The Effect of Early Reading Intervention on Reading Scores of At Risk Kindergarten Students

By Lauren A. Marino

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Abstract

The purpose of this study was to examine the effectiveness of the Early Reading Intervention (ERI) program for enhancing at risk kindergarten students' reading scores. The participants in this study attended a suburban school located in Anne Arundel County, Maryland. All participants received small and whole group instruction from the *Treasures* Language Arts curriculum published by Macmillan/McGraw-Hill. The treatment group also received the Early Reading Intervention (ERI) for 30 minutes a day, beginning in October, 2011 and ending in May, 2012. February and May DIBELS scores for the treatment group were compared to those of a group of On-level and below level students who did not receive ERI. Main analyses compared the groups' mean scores on May (post-intervention) DIBELS and DIBELS gain scores to see if there were any significant differences across the groups. ANOVAs indicated that for the May DIBELS scores, the only significant differences (at the $p<.05$ level) were between the On-level and ERI groups on two DIBELS tests, Letter Naming Fluency (LNF) and Phoneme Segmentation Fluency (PSF). On the LNF subtest, the On-level and ERI groups had mean scores of 58.5 and 38, respectively, and on the PSF subtest scores, the On-level and ERI groups had mean scores of 57.3 and 43.375, respectively. In terms of gain scores, all three groups demonstrated growth on each DIBELS subtest. T-test results indicated that the On-level group's mean gains were significantly greater than zero ($p<.05$) on three DIBELS subtests: LNF (mean gain=7.5, $p<.017$), PSF (mean gain=9.3, $p<.006$), and the Whole Words Read (WWR) portion of Nonsense Word Fluency (NWF) (mean gain= 4.9, $p<.024$). None of the gains for the Non-ERI group were significantly greater than zero, although on average, the Non-ERI group did improve on each subtest. (Non-ERI group mean gains ranged from 8.33 to 13 points). All of the gains for the ERI group were significantly greater than zero ($p<.05$), with mean gains ranging from 7.375

to 16.75 points on the DIBELS subtests. When compared across groups, however, the differences in gains made on DIBELS by each group were not significant. Therefore, it was not clear that ERI was the main cause of the ERI group's growth. It is suggested that future studies include larger, more accurately matched samples and focus on the effectiveness of ERI over a longer period of time.

CHAPTER I

INTRODUCTION

Overview

According to the mandatory kindergarten attendance law, which was established in 1992, all children who reside in Maryland and who will be five years old by September must attend an accredited kindergarten program prior to entering first grade ("Facts for age eligible students," n.d., para. 4). Prior to this time, there were no regulations about the education of young children. This can be attributed in part to the lack of state funding for public preschool programs. Because there are no regulations about a child's education prior to kindergarten, students enter the kindergarten classroom with varying abilities.

Cooke, Kretlow, & Helf (2010) discuss the importance of readiness skills in a child's early school experiences. There is a high correlation between these skills and student success in later grades. Readiness skills include development in physical, motor, socio-emotional, and language abilities. Students also benefit from experience with various approaches to learning, early literacy skills, and having a general understanding of school routines and norms. When children enter kindergarten without these readiness skills, they may have difficulties adjusting to school. Teachers must incorporate instruction in these readiness skills in addition to offering instruction related to content standards. The increasing expectations for what is to be taught in kindergarten have resulted in a continually expanding curriculum for students at that level. When students enter kindergarten with few skills, it becomes very difficult for them to reach a point where they are performing at the same level as peers who are on grade level.

The Maryland Model of School Readiness (MMSR) is an assessment used to determine the school readiness skills of Maryland Kindergarten students (Treakle, 2003). According to 2010-

2011 MMSR results, 81% of kindergarteners were prepared to start school. Although this is a high percentage, 19% represents a significant number of students who were unprepared for the kindergarten curriculum and likely will struggle to catch up with the 81% who were prepared (Maryland State Board of Education, 2009).

Kindergarten curriculum continues to become more advanced, especially as the common core standards are being implemented nationwide. By the end of the kindergarten year, students are expected to be able to decode words and be well on their way to becoming fluent readers. This outcome is very difficult to attain when students enter kindergarten lacking readiness skills. For a child to successfully learn to read, he or she must have significant alphabet knowledge and phonological awareness. Students who lack readiness skills often lack knowledge in these areas and other early literacy skills *(*Irwin, Moore, Tornatore, & Fowler, 2012).

Because alphabet knowledge and phonological awareness are skills that prepare children for later reading success, it is important that students who lack this knowledge and other school readiness skills are identified early in their schooling career. Strong evidence "indicates that children who fall behind in reading acquisition do not catch up" (Irwin, et al., 2012, p. 20). Therefore, many studies support the need for early academic intervention for students who are at risk of experiencing reading difficulties (Bursuck, et al., 2004; Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Cooke, et al. 2010). Investigating reading interventions for kindergarten students can give educators valuable information so as to close the gap between those students who come to school prepared to learn to read and those who lack the readiness skills to do so.

This researcher became interested in exploring the effectiveness of early intervention programs in preparing kindergarten students for success in beginning to read in her role as a

kindergarten teacher. She observed that a significant amount of students entered kindergarten lacking letter and sound knowledge, and wished to learn more about best practice in preparing them to read.

Statement of Problem

Many students enter the classroom with insufficient knowledge of letters and letter sounds. These students also often have insufficient phonological awareness abilities, which are important precursors to the reading process. Lack of knowledge in these areas can result in reading difficulties that have an enormous impact on a child's educational performance, not only in kindergarten but throughout his or her educational future. This study examines the effectiveness of the Early Reading Intervention program for teaching alphabetic knowledge and phonological awareness concepts to kindergarten students, who have modest prior experience with these concepts.

Hypotheses

The following hypotheses were tested to compare DIBELS Next (heretofore referred to as DIBELS) scores over time (which reflect the alphabet knowledge and phonological awareness skills needed to learn to read) for two groups of students identified as low in pre-reading skills. One group received the Early Reading Intervention (with the intention of improving their low letter sound knowledge and phonological awareness) and the other did not. These scores were also compared to those of a comparison group of students who were identified as on grade level (all scored benchmark level on all fall and mid-year DIBELS subtests).

Hypothesis 1:

Compared February DIBELS Subtest Scores across groups

February

ho: mean LNF Feb ERI group = mean LNF Feb Non-ERI group =

mean LNF Feb On-level group

ho: mean PSF Feb ERI group = mean PSF Feb Non-ERI group =

mean PSF Feb On-level group

ho: mean NWF CLS Feb ERI group = mean NWF CLS Feb for Non-ERI group =mean

NWF CLS Feb for On-level group

ho: mean NWF WWR Feb ERI group = mean NWF WWR Feb for Non-ERI group =mean

NWF WWR Feb for On-level group

Hypothesis 2:

Compared May DIBELS Subtest Scores across groups

May

ho: mean LNF May ERI group = mean LNF May Non-ERI group =

mean LNF May On-level group

ho: mean PSF May ERI group = mean PSF May Non-ERI group =

mean PSF May On-level group

ho: mean NWF CLS May ERI group = mean NWF CLS May for Non-ERI group =mean NWF CLS May for On-level group

ho: mean NWF WWR May ERI group = mean NWF WWR May for Non-ERI group =mean NWF WWR May for On-level group

Hypothesis 3:

Compared the gains on each DIBELS subtest for each group to zero

LNF

ho: mean LNF gain Feb-May for ERI group = 0

ho: mean LNF gain Feb-May for Non-ERI group= 0

ho: mean LNF gain Feb-May for On-level group= 0

PSF

ho: mean PSF gain Feb-May for ERI group = 0

ho: mean PSF gain Feb-May for Non-ERI group=0

ho: mean PSF gain Feb-May for On-level group=0

NWF CLS

ho: mean NWF CLS gain Feb-May for ERI group = 0

ho: mean NWF gain Feb-May for Non-ERI group=0

ho: mean NWF gain Feb-May for On-level group=0

NWF WWR

ho: mean NWF WWR gain Feb-May for ERI group = 0

ho: mean NWF gain Feb-May for Non-ERI group=0

ho: mean NWF gain Feb-May for On-level group=0

Hypothesis 4:

Compared the 3 groups' (February to May) gains on each test:

ho1: mean LNF gain for ERI group = mean LNF gain for Non-ERI group= mean LNF gain for On-level group

ho2: mean PSF gain for ERI group = mean PSF gain for Non-ERI group = mean PSF gain Feb-May for On-level group

ho3: mean NWF CLS gain for ERI group = mean NWF gain for Non-ERI group = mean NWF gain for On-level group

ho4: mean NWF WWR gain for ERI group = mean NWF gain for comparison group 1 = mean NWF gain for On-level group

Operational Definitions

The independent variable in the study was **Early Reading Intervention (ERI).** This intervention was designed to improve students' abilities in the area of phonics and phonemic awareness. The complete Early Reading Intervention program, published by Pearson Education, includes 126 daily lessons. Due to time constraints, only the first 100 lessons were completed in

this study. A typical lesson lasted approximately 30 minutes. The first 15 minutes of instruction focused on phonological awareness and alphabetic understanding while the last 15 minutes focused on combining the previously practiced skills with a written component. Each part of the lesson was highly scripted and repetitive. When a new letter or strategy was introduced by the ERI program, it was modeled several times by the instructor. After extensive modeling, the students then practiced the skill in a guided setting. All of the skills built on previously learned skills, so that students could effectively apply knowledge to new concepts. The instructor's script also included various steps to take if students were demonstrating the skill successfully, or if they were having difficulty. A puppet named 'Diz the Dinosaur' helped students to stay engaged. Many activities, especially those that focused on blending and segmenting, were presented as games. Students recorded the written component of lessons in an activity book. (Simmons & Kame'enui, 2003)

ERI lessons were organized into four components. Part one was entitled *Learning Letters and Sounds*. The 42 lessons contained in this section introduced letters m, p, f, c, t, s, d, l, a, o, and r and their corresponding sounds. The phonemic awareness skills of first and last sound isolation in spoken words and pictures were also taught in this section. Part two was entitled *Segmenting, Blending, and Integrating* and included 30 lessons that focused on letters b, i, n, g, and u and their corresponding sounds. The sounds that were learned in this section and the previous section were then used to practice blending and segmenting in part two. Letter tiles were utilized to practice these skills. First and last sound isolation continued to be a focus in section two. Part three was entitled *Reading Words* and included 24 lessons that focused on letters j, w, e, z, h, and y and their corresponding sounds. Part three also included instruction in blending and segmenting two letter, vowel consonant and three letter consonant-vowel-

consonant words. Students applied previous letter sound knowledge to practice reading real words and were introduced to high frequency words with irregular spelling patterns. Part four was entitled *Reading Sentences and Storybooks*. This section contained 30 lessons which focused on combining alphabetic and phonological knowledge learned in previous sections with high frequency word reading to read sentences and decodable readers. Students moved on to blend four letter words in this section. Students were very closely guided through their reading of sentences and decodable books, entitled "Diz Student Storybooks." They sounded out one word at a time in the sentence and then returned to read the whole sentence. Reading was done chorally.

At the completion of each part of the ERI program, the instructor worked with individual students and administered an assessment that evaluated the concepts that were taught in that section. Assessments included an oral and written component. These assessments were contained in the *ERI Assessment Handbook.* In addition, the instructor used components of the DIBELS assessment as a means of progress monitoring throughout each component of the ERI program.

The dependent variable was **student performance on "The Dynamic Indicators of Basic Early Literacy Skills (DIBELS)." DIBELS** is a set of measures used to assess early literacy and reading skills for students from kindergarten through sixth grade" (Good, et al., 2011, p. 1). The purpose for using the DIBELS assessment was to identify students who were at risk for not meeting third grade state reading standards. The beginning of year DIBELS assessment included two components. These components were letter naming fluency and first sound fluency. The midyear assessment included letter naming fluency, first sound fluency, phoneme segmentation fluency, and nonsense word fluency. The end of year DIBELS

assessments included letter naming fluency, phoneme segmentation fluency, and nonsense word fluency. DIBELS was administered to students individually by the kindergarten assistant teacher. Four subtests which were administered in February and May were used for the analyses in this study: Letter Naming Fluency, Phoneme Segmentation Fluency, and Nonsense Word Fluency.

- Letter Naming Fluency (LNF): During this portion of the assessment, students viewed a page of random upper and lowercase letters. The test administrator began by giving the student directions and modeling return sweep while naming letters on the page. The student was given one minute to name as many letters as possible. The total letters read were added and the total was recorded as a numerical score for the student.
- Phoneme Segmentation Fluency (PSF): The test administrator began by reading the directions to the students and completed one practice item before beginning. The administrator then read a word and the student stated all of the sounds he or she heard in the word. The student was awarded one point for each correctly segmented sound. The student was given one minute to complete this portion of the test as well.
- Nonsense Word Fluency (NWF): The test administrator began by reading the directions to the students and completed one practice item before beginning. Students viewed a page of two or three-letter nonsense words, such as 'sut, kiz, and es.' The students were asked either to say each sound they saw in the word, or read the word if they are able. The students received two scores from this portion of the assessment. These scores include the amount of sounds that were correctly read (CLS) and the amount of whole words that were correctly read (WWR). These four subtests reflected student's letter-sound knowledge and phonemic awareness skills. (Dynamic Measurement Group, 2009)

CHAPTER II

REVIEW OF THE LITERATURE

This literature review examines the relationship between the alphabetic principle and phonological awareness and emergent literacy, difficulties in early readers, and components of successful early reading interventions. Section one discusses perspectives on emergent literacy. The second section describes the importance of phonics and phonemic awareness in emergent literacy instruction. Section three explores difficulties students experience in the acquisition of pre-literacy skills. The final section reviews reading interventions for emergent readers.

Individuals must be literate to be successful members of society in the 21st Century. The reading process is a major component in establishing literacy. Learning to read begins as soon as children enter school and emergent literacy skills are acquired by some students before school enrollment. Emerging kindergarten readers primarily focus on skills needed to decode words such as phonemic awareness and phonics. Because the ultimate goal of reading is making meaning from text in later elementary and secondary education, students must read to learn. Emerging readers rely heavily on their knowledge of the alphabetic principle and phonological awareness skills to decode words. If these skills have not been acquired, students may experience much difficulty with reading. Because the alphabetic principle and phonological awareness are intrinsic to beginning readers, it is important to understand how they relate to emergent literacy, how lack of these skills creates difficulties for early readers, and the components of successful early reading interventions. (Graves, Juel, & Graves, 2007)

Perspectives on Emergent Literacy

Emergent literacy focuses on the initial stages of reading and writing for young children. Children cannot actually read or write in the emergent stage of literacy. This stage showcases their first interactions with books and the written word. Lapp and Fisher (2006) summarize the key components in emergent literacy instruction. These components include "book handling, drawing, developing literate spoken and written language, peer and adult interaction to stimulate language, writing, and phonological awareness" (p. 11). There are many different theories related to best practices to assist emergent readers. Lapp and Fisher classify these theories as the maturationist, connectionist, developmentalist, constructivist, and critical views. These views differ in the strategies recommended to provide instruction for emergent readers. The maturationist theory focuses on a child's development and the appropriate time to begin reading instruction. Maturationists believe that children cannot be rushed into the reading process. There is a stage of development when instruction in this area should occur. Connectionists feel that part to whole instruction is the best means of teaching reading. Instruction based on this perspective focuses heavily on learning letters, letter sounds, and spelling patterns. The developmentalist emergent perspective discusses a child's ability to adapt to the formal school setting. These emergent literacy theorists believe that students should be surrounded by a print rich environment very early in their school experience. This perspective emphasizes a whole-to-part perspective on reading instruction and emphasizes continuity between home and school environments. The social constructivist perspective identifies children as being highly capable users of the oral and written language system. Social constructivists hold students to very high standards. The critical perspective finds discrepancies between school institutions and minority populations. This perspective

examines why many children of poverty struggle in the formal school environment. The semiotic perspective focuses on the need for vast resources in education. Oral language, visual imagery, numerical symbols, music, and technology are proposed as components of effective instruction. Although these theories differ, their elements continue to impact reading instruction in today's primary classrooms.

This review of the literature focuses on the significance of two components of emergent literacy, phonological awareness and the alphabetic principle. Phonological awareness skills and knowledge of the alphabetic principle are important pre-literacy skills. Phonological awareness is "…the ability to reflect on units of spoken language smaller than the syllable" (Lapp & Fisher, 2006, p. 8). Lapp and Fisher explain that phonological awareness is not only an important pre-literacy skill, but it is also closely involved in early reading achievement. According to Das, Georgiou, and Janzen (2008), there is a significant positive correlation between phonological awareness abilities among kindergarten students and reading performance in the first two years of schooling. Phonemic awareness is one critical component of phonological awareness. It is the understanding that speech is made up of a series of individual consonants and vowels known as phonemes.

The alphabetic principle focuses on a child's ability to recognize letters and corresponding letter sounds (Armbruster, Lehr, Osborn, & Adler, 2003). The alphabetic principle is related to rapid automatized naming (RAN). RAN "…refers to how quickly an individual can pronounce the names of a set of visually presented highly familiar symbols," such as letters (Georgiou, Parrila, Manolitsis, & Kirby, 2011, p. 6). Students who can identify letters and produce letter sounds quickly and with automaticity will be able to

decode words at a rapid pace. Fluent readers spend little to no time decoding words; therefore they can focus their attention on the meaning that is connected to the text.

Das, et al. (2008) illustrate the necessary tasks that a child must complete to recognize a word. First, a child must recognize all letters in the word. Next, he or she must recognize the sounds associated with the letters or letter combinations. Thirdly, these phonemes, or sounds must be "…stored in working memory in their exact order of presentation" (p. 268). Fourth, the child must blend the phonemes together to form a cohesive depiction of the word. Finally, this depiction must be recognized as a word that the child has included in his or her lexicon, or mental dictionary. The importance of alphabetic knowledge and phonemic awareness clearly is evident in the first four steps of this process. The connection between letters and letter sounds also is apparent in brain research. Jobard, Vigneau, Simon, and Tzourio-Mazoyer (2010) discuss the reading process as it occurs in the brain. Early readers utilize the grapho-phonological route to reading skill acquisition. This involves process involves linking "sublexical orthographic units [or letters] to their phonological counterparts" (Jobard, et al., p. 114). The initial steps in decoding a word involve applying skills related both to the alphabetic principle and phonemic awareness. If a child does not have an understanding of these concepts and how to apply them, he or she most likely will not be able to decode unfamiliar words.

The Importance of Phonics and Phonemic Awareness in Emergent Reading Instruction

Research such as that reported by Cavanaugh, Kim, Wanzek, and Vaughn (2004) suggests that educators should instruct students in the areas of phonics and phonemic awareness because these skills have such strong effects on students' reading progress.

Similarly, Cooke, et al. (2010) state that "…young students' phonemic awareness and phonics skills best predict reading achievement in later grades" (p. 138). Phonics instruction focuses on the alphabetic principle. Armbruster, et al. (2003) suggest that the most effective phonics instruction involves direct instruction of a set of letters and sounds. This direct instruction should follow an appropriate sequence so that students can apply their alphabetic knowledge to actual words. For example, if students are taught the letters m, a, and t, and their corresponding sounds, they then can use this knowledge to blend the sounds in the words mat, at, or am. Studies of early fluent readers also demonstrate the importance of the alphabetic principle. Brenna (2011) discusses the factors that contribute to students' early reading fluency. From a very early age, these readers were encouraged to sound out words they did not know. Parents of students in this study prominently displayed alphabet charts and reviewed them on a regular basis.

Instruction in the area of phonological awareness in kindergarten and first grade classrooms focuses mainly on phonemic awareness concepts. "Effective phonemic awareness instruction teaches children to notice, think about, and work with (manipulate) sounds in spoken language" (Armbruster, et al., 2003, p. 5). Sounds are not attached to the written letter in this area of instruction. Instead, students isolate, identify, categorize, blend, segment, delete, add, and substitute sounds in spoken words. When students isolate and identify sounds, they name the beginning and ending sounds in words. This task can be extended when students categorize sounds. Categorization involves sorting spoken words or pictures by their beginning or ending sounds. Armbruster, et al. explains that when students blend, they listen to a set of sounds and then identify the word the sounds make. For example, a student who successfully can blend can hear a teacher say c – a – t and then say

the corresponding word, ‘cat.’ Segmenting involves separating sounds in a word. If a teacher says the word “cat,” a skilled student could separate the sounds, saying c – a – t. He or also should be able to recognize that there are three sounds in the word cat. Deleting, adding, and substituting sounds in words are activities teachers use to assist students to master these skills. A teacher instructing a student in the area of deletion would ask the student to take the /m/ from the word map. The child then would be able to say ‘ap.’ The reverse task, starting with “ap” would occur for instruction in adding sounds. Substitution of sounds involves changing the beginning consonant of the word, but keeping the ending rime. For example, the teacher might say “cat” and ask the child to change the /c/ in cat to an /s/. The child responds by saying the new word, “sat.”

In addition to instruction in the areas of phonics and phonemic awareness, reading instruction also includes fluency, vocabulary, text comprehension, and writing. Effective vocabulary instruction is highly correlated with success for early readers. If a student immediately understands the meaning of a word, it is easier for him or her to decode, or sound out the word. Acquisition of this skill also contributes to later success in comprehension, or understanding of the text.

Reading instruction teaches children strategies that involve long term and short term working memory. These strategies are a key component of the reading process. For instruction to be effective, it must include “metacognitive information and self regulated use of the strategies being taught” (Pressley & Harris, 2008, p. 89). If students participate in effective phonics and phonemic awareness instruction, they will be prepared to utilize the strategy of blending when they come to an unknown word. If students are applying metacognitive skills, they automatically will begin to sound out the word. They do not need

to take time to think about an appropriate strategy.

Difficulties in the Early Acquisition of Pre-literacy Skills

Research such as that conducted by Jobard, et al. (2010) reveals that the brain processes alphabetic and phonological concepts in different locations than more complex concepts that are utilized by skilled readers. Jobard, et al. state that "reading can rely on different brain activation patterns, even in literate subjects, in a way that reflects their proficiency with written material" (p. 113). As stated previously, lower skilled readers rely on parts of the brain that are related to grapho-phonological processing. This process focuses on letter symbols (grapho) and their corresponding speech sounds (phonological). In comparison to this grapho-phonological route to early literacy instruction, more skilled readers utilize the lexico-semantic route, which involves recognizing whole words in a more automatic manner and attaching meaning to these words. Jobard, et al. refer to the occipital-temporal region as the "Visual Word Form Area" (p. 123). This area is responsible for "…identifying and assembling recognized letters into familiar wholes…" (p.123). Students who have little to no knowledge of letters and letter sounds cannot begin to recognize these letters. Therefore, it is unlikely that they will engage successfully in the beginning steps of reading.

Cavanaugh, et al. (2004) state that because phonological awareness skills and the alphabetic principle are so closely intertwined, students who have difficulties with one of these concepts most likely will have difficulties with the other. Problems in these areas can lead to further struggles with decoding and word recognition. Research such as that reported by Vernon-Feagans, Kainz, Amendum, Ginsberg, Wood, and Bock, 2012, identifies phonological awareness and rapid naming fluency as two significant difficulties among

struggling readers Georgiou, et al. (2011) state that "children with deficits in both phonological awareness and RAN are poorer readers than children with single deficits in either phonological awareness or RAN" (p. 6), emphasizing the impact combined difficulties can have on a young reader. Das, et al. (2008) go further into detail to describe how the underlying problem for these young readers lies in their ability to sequence letters in a word and then words in a sentence. Reed (2008) affirms that if children have deficits in letters, sounds, and phonological awareness, they are "not likely to crack the code of printed words and become proficient readers" (p. 36). Armbruster, et al. (2003) emphasize the enormous long- term effect reading failure has on a child. It not only affects a student's performance later in school, but also negatively impacts his or her self-esteem and enthusiasm for learning.

For the appropriate processes to occur in the brain that will lead to development of successful reading skills, teachers need to instruct students in strategies for reading words. Children must utilize procedural knowledge and declarative knowledge to decode words. Procedural knowledge occurs when a child is blending sounds to read a word. Declarative knowledge involves the memorization of letters and their corresponding letter sounds. For students to utilize each type of knowledge, they need to engage long term and short term memory. Ultimately, alphabetic knowledge must be entered into a child's long term memory so that it can be accessed immediately when sounding out words. Working memory is utilized when a child is manipulating information, such as remembering a sequence of letter sounds and blending them together. This is a key component to the reading process. Pressley & Harris (2008) state that "…some people's working memories seem to be greater in capacity, with smaller working memory associated with a variety of learning and language

disorders" (p.78). At risk students also may be negatively impacted by a small working memory. While some information is automatically accessed from a person's working memory, other information can be activated strategically based on the task at hand. Skilled readers are able to activate strategically the information in their working memory that will help them to decode an unknown word, or link meaning to a word that is read. Activating this information involves the use of memory strategies. Research such as that reported by Pressley & Harris, suggests that "with advancing age, [the ability to] recall information improve[s] as [does] use of a particular memory strategy" (p. 78). When a young child's working memory is compared to their older counterpart, it appears to be limited. This is due to "… the fact that internal cognitive operations are performed more slowly by younger compared to older children, with slower operations consuming more working memory capacity to execute"(p. 80). Therefore, it is likely that prekindergarten and kindergarten students have little experience with memory strategies.

PASS, an approach to intelligence proposed by Das, et al., (2008) relates to one's understanding of memory and strategy use in early readers. PASS stands for planning, attention, simultaneous processing, and successive processing. Planning involves a child's ability to develop and carry out an appropriate strategy. Attention entails a child's ability to focus on only relevant information. Simultaneous processing is a child's ability to look at ideas and information as a whole, while successive processing involves sequencing the information in appropriate order. Das, et al. state that this approach can be observed in skilled readers, while struggling readers have deficits in one or more components of PASS.

Reading Interventions for Emergent Readers

It is imperative that children who are at risk because of their difficulties with reading are identified early in their educational experience. Studies such as those reported by Irwin, et al., 2012, suggest that "children who fall behind in reading at seven years of age continued to lag behind at age twelve and beyond" (p. 20). This trend has come to be known as the Matthew effect. Georgiou, et al. (2011) supports the mantra that "the best intervention is early prevention" (p. 6). If a child can be identified as at risk early in his or her school experience, intervention can combat the Matthew effect. RAN assessments along with other variables can identify children who are in need of early intervention as young as the age of three.

Cavanaugh, et al. (2004) stress the importance of kindergarten intervention for students who are at risk of having reading difficulties. Intervention should focus on building phonemic awareness skills. In addition to these skills, intervention also should incorporate alphabet knowledge, concepts about print, early word-level skills, and expressive vocabulary. Because highly skilled readers demonstrate effective problem solving strategies when reading texts, it also may be beneficial to focus on developing these strategies in intervention programs (Brenna, 2011). The PASS model may help to guide instruction in problem solving strategies that could be utilized when reading. Pressley & Harris (2008) suggest that even though young children often enter school with little experience with memory strategies, these strategies can be taught.

The remaining interventions are characterized as tier two or tier three interventions. Tiered reading instruction stems from the Response to Intervention program. The goal of

this program is to identify students who are not benefiting from instruction in the general education setting and find the best method of intervention for these students (Fuchs & Fuchs, 2006). Tiers relate to student performance on the Dynamic Indicators of Basic Early Literacy Skills (DIBELS), which is an assessment that identifies students who possibly will be at risk for reading difficulties (Good, et al., 2011). Tier two interventions are appropriate for students who are identified as needing strategic support. These students perform slightly below the benchmark score. Tier three interventions are appropriate for students who are identified as needing intensive support. These students perform significantly below the benchmark score (Cooke, et al., 2010).

Simmons, et al. (2011*)* provide evidence that ERI, Early Reading Intervention may be more effective than typical intervention practices currently found in schools. ERI is a tier two intervention program. It includes 126 daily lessons. The lessons last for approximately 30 minutes. The first 15 minutes of instruction focus on phonological awareness and alphabetic knowledge while the second 15 minutes incorporate writing and spelling with phonological and alphabetic skills previously learned. Approximately 18 elementary schools in Anne Arundel County Public Schools in Maryland utilize ERI as a means of intervention for at risk kindergarten students. Simmons, et al. (2011) find that although students in both intervention settings demonstrate growth, students in the ERI program "produce a stronger response than the typical practice intervention in particular for [below level students]" (p. 221).

Early Reading Tutor is a tier two intervention that focuses on phonemic awareness, explicit phonics, passage reading, and fluency skills taught in kindergarten and first grade.

(Cooke, et al., 2010) Reading Mastery Classic I is a tier three intervention that teaches phonemic awareness, phonics, word attack skills, and comprehension strategies. The comprehension component of this intervention makes it unique to many other early reading interventions. Cooke, et al. performed a study to assess the effectiveness of these intervention programs when they are administered in the beginning of the year as compared to mid-year. The results of the study suggest that instruction that begins in the initial months of the year is more beneficial than instruction that starts mid-year.

The Targeted Reading Intervention (TRI) program also proves to be effective when used with kindergarten and first grade students. This intervention is administered for fifteen minutes each day, four days a week, in a one-on-one setting and instructs students in word identification strategies, decoding, and fluency within words and text. One of the reasons for the TRI's effectiveness is one-on-one administration by a trained and highly qualified classroom teacher. Although this type of instructional delivery provides the most differentiation to meet students' needs, it may not be feasible for some schools to implement due to constraints related to time and staffing (Vernon-Feagans, et al., 2012)

Current interventions also may rely on the use of technology. Lapp & Fisher (2006) discuss the results from one study in which preschoolers with disabilities utilized graphics and story making software. These students demonstrated improvement in communication and other emergent literacy skills. The use of interventions involving technology has become more accessible because iPads, laptops, and computers are utilized in increasing numbers in today's schools as a means of instruction and intervention.

Intervention programs that yield the best results are completed in a small group

instructional format, are completed at least two to three times per week for 15 to 30 minutes, last for eight to ten weeks, and are implemented by a trained instructor (Cavanaugh et al., 2004). Explicit instruction, scaffolding, a brisk pace, the use of choral and individual response, and simple, direct language also aid in student success (Cooke, et al., 2010). Effective reading interventions focus on each child as an individual. A child's processing deficits should be identified and remediation should then focus on these specific areas (Das, et al., 2008).

Summary

The alphabetic principle and phonological awareness are crucial components to reading success. Deficits in reading are tied closely to deficits in these concepts. For a child to become a fluent reader, effective instruction in the alphabetic principle and phonological awareness must be present. Students who are at risk of experiencing reading difficulties should be identified as soon as possible. Effective interventions can help these students to overcome deficits in alphabetic and phonological knowledge and enable the students to master the reading process.

CHAPTER III

METHODS

The purpose of this study was to determine the effectiveness of the Early Reading Intervention (ERI) program for improving reading skills when it is utilized as a means of intervention with students who enter kindergarten below grade level.

Design

This was a pretest-posttest control group quasi-experimental study. The DIBELS assessment was given as a pre-test. Post test scores were compared for the group of students received ERI, a group of below level students who did not receive ERI, and a group of students achieving on level at the time of the pretest who also did not receive ERI.

Participants

Participants were selected from 41 kindergarten students from two self-contained classes at a suburban school in Anne Arundel County, Maryland. A purposive sample was selected from these 41 kindergarten students. The sample was organized into three groups. Group One was the experimental group, Group Two was the first comparison group, and Group Three was the second comparison group.

Group One, the experimental group, consisted of eight students who received the Early Reading Intervention from September through June. This group of five to six year old students included five boys and three girls. These students were identified as at risk through beginning and mid-year DIBELS results. Beginning of the year DIBELS results were used when determining which students received the ERI intervention. Students who received the ERI intervention scored at the “intensive” or “strategic” level on the first sound fluency or letter naming fluency DIBELS subtests on the beginning of the year DIBELS assessment. In addition

to DIBELS results, teacher observation and student academic history were taken into account when deciding which students were appropriate for ERI.

The mid-year test was significant because it tested different skills than those measured by the initial test. Although some students who were identified as “intensive” or “strategic” were no longer identified as at risk in February, they continued to receive the intervention. The school reading teacher advised that all students should remain in the intervention for the duration of the school year.

To have a basis for deciding if the gains of the ERI group were meaningful, two comparison groups were developed. Group Two was the first comparison group. This group was the most similar to the treatment group and contained three students who were identified as below grade level on the fall or mid-year DIBELS but who were not provided the ERI intervention, although two students from this group met the benchmark on the fall DIBELS. This group of five to six year old students included one boy and two girls. These students scored at the “strategic” level on one or more DIBELS subtests. They received whole group and small group Language Arts instruction in the classroom, (as did all students in the study, but did not receive the specific ERI intervention). Although these students were identified as likely to need strategic support, kindergarten and reading teachers felt that they would make sufficient growth with regular classroom instruction.

The second comparison group was Group Three. This group consisted of 10 students who were randomly selected from the pool of students who were identified as on grade level, having scored at benchmark on all fall and mid-year DIBELS subtests. This group of five to six year olds consisted of six girls and four boys.

The spring DIBELS scores for the three groups were compared to determine if they differed

among the groups that were or were not identified as weak in skills and who did or did not receive the ERI intervention.

Instrument

The DIBELS assessment was the instrument used in the study. This assessment can be given to students in grades K through 3. In Anne Arundel County, it is administered only to students in grades K through 2. The goal of DIBELS is to identify and monitor the progress of students who are unlikely to meet state reading standards in third grade. Three benchmark assessments are administered to students throughout the year: beginning of the year, mid-year, and end of year. In addition, students who are identified as "at risk" may complete progress-monitoring assessments throughout the school year. (Dynamic Measurement Group, 2009)

The DIBELS beginning of the year subtest differs from the mid and end of year subtests. Scores result in labels of *core* (those who score at or above the designated benchmark score and are unlikely to need additional support outside regular classroom instruction), *strategic* (those who score below the benchmark and are likely to need strategic support) and *intensive* (those who score well below the designated benchmark for each subtest).

Shanahan (2012) examined the various parts of the DIBELS test to evaluate its reliability and validity. He states that when looking at the components of the DIBELS assessment, the First Sound Fluency (FSF), Letter Name Fluency (LNF), Phonemic Segmentation Fluency (PSF), and Nonsense Word Fluency (NWF) measures all demonstrated remarkable levels of reliability. Similarly, these tests presented strong predictive and concurrent validity evidence when compared to measures such as the Woodcock-Johnson Reading Tests. The average concurrent validity coefficients (correlations with other measures taken at the same time) were .58 for NWF, .44 for PSF, and .55 for FSF. The predictive validity coefficients were .47 for PSF, .53 for FSF,

and .68 for NWF. No data were found concerning the reliability or validity of the instructional groupings that result from the DIBELS assessment (Brunsman & Shanahan, 2003).

Procedure

The DIBELS assessment was administered to students in mid-September. After results were calculated, kindergarten teachers analyzed data and selected eight students who were identified as “intensive” or “strategic” in the first sound fluency and/or letter naming fluency subsections of the test. The researcher determined that Early Reading Intervention (ERI) would be an effective means of intervention for these students as a result of DIBELS results, school history, and teacher observation of readiness skills. Students who had no school experience prior to kindergarten may not have been selected to receive ERI so as to give these students more time to build school readiness skills in the regular classroom setting. In addition, some students who scored at the “strategic” level, but demonstrated attentiveness and effective learning abilities were not referred to receive ERI.

Students were divided into two small groups which received ERI, each containing four students. The ERI groups were led by the kindergarten assistant, who was trained in the ERI program. Having the same instructor provide the intervention for both groups along with the scripted nature of the ERI program ensured consistency in the treatment received by the groups. One group of students met with the kindergarten assistant from 9:00-9:30 a.m. and the second group met from 1:00-1:30 p.m. Grouping of the students was based on compatibility and patterns of attendance. For example, certain students were more distracting to one another and particular students were frequently late to school, making it evident that they would not receive the most effective instruction in the morning. The kindergarten assistant took students to an empty classroom for ERI instruction. Students sat around a kidney shaped table throughout the

lesson. Students received the intervention on a daily basis, with the exception of snow days or changes in schedule due to school day delays, from October through the end of May.

The kindergarten assistant began with Part One of the ERI program and ended with lesson 100 of 126 (which is in Part Four). Students did not complete Part Four entirely, due to time constraints. The DIBELS test was given to students in February 2012 and again in May 2012 to monitor student progress.

The spring DIBELS scores of students who received ERI were compared with those of a group of below level students who did not receive the intervention and those of a group of students who were on grade level in the fall. Students in all three groups participated in general language arts instruction in the classroom setting which included whole and small group instruction in the areas of phonics and phonemic awareness. Both kindergarten teachers followed the McGraw Hill *Treasures* reading series for their language arts curriculum. The Treasures program for kindergarten students includes instruction in the areas of listening and reading comprehension, phonics, phonemic awareness, grammar and writing. The majority of phonics and phonemic awareness instruction occurred in a homogeneous small group setting and involved the introduction of approximately four to five letters and sounds over a three week period. After introducing these sounds, students practiced blending them to read words using magnetic letters and also applied this knowledge when reading decodable books. Segmenting was introduced mid-year. Focus on initial, medial, and final sound isolation also was practiced in the *Treasures* program. (August, et al., 2011)

CHAPTER IV

RESULTS

The purpose of this study was to determine the effectiveness of the Early Reading Intervention (ERI) program for improving reading skills when it is utilized as a means of intervention with students who enter kindergarten below grade level. Results of the study are presented below.

Hypotheses 1 and 2

Hypotheses 1 and 2 were established to compare the mean DIBELS scores on the four subtests across the three groups in February and May. Of the groups, one received ERI and two did not. One of the groups that did not receive ERI was on grade level, while the other was below level.

Prior to comparing the groups' May (mean post intervention) scores, their February DIBELS scores were compared to determine if the groups began with significant differences on the four February DIBELS subtests (LNF, PSF, NWF CLS, and NWF WWR).

February ANOVA Results

Results of the one-way ANOVAs comparing February DIBELS results are reported below in Tables 1-3. Multiple comparisons (Table 3) indicated that only the following mean scores differed significantly ($p<.05$): scores for the on level and ERI groups on the LNF, PSF and CLS subtests. (The On-level and ERI groups had mean scores of 51 and 21.25, respectively, on the LNF subtest and mean scores of 48 and 26.88, respectively, on the PSF subtest and mean scores of 34.7 and 15.63, respectively, on the CLS subtest.) The three groups' mean scores did not differ significantly on the February WWR subtest.

Table 1

February Descriptive Statistics for

(DIBELS subtests: LNF, PSF, NWF CLS, NWF WWR)

Test/Group		N	Mean	s.d.	Std. Error	95% Confidence Interval for Mean		Range
						Lower Bound	Upper Bound	
February LNF	On Level	10	51.000	8.000	2.530	45.277	56.723	39-60
	Non- ERI	3	35.333	19.732	11.392	-13.683	84.349	22-58
	ERI	8	21.2500	14.099	4.985	9.463	33.037	4-43
	Total	21	37.429	18.296	3.993	29.100	45.757	4-60
February PSF	On Level	10	48.000	6.218	1.966	43.551	52.448	40-56
	Non- ERI	3	34.000	16.643	9.609	-7.344	75.344	15-46
	ERI	8	26.875	11.946	4.223	16.888	36.862	9-41
	Total	21	37.952	14.034	3.062	31.564	44.341	9-56
February NWF CLS	On Level	10	34.700	12.157	3.844	26.004	43.397	20-53
	Non- ERI	3	19.000	5.196	3.000	6.092	31.908	16-25
	ERI	8	15.625	8.700	3.076	8.351	22.899	5-34
	Total	21	25.191	13.537	2.954	19.028	31.353	5-53
February NWF WWR	On Level	10	5.400	7.291	2.306	.185	10.616	0-17
	Non- ERI	3	.000	.000	.000	.000	.000	0-0
	ERI	8	.000	.000	.000	.000	.000	0-0
	Total	21	2.571	5.618	1.226	.014	5.129	.000

Table 2

ANOVA Results Comparing February DIBELS Subtest Means

		Sum of Squares	df	Mean Square	F	Sig.
February LNF	Between Groups	3948.976	2	1974.488	12.942	.000
	Within Groups	2746.167	18	152.565		
	Total	6695.143	20			
February PSF	Between Groups	2038.077	2	1019.039	9.650	.001
	Within Groups	1900.875	18	105.604		
	Total	3938.952	20			

February NWF CLS	Between Groups	1751.263	2	875.632	8.235	.003
	Within Groups	1913.975	18	106.332		
	Total	3665.238	20			
February NWF WWR	Between Groups	152.743	2	76.371	2.874	.083
	Within Groups	478.400	18	26.578		
	Total	631.143	20			

Table 3

Multiple Comparisons of February DIBELS Scores

Scheffe							
Dependent Variable	Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
FebruaryLNF	On Level	Non-ERI	15.667	8.131	.185	-6.013	37.346
		ERI	29.750*	5.859	.000	14.128	45.372
	Non-ERI	ERI	14.083	8.362	.268	-8.213	36.379
FebruaryPSF	On Level	Non-ERI	14.000	6.765	.146	-4.037	32.037
		ERI	21.125*	4.875	.002	8.128	34.122
	Non-ERI	ERI	7.125	6.957	.601	-11.425	25.675
FebruaryNWF CLS	On Level	Non-ERI	15.700	6.788	.096	-2.399	33.798
		ERI	19.075*	4.891	.004	6.033	32.117
	Non- ERI	ERI	3.375	6.981	.890	-15.239	21.989
FebruaryNWF WWR	On Level	Non-ERI	5.400	3.394	.306	-3.649	14.449
		ERI	5.400	2.445	.116	-1.120	11.920
	Non- ERI	ERI	.000	3.490	1.000	-9.306	9.306

* The mean difference is significant at the 0.05 level.
The group sizes are unequal. The harmonic mean of the group sizes (5.373) is used. Type I error levels are not guaranteed.

May ANOVA Results

Results of the one-way ANOVAs comparing May DIBELS results are reported in Tables 4-6. Multiple comparisons (Table 6) indicated that only the scores for On-level and ERI groups

on the LNF and PSF subtests differed significantly (p<.05). (On-level and ERI group had mean LNF subtest scores of 58.5 and 38, respectively and mean PSF subtest scores of 57.3 and 43.375 respectively.) None of the three groups' scores differed significantly on the May CLS or WWR subtests. Notably, none of the subtest scores for the below grade level group which did not receive ERI (the "Non-ERI" group) differed significantly from either the On-level or the ERI group. As in February, their scores fell between those of the On-level and ERI group on the LNF, PSF and CLS subtests. In February, the Non-ERI group and ERI group both scored zero on the WWR test. In May, the Non-ERI group's mean score (8.333) and was slightly (but not statistically significantly) higher than the ERI group's mean (7.375).

Table 4

May Descriptive Statistics and ANOVA Results Comparing Group Means

(DIBELS Four Subtests: LNF, PSF, NWF CLS, NWF WWR)

Test/Group		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Range
						Lower Bound	Upper Bound	
May LNF	On Level	10	58.500	13.151	4.159	49.093	67.908	38-80
	Non-ERI	3	48.333	19.035	10.990	1.048	95.619	30-68
	ERI	8	38.000	10.529	3.723	29.198	46.802	23-51
	Total	21	49.238	15.697	3.425	42.093	56.383	23-80
May PSF	On Level	10	57.300	6.413	2.028	52.713	61.887	46-69
	Non-ERI	3	46.667	6.658	3.844	30.127	63.207	41-54
	ERI	8	43.375	13.700	4.844	31.921	54.829	17-58
	Total	21	50.476	11.588	2.529	45.202	55.751	17-69
May NWF CLS	On Level	10	38.900	11.571	3.659	30.623	47.177	24-65

	Non-ERI	3	29.000	14.177	8.185	-6.218	64.219	18-45
	ERI	8	27.625	10.183	3.600	19.112	36.138	10-42
	Total	21	33.191	12.164	2.654	27.654	38.727	10-65
May NWF WWR	On Level	10	10.300	6.800	2.150	5.436	15.164	0-22
	Non-ERI	3	8.333	5.859	3.383	-6.222	22.889	4-15
	ERI	8	7.375	4.069	1.438	3.974	10.776	1-12
	Total	21	8.905	5.656	1.234	6.330	11.479	0-22

Table 5

ANOVA Results Comparing May DIBELS Subtest Means

		Sum of Squares	df	Mean Square	F	Sig.
MayLNF	Between Groups	1870.643	2	935.321	5.507	.014
	Within Groups	3057.167	18	169.843		
	Total	4927.810	20			
May PSF	Between Groups	912.596	2	456.298	4.633	.024
	Within Groups	1772.642	18	98.480		
	Total	2685.238	20			
May NWF CLS	Between Groups	626.463	2	313.232	2.417	.118
	Within Groups	2332.775	18	129.599		
	Total	2959.238	20			
May NWF WWR	Between Groups	39.168	2	19.584	.587	.566
	Within Groups	600.642	18	33.369		
	Total	639.810	20			

Table 6

Multiple Comparisons of May DIBELS Scores

Scheffe							
Dependent Variable	**Group**	**Group**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	Upper Bound
May LNF	On Level	Non-ERI	10.167	8.579	.509	-12.707	33.041
		ERI	20.500*	6.182	.014	4.018	36.983
	Non-ERI	ERI	10.333	8.823	.516	-13.191	33.858
May PSF	On Level	Non-ERI	10.633	6.533	.291	-6.785	28.051
		ERI	13.925*	4.707	.028	1.374	26.476
	Non-ERI	ERI	3.292	6.718	.888	-14.622	21.205
May NWF CLS	On Level	Non-ERI	9.900	7.494	.434	-10.081	29.881
		ERI	11.275	5.400	.142	-3.123	25.673
	Non-ERI	ERI	1.375	7.707	.984	-19.174	21.924
May NWF WWR	On Level	Non-ERI	1.967	3.803	.876	-8.172	12.106
		ERI	2.925	2.740	.576	-4.381	10.231
	Non-ERI	ERI	.958	3.910	.970	-9.469	11.386

* The mean difference is significant at the 0.05 level.
The group sizes are unequal. The harmonic mean of the group sizes (5.373) is used. Type I error levels are not guaranteed.

Hypothesis 3

Evaluation of Gain Scores' Significance

The next major hypotheses of interest were developed to determine whether any of the groups' gains on any of the DIBELS tests from February to May were significant. One sample T-tests were computed to determine if any of the groups' gains differed significantly from zero. Those results are reported in Tables 7-12 and described below for each group.

Gain Scores for the On-level Group

The one-sample T-test results in Table 7 indicate that the mean gains for the On-level group ranged from 4.2-9.3 points on the subtests. Results in Table 8 indicate that the On-level group's mean gains were significantly greater than zero ($p<.05$) on three subtests: the LNF subtest (mean gain=7.5, $p<.017$), the PSF subtest (mean gain=9.3, $p<.006$), and the WWR subtest (mean gain= 4.9, $p<.024$).

Table 7

Descriptive Statistics for On-level Group's Gains

On-level	N	Mean	Std. Deviation	Std. Error Mean
GAIN LNF	10	7.500	8.086	2.557
GAIN PSF	10	9.300	8.138	2.574
GAIN CLS	10	4.200	12.891	4.076
GAIN WWR	10	4.900	5.744	1.816

Table 8

On-level Gain Scores Compared to Zero (One sample T-test results)

On-level	t	df	Sig. (2-tailed) (p)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
GAIN LNF	2.933	9	.017	7.500	1.715	13.285
GAIN PSF	3.614	9	.006	9.300	3.478	15.122
GAIN CLS	1.030	9	.330	4.200	-5.022	13.422
GAIN WWR	2.698	9	.024	4.900	.791	9.009

Gain Scores for the Non-ERI Group

Tables 9 and 10 (below) depict the results of the one sample T-tests for the Non-ERI group's gain scores. Results in Table 10 indicate that none of the gains for the Non-ERI group were significantly greater than zero, although on average, the Non-ERI group did improve on each subtest (gains ranged from 8.33 to 13 points, see Table 9).

Table 9

Descriptive Statistics for Non-ERI Group's Gains

Non-ERI	N	Mean	Std. Deviation	Std. Error Mean
GAIN LNF	3	13.000	10.817	6.245
GAIN PSF	3	12.667	11.719	6.766
GAIN CLS	3	10.000	9.165	5.292
GAIN WWR	3	8.333	5.859	3.383

Table 10

Non- ERI Gain Scores Compared to Zero (One sample T-test results)

Non-ERI	t	df	Sig. (2-tailed) (p)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
GAIN LNF	2.082	2	.173	13.000	-13.870	39.870
GAIN PSF	1.872	2	.202	12.667	-16.445	41.778
GAIN CLS	1.890	2	.199	10.000	-12.768	32.768
GAIN WWR	2.463	2	.133	8.333	-6.222	22.889

Gain Scores for the ERI Group

Tables 11 and 12 respectively depict the descriptive statistics and results of the one sample T-tests for ERI group's gain scores. Results in Table 12 indicate that all of the gains for the ERI group were significantly greater than zero ($p<.05$), and on average, like the Non-ERI comparison group, which started out below the on level group but which did not receive the ERI intervention, the ERI group improved on each subtest, with gains ranging from 7.375 to 16.75 points.

Table 11

Descriptive Statistics for ERI Group's Gains

One-Sample Statistics[a]				
ERI group	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
GAIN LNF	8	16.750	13.594	4.806
GAIN PSF	8	16.500	11.964	4.230
GAIN CLS	8	12.000	12.884	4.555
GAIN WWR	8	7.375	4.069	1.438

Table 12

ERI Group's Gain Scores Compared to Zero (One sample T-test results)

ERI Group	**t**	**df**	**Sig. (2-tailed) (p)**	**Mean Difference**	**95% Confidence Interval of the Difference**	
					Lower	Upper
GAIN LNF	3.485	7	.010	16.750	5.386	28.115
GAIN PSF	3.901	7	.006	16.500	6.498	26.502
GAIN CLS	2.634	7	.034	12.000	1.229	22.771
GAIN WWR	5.127	7	.001	7.375	3.974	10.776

Hypothesis 4

Comparison of the Groups' Gains on the DIBELS Subtests

Finally, the three groups' gain scores on each DIBELS subtest were compared to determine whether any group gained significantly more or less than the other groups on each subtest. Descriptive statistics regarding these gains are presented below in Table 13 and indicate all groups made positive mean gains on all subtests. ANOVA results comparing the three groups' gains on each subtest are presented in Table 14. These indicate that there were no statistically significant differences in the three groups' gains on any of the DIBELS subtests.

Table 13

Descriptive Statistics for All Groups' Gains on the DIBELS Subtests

Gains (May-February scores)		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Range
						Lower Bound	Upper Bound	
GAIN LNF	On Level	10	7.500	8.086	2.557	1.715	13.285	-1-21
	Non-ERI	3	13.000	10.817	6.245	-13.870	39.870	4-25
	ERI	8	16.750	13.594	4.806	5.386	28.115	1-45
	Total	21	11.810	11.183	2.440	6.719	16.900	-1-45
GAIN PSF	On Level	10	9.300	8.138	2.574	3.478	15.122	-2-24
	Non-ERI	3	12.667	11.7189	6.766	-16.445	41.778	4-26
	ERI	8	16.500	11.964	4.230	6.498	26.502	-2-35
	Total	21	12.524	10.255	2.238	7.856	17.192	-2-35
GAIN CLS	On Level	10	4.200	12.891	4.076	-5.022	13.422	-18-23
	Non-ERI	3	10.000	9.165	5.292	-12.768	32.768	2-20
	ERI	8	12.000	12.884	4.555	1.229	22.771	-6-37
	Total	21	8.000	12.470	2.721	2.324	13.676	-18-37
GAIN WWR	On Level	10	4.900	5.744	1.816	.791	9.009	-4-13
	Non-ERI	3	8.333	5.859	3.383	-6.222	22.889	4-15
	ERI	8	7.375	4.069	1.438	3.974	10.776	1-12
	Total	21	6.333	5.112	1.116	4.006	8.660	-4-15

Table 14

ANOVA Results comparing Group Gains on DIBELS Subtests

		Sum of Squares	df	Mean Square	F	Sig.
GAIN LNF	Between Groups	385.238	2	192.619	1.639	.222
	Within Groups	2116.000	18	117.556		
	Total	2501.238	20			
GAIN PSF	Between Groups	230.471	2	115.236	1.108	.352
	Within Groups	1872.767	18	104.043		
	Total	2103.238	20			
GAIN CLS	Between Groups	284.400	2	142.200	.906	.422
	Within Groups	2825.600	18	156.978		
	Total	3110.000	20			
GAIN WWR	Between Groups	41.225	2	20.612	.771	.477
	Within Groups	481.442	18	26.747		
	Total	522.667	20			

CHAPTER V

DISCUSSION

The purpose of this study was to determine the effectiveness of the Early Reading Intervention (ERI) program for improving reading skills when it is utilized as a means of intervention with students who enter kindergarten below grade level.

Four null hypotheses were developed for this study. Hypothesis one was established to compare the mean DIBELS scores on the four subtests across the three groups in February. This hypothesis stated that the February mean subtest scores would not differ significantly across the three groups. One-way ANOVAs were used to test hypothesis one. Results of these ANOVAs indicated that mean scores of the On-level and ERI groups differed significantly on the LNF, PSF, and CLS subtests in February so the hypothesis that all groups started out with statistically equivalent scores on all four DIBELS tests was rejected. The February On-level group's mean scores were significantly higher than the ERI group's scores. This is not surprising because the ERI group was identified early in the year as reading below level. It was for this reason that these students received the ERI intervention. The ERI group came to kindergarten with far fewer readiness skills than the On-level group. The Non-ERI group's mean scores did not differ significantly from those of the ERI or On-level group because they entered kindergarten with slightly more skills than the ERI group, but were not quite as prepared as the On-level group. This affirms the reason why these students were not selected to receive ERI. The three groups' mean scores did not differ significantly on the February WWR subtest. The mean scores on this subtest were low and ranged from 0-5.4. These results likely relate to the limited emphasis on nonsense and real word reading in the beginning months of school. The blending process remains difficult for many students at this time.

Hypothesis two was established to compare the mean DIBELS scores on the four subtests across the three groups in May, after the ERI group had participated in the intervention since October. Results of the one-way ANOVAs comparing May DIBELS results indicated that the scores for On-level and ERI groups differed significantly on the LNF and PSF subtests, so hypothesis two, that the groups' May DIBELS scores on each subtest would be equal, was rejected for the LNF and PSF tests. Although the ERI group's scores on the LNF and PSF subtests did increase from February to May, the On-level group still scored significantly higher on these subtests than the ERI group. Because ERI students were very far behind in February, it was unlikely for them to improve enough to match the On-level students' scores. However, the results indicated that the ERI group's scores did not differ significantly from the Non-ERI group or On-level group on the CLS or WWR subtests. These subtests demonstrate students' abilities to quickly identify letter sounds and blend sounds to read words, which are essential tasks for a beginning reader. The ERI group's blending abilities improved so that they were achieving at a level that did not differ significantly from that of the On-level group and Non-ERI group, so hypothesis two was retained for the CLS and WWR subtests.

Hypothesis three was established to determine whether any of the groups' gains on the DIBELS subtests, which were given in February and May, were significant. One-sample T-tests were run to see if any of the groups' gains were significantly greater than zero. All gains were positive. Results indicated that the mean gains for the On-level group were significantly greater than zero on LNF, PSF, and WWR subtests. Mean gains were not significant for the On-level group in the CLS subtest. Although the Non-ERI group's scores did improve on each subtest, its gains were not significantly greater than zero on any subtest. The ERI group's gains, however, were significantly greater than zero for each subtest. These results indicated the null hypothesis

that all of the gains would equal zero should be rejected for the On-level and ERI groups, but accepted for the below level group that did not receive ERI as none of its gains were statistically significant.

Hypothesis four was developed to compare the three groups ‘gain scores on each DIBELS subtest with one another to determine whether any group gained significantly more or less than the other groups on each subtest. The null hypothesis stated that the gains across groups would not differ significantly. ANOVA results supported these hypotheses and indicated that there were no statistically significant differences in the three groups’ gains on any of the DIBELS subtests.

Implications of Results

Results from this study support the need for early identification of students who are at-risk for experiencing reading difficulties. Students who received ERI were identified early in the year as at risk of performing below level. The findings indicate that all students demonstrated growth in their abilities to identify letters, letter sounds, segment, and blend sounds and the ERI group made larger gains than a similar group of students who did not receive ERI. This growth may be attributed to the ERI program; however, because all groups demonstrated growth, it is not clear that ERI was the most effective method of instruction for at- risk students. All students participated in daily *Treasures* whole group and small group instruction that focused on key pre-reading skills. This instruction also could have played a large role in the growth of the ERI students. Because parental support at home also was strongly encouraged, this support may have influenced student growth. Student maturity and growth also may have contributed to increased performance.

The results regarding hypothesis two are notable. These findings indicated that student

performance on the May CLS and WWR subtests did not differ significantly across groups. February WWR results did not differ significantly across groups because all scores were very low. This portion of the DIBELS test assesses a student's ability to read nonsense words and is believed to be a valuable predictor of a student's reading ability. The fact that all of the students were performing similarly on this subtest (WWR) in May is very encouraging for the ERI students and supports the benefit of early intervention with at risk students as the ERI group appeared to keep up with the On-level group. Again, because all students made gains in this area, the researcher cannot be certain that ERI was the main reason for this growth in student achievement. Additionally, hypothesis four indicated that student gains in all groups were not statistically different, confirming that the ERI group did not make gains that were much greater than other student groups. Many instructional and non-instructional factors could have contributed to student growth in this area.

Although this study failed to prove conclusively the effectiveness of ERI, it does suggest that at-risk students should be identified early in the school year and closely monitored as the year progresses. Results from the study also support the need for and benefit of intervention with these students.

Theoretical Consequences of the Research

Although the results of this study suggest that ERI may have contributed to the growth of students' pre-reading skills, one cannot be certain that ERI was the only or largest contributor to this growth. Therefore, the focus school might consider continuing the use of the ERI program as an intervention for at-risk students. It may also continue to utilize DIBELS and other assessments to identify at-risk students early in their schooling experience. In the future, if other intervention programs become available, the school may choose to test these programs to

determine if they prove to be more effective with at risk students. Also, this study suggests that educators should make informed and careful decisions when deciding if ERI or another intervention is best for a student. Regular classroom instruction may prove to be effective in improving student performance, as was the case with the group of below level students who did not receive the ERI intervention.

Threats to Validity

Major threats to validity throughout this study include sample type and size, limitations of the testing instrument, time frame, and teaching methods. The experimental (ERI) group was selected because they were identified as at-risk students at the beginning of the year and therefore were candidates for the ERI intervention. The comparison group of students who were identified as below level by beginning or mid-year DIBELS but did not receive the intervention was a very small group of students. If this group had been larger and slightly more similar to the experimental group, the results may have been more conclusive. In addition, the overall sample size was small. A more ideal sample would include multiple schools across Anne Arundel County Public Schools and include more varied demographic groups.

The testing instrument, DIBELS, also provided some limitations to the validity of the study. Because the beginning of the year test differs significantly from the mid and end of year test, student scores could not be compared over a yearlong time-span. The ERI intervention began during the month of October, so it is highly likely that students in the experimental group gained a significant amount of knowledge from October to February.

In addition, much growth occurs for most students between the start of kindergarten in August and February. This study also would be more effective if it were continued over a two-to-three year time span. First graders do not have the opportunity to receive formal reading

intervention as they did in kindergarten; therefore, many students who demonstrated substantial growth in pre-reading skills in kindergarten may fail to continue to make a satisfactory level of progress in first grade and beyond. It would be helpful for educators to learn if ERI has a positive impact on students in the long term, or if its positive effects are limited to the kindergarten level.

In this study, students involved in ERI were instructed by the teaching assistant, who was trained in using the ERI program and has a degree in teaching. However, the assistant did not plan instruction lessons or instruct students in a whole group setting. If ERI had been implemented by a classroom or reading teacher, the intervention may have produced different results.

Connections to Previous Studies / Existing Literature

In contrast to the present study, research by Irwin, et al., 2012 finds that early intervention for at risk students is necessary for these students' success in later grades. In the present study, all students demonstrated growth and in some cases, the group receiving intervention did not demonstrate growth that was significantly more than the groups which did not receive the intervention. Irwin, et al. focused on interventions that are associated with the Response to Intervention model. In this model, interventions are tiered to meet the needs of students based on their level of need for support. ERI is characterized as a tier two intervention in the Response to Intervention model.

Simmons, et al. (2011) performed a similar study which compared the use of ERI with other typical practice interventions that were not as specific or formalized. Simmons, et al. produced similar results to the present study in that students in both ERI and the typical practice intervention programs demonstrated significant growth; however, students in the ERI program

consistently demonstrated larger gains that comparison groups.

Vernon-Feagans, et al. (2012) support the need for early intervention in the areas of phonics and phonemic awareness. Vernon-Feagans, et al. find that "young struggling readers could gain significantly from individualized instruction from the classroom teacher with the help of ongoing consultation by a literacy specialist" (p. 111). These researchers utilized the Targeted Reading Intervention in their study. This intervention differs from ERI because it is administered in a one-on-one setting by a classroom teacher.

Implications for Future Research

Studies such as those reported by Irwin, et al. (2012) discuss the "Matthew effect." According to this effect, if students are identified as at-risk early in their education, but don't receive support, they will continue to be at-risk throughout the majority of their schooling. However, if students receive intervention early in their school career, immediately after being identified as at-risk, there is a greater likelihood that they may catch up to their On-level peers.

Future studies of the ERI program may support this concept by following students who have received intervention over a period of several years. It would be helpful for educators to learn if these students continue to progress and attain ability levels comparable to those of their on-grade level peers, or if they continue to struggle with the reading process.

Anne Arundel County Public Schools may want to perform similar system-wide studies with additional interventions that are available and compare the findings from those studies to those from this study.

Conclusions/Summary

Although this study did not prove conclusively the effectiveness of the ERI intervention, it does suggest that early identification of at-risk students is a valuable practice in the kindergarten

classroom. Additionally, this study illustrated patterns of growth across student groups. This growth is positive and suggests that effective instruction was taking place in the focus school. It also showcases the importance of emphasizing phonemic awareness and phonics concepts to promote growth in basic reading skills in beginning readers.

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