Dependent Variable: SOL3

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1000.762 ^a	2	500.381	15.993	.000
Intercept	11783.940	1	11783.940	376.633	.000
PALSKPRE	953.476	1	953.476	30.475	.000
GROUP	31.291	1	31.291	1.000	.319
Error	4567.989	146	31.288		
Total	189637.00	149			
Corrected Total	5568.752	148			

a. R Squared = .180 (Adjusted R Squared = .168)