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**Research-based Early Literacy Interventions or Teacher-Created Early Literacy
Interventions: Action Research on Letter Sound Fluency**

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An Action Research Project Presented
in Partial Fulfillment of the Requirements
For the Degree of Master Teacher Leader
Northwestern College

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Table of Contents

Abstract.....	4
Introduction.....	5
Review of the Literature.....	8
Response to Intervention Framework.....	9
Tier 1.....	10
Tier 2.....	10
Tier 3.....	10
Special Education.....	11
Emotional Behavioral Disorders and Reading.....	12
At-Risk Students.....	13
Components of Reading.....	13
Automaticity and Fluency.....	15
Early Literacy Foundations.....	15
Conclusion.....	17
Methods.....	18
Participants.....	18
Intervention.....	18

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Measures & Data.....20

IRB Application or Exemption.....20

Data Collection.....21

Results.....,22

 Data Analysis.....22

 Findings.....24

 Limitations of the Study.....25

 Further Study.....25

Conclusion.....26

References.....27

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Abstract

The purpose of this action research project was to determine if research-based early literacy interventions are more effective than teacher-created early literacy interventions with special education students on letter identification and letter sound recognition. Before the interventions began the students were given the Foundational Skills Survey in Letter Identification and Letter Sound Recognition by Really Great Reading. This score was the baseline for the reported data. For eight weeks the researcher instructed the students using a research-based reading intervention from Really Great Reading's Countdown focused on letter identification and letter sound recognition. This was done in addition to the general classroom instruction in those two areas. Another teacher instructed special education students on letter identification and letter sound recognition using a teacher-created intervention. This was done in addition to the general classroom instruction in letter identification and letter sound recognition. Data was collected through end-of-the-week assessments over letters and sounds. A post-test was given to determine the total number of upper and lower case letters that the students could identify and the total number of letter sounds the students could produce.

Keywords: reading intervention, special education, letter sound recognition, letter identification

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Research-based vs. Teacher Created Early Literacy Interventions in Letter-Sound Fluency

Research-based early literacy interventions increase student knowledge in letter identification and letter sounds more than teacher-created interventions. Reading interventions that are provided to students in primary grades proclaim higher average impacts on reading outcomes than interventions that began for students in higher grades (Wanzek et al., 2010). Research shows that students with low levels of reading achievement continue to be students who require assistance throughout their academic careers (Wanzek et al., 2010). Substantial research in beginning reading has documented that providing intensive, early reading interventions can produce significant improvement in reading outcomes for most students, reducing the performance gap between struggling readers and their higher performing peers (Austin et al., 2017). Research-based reading interventions improve literacy skills in Kindergarten through First Grade students more than non-research based reading interventions (Austin et al., 2017). The variables that are noted for intervention success are length of the interventions, duration of the interventions, and the size of intervention groups (Wanzek et al., 2010). Primary grades are the target for early literacy interventions (Wanzek et al., 2018). Reading difficulties and future special education services can possibly be prevented if students are provided an early reading intervention (Wanzek et al., 2018). Research shows that students who have reading difficulties in primary grades continue to have reading difficulties throughout their academic careers (Wanzek et al., 2018). Students in special education are at a higher risk for dropping out of school, unemployment, or being incarcerated (Austin et al., 2017). Students who fail to make growth in reading skills require supplementary reading interventions (Austin et al., 2017). Research shows that 20% to 25% of students in special education do not make adequate growth from reading interventions that are provided in schools (Fuchs & Fuchs, 2015).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Teacher-created interventions are interventions that educators have made to improve student progress without having a guided research base (Ryder et al., 2007). Classroom data (assessments, rubrics, observations) assists the teacher in organizing and selecting what student needs need met. In evidence-based reading interventions data supports the growth that they are effective to improve early literacy skills (Wanzek et al., 2018).

Response to Intervention (RtI) is a key term in education. RtI in reading is an instructional framework that assists schools to provide the type of intervention students with academic risks are required (Simmons et al., 2013). RtI was authorized in 2004 with the Individuals with Disabilities Education Improvement Act [IDEIA] to determine levels of direct instruction students need to have success in reading (Kerins et al., 2010). RtI can provide comprehensive classroom instruction, screening of all students to identify at-risk readers, implement research-based interventions for students who require additional support, and raise the level of support for students who do not respond to interventions (Simmons, et al., 2013).

There are three levels of the RtI process. Tier 1 is high-quality, evidence-based, classroom instruction that all students receive (Koutsoftas et al., 2009). Tier 2 has many components such as screening all students three times per year and implementing core reading instruction that is research-based and student data driven (Wanzek & Cavanaugh, 2012). Students who do not respond to the level of intervention received in Tier 2 are referred to Tier 3. Tier 3 is provided to students who continue to be unresponsive to the intervention after Tier 2 guidance. Tier 3 interventions are constructed of intense, explicit instruction that is given to students for longer lengths of time in small groups or one-on-one with a specialized educator (Wanzek & Cavanaugh, 2012). Determination of special education services relies on the growth or unresponsiveness in Tier 3. Elementary RtI models in reading provide a research base

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

for interventions. The interventions assist educators in identifying students that are at a high-risk for reading difficulties (Wanzek & Cavanaugh, 2012). The RtI model offers multiple tiers of instruction provided in the general education setting that integrates general education resources with special education interventions (Wanzek & Cavanaugh, 2012). Early reading interventions consistently display the effectiveness in improving student outcomes in early literacy skills in phonemic awareness, decoding, and word recognition by explicit, gradual instruction of letter-sound manipulation, letter-sound correspondence, and the use of sound awareness to decode text (Wanzek & Cavanaugh, 2012). Progress monitoring is valuable and necessary for the educator to view the degree of progress during the intervention (Koutsoftas, 2009).

Students need to develop strong reading skills in early grades or they will likely continue to have difficulty with reading throughout school (Wanzek et al., 2018). Reading difficulties and special education services can be prevented if students are emerged in early reading interventions (Wanzek et al., 2018). Reading difficulties include, but are not limited to phonological awareness, rapid naming, fluency, and an understanding of the alphabetic principal (Austin, et al., 2017). The National Center on Intensive Intervention state by increasing intervention time, duration, and the size of the group, the outcome of intensifying instruction aligns with multi-tiered intervention levels (Wanzek et al., 2018).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Review of the Literature

Research-based early literacy interventions increase student knowledge in letter identification and letter sounds more than teacher-created interventions. Intervention studies provide evidence that phonemic awareness, understanding the alphabetic principle, and decoding are teachable (Simmons et al., 2007). Research shows that students with low levels of reading achievement continue to be students who require assistance throughout their academic careers. Substantial research in beginning reading has documented that providing intensive, early reading interventions can produce significant improvement in reading outcomes for most students, reducing the performance gap between struggling readers and their higher performing peers (Austin et al., 2017). There are reading interventions for all areas of reading discrepancies: letter-naming, phonological awareness, sight words, fluency, and comprehension. The variables for interventions include length of the interventions, duration of the interventions, and the size of the intervention groups. Research-based reading interventions improve literacy skills in Kindergarten through First Grade students more than teacher created reading interventions (Austin et al., 2017). Supplemental reading instruction that includes phonemic awareness, understanding the alphabetic principal, and decoding strategies are an important focus in early literacy programs (Simmons et al., 2007). Research states that some students do not make adequate growth while being provided explicit reading interventions (Austin et al., 2017). Classroom data (assessments, rubrics, observations) assists the teacher in organizing and selecting what student needs are top priority for interventions. Evidence-based reading interventions rely on data that supports the needs of the student (Casey, et al., 2011). The response to intervention (RtI) is a tool to begin the process of reading remediation (Casey et al., 2011).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Response to Intervention Framework

In 2004 the Individuals with Disabilities Education Act reauthorized the implementation of interventions for students struggling academically called response to intervention (RtI) (Koutsoftas et al., 2009). Response to intervention is a Multi-Tiered System of Support (MTSS). Response to intervention (RtI) in the area of reading is an instructional structure that allows schools to provide interventions at students' level and need (Simmons et al., 2013). The goal of RtI is to identify students who are not academically making gains in regular education curriculum and provide individualized, intense interventions that are aligned to curricular goals. In the past students were identified for special education services with an IQ assessment to view discrepancies between the stated student and peers (Koutsoftas et al., 2009). This process of finding discrepancies between IQ and academic achievement typically are not large enough to determine if special education services are needed until the second grade (Kerins et al., 2010). By this time an impression of academic failure had been made which makes it more difficult for students to acquire the early skills they need to be successful in reading (Kerins et al., 2010). RtI is a design of deciding if students respond to scientific, research-based interventions instead of special education assessments (Kerins et al., 2010). More than 70% of elementary schools use RtI or a similar version in the area of reading (Simmons et al., 2013). RtI has an organized format with three tiers of interventions. Common features include: providing high-quality classroom instruction, screening all students to identify students with reading issues, implementing research-based interventions for students who need assistance, and raising the level of support for students who do not respond to the intense interventions (Simmons et al., 2013).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Tier 1

The tier one intervention piece is made up of high-quality, research-based classroom instruction that teaches students to learn how to read (Koutsoftas et al., 2009). The entire class benefits from teacher led instruction in reading during core reading time. Student progress monitoring is important in this tier to see the discrepancies between students as it allows schools to evaluate individual student achievement and the quality of instruction (Kerins et al., 2010).

Tier 2

The second tier consists of assessing and identifying students who have not responded to classroom interventions in tier one (Kerins et al., 2010). In this tier each student who does not show growth is assessed and a baseline of their abilities is measured. They are followed closely to see if they are responsive to more intense, focused intervention (Kerins et al., 2010). Often reading specialists, special education teachers, and speech-language pathologists provide the intervention due to their specialized education in phonemic awareness and reading interventions (Kerins et al., 2010).

Tier 3

Tier three is the most intense form of the RtI process. It is designed for students who are unresponsive to tier one and two efforts (Kerins et al., 2010). Students are often referred for special education services in or at the end of this tier (Kerins et al., 2010). The data from tier one and tier two are vital to display the significance of the unresponsiveness and to begin the special education process by diagnosticians (Kerins et al., 2010). Following the assessments of the diagnosticians an eligibility determination for special education services is made (Kerins et al., 2010).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Special Education

Research shows that students who have extreme reading problems in early elementary grades are likely to continue to have difficulties in reading throughout their academic career (Austin et al., 2017). Students in special education are at a higher risk for dropping out of school, unemployment, or being incarcerated (Austin et al., 2017). Research shows that 20% to 25% of students in special education do not make adequate growth from reading interventions that are provided in schools (Fuchs & Fuchs, 2015). Students in special education receive tier 3 RtI interventions daily by a special educator. The interventions are aligned with their Individualized Education Plan (IEP) to meet the student's individual academic or behavioral needs.

Wanzek and Cavanaugh studied elementary teachers and the supplemental reading interventions they used for students with reading difficulties who were in the general education classroom. There is not an overabundance of data about school implementations of supplemental reading interventions. RtI recommends interventions are intensive, systematic, and provided to a small group of students (Wanzek & Cavanaugh, 2013). The researchers studied results for the time spent in interventions, the group size, and who provided the interventions. The study shows that 74% of classrooms have students who received interventions in the classroom, 50% received interventions outside of the classroom. 60% of students received published intervention programs for reading difficulties and 57% of teachers stated they used reteaching of skills or homework as the intervention program (Wanzek & Cavanaugh, 2013). The study shows information on the levels of interventions that students with reading difficulties receive in the general education classroom. The study showed that time spent in the classroom, the group size,

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

and who provided the interventions are in line with recommendations from the Institute of Educational Sciences in regards to intervention implementation (Wanzek & Cavanaugh, 2013).

Students in special education require intense, authentic reading instruction. Students who receive a tier three intervention in the RtI process need to be in small groups or one-on-one with a special education teacher (Wanzek & Cavanaugh, 2013). As stated in the study by Wanzek & Cavanaugh the amount of time for the intervention, the frequency, duration, and group size along with the students instructional need and the use of data are used to make instructional decisions for the student.

Emotional Behavioral Disorders and Reading

There is evidence that problematic behavior and academic difficulties are connected in students with emotional and behavioral disorders (Oakes et al., 2010). Researchers found that teachers provide less instruction to disruptive students, therefore they are omitted from the rigor of interventions and instruction due to being removed from the classroom (Lane et al., 2002). This can become a habit of task-avoidance strategies by the student. Disruptive behavior can derive from factors such as mental illness, poverty, lack of positive role models, and reading difficulties that lead to removal from classrooms (Lane et al., 2002). Students who are unresponsive to instruction and interventions are missing key components of high-quality reading instruction: phonemic awareness, phonics, comprehension, vocabulary, and fluency (Oakes et al., 2010). For the majority of readers, the five components of high-quality reading instruction are learned without difficulty. Practice in the classroom with peers is essential for mastering the skills (Oakes et al., 2010). Students with behavioral issues are not engaged in reading instruction that is found to be a predictor of negative behavior and reading problems (Oakes et al., 2010).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

At-Risk Students

The term “at-risk” is any identified student who needs additional support and who is not meeting or not expecting to meet the established goals of the educational program (academic, personal/social, career/vocational). At-risk students include but are not limited to students in the following groups: homeless children and youth, dropouts, returning dropouts, and potential dropouts. Factors that contribute to students being at-risk include poverty, cultural or linguistic diversity, educational expectations, and education level of family members (Musti-Rao & Cartledge, 2007). Students who are risk for reading disabilities are also included (Musti-Rao & Cartledge, 2007). Children who are immersed with stories, have been read to, and exposed to literature at young ages have less problems in reading. Literacy-rich environments give children exposure and enjoyment to words. Children who come from impoverished homes become at-risk students who need explicit, intense, systematic interventions and instruction to be successful in reading (Musti-Rao & Cartledge, 2007). Programs that offer alphabetic code and phonological awareness interventions help students improve word-reading skills at a faster pace than programs without those components (Musti-Rao & Cartledge, 2007).

Components of Reading Skills

Proficient reading is related to academic success. Students must learn the foundational literacy skills for their reading development (Paige et al., 2017). A balanced literacy program that contains phonological awareness, language development, and comprehension is important for students to learn foundational literacy skills (Menziez et al., 2008). Researchers discovered four areas of importance for students learning to read.

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

The first area is Theoretical Framework. This subskill is quick recognition of letter naming and letter-sound correspondences. The subskill also includes mastery of letter name knowledge and the ability to isolate and manipulate phonemes, and intense instruction in letter-sound correspondence that leads to reading and spelling (Paige et al., 2017).

The second subskill is Letter Name Knowledge (LNK). To build a foundation of letter names students need opportunities in early childhood to encounter the language of the alphabet. LNK is a foundation of reading skills that Kindergarten students are emerged in (Paige et al., 2017). LNK requires students to name upper and lower case letters of the alphabet and progresses toward a goal for students to find the connection that printed letters represent the sounds in speech, a concept named alphabetic principle (Paige et al., 2017). LNK leads to other important skills in reading. Invented spelling is a skill that uses processes that activate reading fluency and is a predictor of reading achievement (Paige et al., 2017).

The third subskill is Phonological Awareness. Students who know that words have sounds understand phonemes (Paige et al., 2017). The development of phonological awareness is a continuum that begins large and moves to small units of sounds that are produced in words (Paige et al., 2017). Phonological awareness includes isolating sounds, manipulating sounds, recognizing onset and rime, and understanding that phonemes produce sounds (Paige et al., 2017).

The fourth subskill is Spelling Knowledge. The beginning phase is invented spelling that researchers state is the component of spelling (Paige et al., 2017). As reading development advances students use the knowledge of phonology and orthography to spell words (Paige et al., 2017). Early elementary educators analyze student spelling to have insight into their orthographic knowledge and beginning components of the reading process (Paige et al., 2017).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

There are five stages of Spelling Knowledge: preliterate, letter name, within-word, syllable juncture, and derivational constancy (Paige et al., 2017).

The sixth and final subskill is Learning to Read. Matching sounds to letters and understanding the relationship of these units is the foundation for beginning reading (Paige et al., 2017). Understanding letter-sound correspondences, identifying letters, and letter combinations are areas that beginning readers need to access for positive results in reading (Paige et al., 2017).

Automaticity & Fluency

An education goal for elementary students is the development of fluency and automaticity in reading skills (Schwanenflugel et al., 2006). The National Institute for Child Health and Human Development states that fluent reading is the ability to read quickly, accurately, and expressively when oral language is included (Schwanenflugel et al., 2006). Fluency begins as students learn letters and sounds. Being fluent is not only considered when reading text, as students need to be fluent in letter naming and sounds (Schwanenflugel et al., 2006). Automaticity is the ability to begin a task without attending to it. Automaticity develops as students become fluent in reading areas. Schwanenflugel found seven specific tasks and assessments related to fluency and are described in research as tasks to assess the automaticity component of reading.

Early Literacy Foundations

Rapid-naming objects is an assessment used to measure how quickly a child can name a series of pictures. It gives an indication of how fast students can name numbers, colors, letters, and noun objects and is a beginning predictor of reading and fluency skills (Schwanenflugel et al., 2006). Rapid-naming objects is the predecessor to nonsense word or non-word reading.

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

The skill to name nonsense words or non-words is a gauge of student's understanding between letters, sounds, and phonemes. Non-word reading speed is considered an indicator of automaticity in the areas of phonics and blending sounds together to make words (Schwanenflugel et al., 2006). The next skill is word recognition and is considered a core skill that reading fluency is based on and it is important for reading comprehension (Schwanenflugel et al., 2006). High-frequency words are named at a faster rate than low-frequency words. Teachers use different strategies to teach the words to students in early elementary grades (Schwanenflugel et al., 2006).

Orthographic processing tests student's knowledge of visual spelling patterns to see if they are consistent in word-reading skills and phonological processing. Students with reading difficulties use this skill to see spelling patterns instead of using phonics skills which are often not developed (Schwanenflugel et al., 2006). Orthographic processing assists in the skill of text reading fluency. Text reading fluency is often used to have children read a passage aloud while the teacher tracks the number of words read that are correct and errors that the student makes. Researchers' ultimate goal in promoting text reading fluency is for readers to gain automaticity when reading print (Schwanenflugel et al., 2006). The Stroop task is an assessment of automaticity in early childhood students (Schwanenflugel et al., 2006). The student names a color or picture while not acknowledging a printed word. Eventually the student will complete the naming of the object while reading the word (Schwanenflugel et al., 2006). A study linked the Stroop interference to reading development. Implications of the research showed that not only words were processed automatically but letter units also (Schwanenflugel et al., 2006).

Comprehension was one of the final skills to be assessed and studied in students and could be simple or more inferential after reading a text. The ability to answer questions about a

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

text is a factor between students who comprehend what they have read versus students who do not comprehend what they read (Schwanenflugel et al., 2006). There are many components to being a fluent and automatic reader. Compiling early reading skills scaffolds the skills required to become a fluent and automatic reader for students who are given high-quality reading instruction or interventions (Schwanenflugel et al., 2006).

Conclusion

A study conducted by O'Connor, Fulmer, Harty, and Bell exhibits a layered approach to a reading intervention in kindergarten through third grade. The layers of the study were professional development and direct intervention. Over four years of study in research-based reading instruction and interventions shows that students who receive intense and researched programs make gains in reading (O'Connor et al., 2005). Early intervention is essential for at-risk reading students to learn the understandings of sounds in words and the print of those words (O'Connor et al., 2005). Teachers were provided professional development that included modeling, implementation guidance, planning and explanation of new strategies, and continual feedback during the study (O'Connor et al., 2005). The researchers' goal was to identify if research-based instruction and interventions reduced reading difficulties for students in early elementary school. With continual professional development and progress monitoring for 4 years, the teachers and researchers could analyze data and make adjustments as needed for the students. The study is a synopsis of the importance of early intervention in reading for students with reading difficulties. Research proves that implementing scientifically based reading instruction and interventions that include phonemic awareness, phonics, fluency, vocabulary, and comprehension raise students' reading progress and lessen reading disabilities (O'Connor et al., 2005).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Methods

Participants

Participants of the action research project were first-grade students in two multi-categorical special education classrooms in a rural elementary school in Southern Iowa. Classroom A had seven students, 3 boys and 4 girls. Classroom B had five students, 3 boys, and 2 girls. Classroom A had one male student who was African-American and Classroom B had one male student who was Latino. The students had been in special education since pre-school or Kindergarten. They were identified for learning disabilities prior to qualifying for special education services.

Intervention

Students were assessed weekly for 8 weeks on Letter Identification (LI) and Letter Sound (LS) recognition. Classroom A's teacher intervened with an intervention which was a research-based early literacy reading intervention program. Classroom B's teacher used an intervention created by her that focused on letter identification and letter sounds. Prior to the interventions each student was given a diagnostic assessment, foundational skills survey to determine which skills the students needed to acquire to become a reader. The assessment was given to students one-on-one assessing letter identification and letter-sound correspondence.

Classroom A: Research-Based Intervention

Teacher A used a research-based intervention that began with concepts and vocabulary such as one-to-one correspondence, first-next-last, same and different, and whole-part. This intervention was taught through fun, colorful instruction that used words and pictures that were familiar to the participants. When students understood the concepts, the teacher moved on to the

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

next phase of the intervention which was rhyming and phonemic awareness. Recognizing that there was a relationship between letters and sounds was important for the decoding process.

The research-based intervention began by the teacher launching the program on a Promethean Board. The program had a script which followed along with the pictures, letters, and eventually words on the screen. The intervention used an “I Do, We Do, You Do” structure when the teacher introduced a new concept (I Do), offers and gives support as the students began to develop the skill (We Do), and then allowed the students who had mastered the concept to practice it (You Do). This structure let the teacher scaffold phonemic awareness and phonics concepts and skills, that lead to reading. If students did not understand a concept or skill the teacher could assess that quickly and review the lesson again as a small group or pull a student one-on-one to review the missing concept or skill.

The students were instructed with the research-based intervention daily for 15 minutes in small groups of two or three students. Each Friday the students were progress monitored over letter identification and letter sound recognition by the teacher who showed the student a letter card. The student responded and the total number correct for each assessment was put into an Excel spreadsheet which was graphed. At the end of the intervention students were given a post-test on letter identification and letter sound recognition to determine growth from the beginning of the intervention.

Classroom B: Teacher-Created Intervention

The teacher-created early literacy intervention was made by Teacher B and consisted of letter mats, tile letters, and printed pictures aligned with the letters of the alphabet. On day one of each week, students were give a letter mat that contained the uppercase and lowercase letters

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

and three labeled pictures that began with the corresponding letter sound. Students repeated the sound of the letter and would say the picture names after the teacher. On day two the students participated in an oral activity for fluency. The students repeated the sounds and words as instructed by the teacher. Day three consisted of students giving examples of items that began with the letter chosen. This was completed after the teacher reviewed the letter and sound of the week. On day four the students were given six pictures with labels and the first letter was omitted. They worked with a partner and reviewed the pictures and shared with their partner what letter was missing on each picture. A letter sound assessment was given over instructed letters and sounds on day five. The teacher showed letter cards of the alphabet and the student responded with a letter name and sound. Teacher B gave the data to Teacher A who input the data into an Excel spreadsheet and graph. At the end of eight weeks the students were given a post-test on letter identification and letter sound recognition.

Measurement & Data

The collected data of student scores on upper and lower case letter identification (x out of 26) and letter sound recognition (x out of 26) was measured by a Two-Sample t-Test for independent or correlated samples. A t-Test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups, in this study Classroom A and Classroom B. The numbers calculated (t-value) illustrate the difference between the two group means being compared and estimates the likelihood that this difference is purely chance (p-value).

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

IRB Approval or Exemption

The research was conducted in an established or commonly accepted educational setting and involved normal education practices which included: special education instructional strategies, progress monitoring, research on instructional techniques and interventions. The research did not adversely impact student learning and teacher assessment. This allowed the special education teachers to conduct research and continue the learning process with students in their designated special education classrooms. The data was used at conferences with parents to show growth or areas of need.

Data Collection

Students were assessed weekly on letter identification and letter-sound recognition. The teacher met with each student one-on-one in a quiet classroom. The teacher had a list of the letters of the alphabet with two corresponding columns, one for letter identification and one for letter-sound recognition. The first assessment was of letter identification of letters. The cards were in random order and were showed one at a time to the student. The student would name the letter, if it was correct the teacher marked a “+” next to the corresponding letter on the list, if it was not correct the teacher left it blank. The same technique was used for letter sound recognition. At the end of the assessment the teacher indicated at the bottom of the page the number of correct letters that were identified and the correct number of sounds that were recognized by the student.

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Results**Data Analysis**

Student's Pre-Test scores were represented by blue bars in Figure 1 on Letter Identification. The orange bars represented the students' Post-Test scores on Letter Identification. The second graph showed scores from the teacher-created intervention on Letter Identification with blue bars representing students' Pre-Test scores and orange bars representing students' Post-Test scores. Students made growth on letter identification in both interventions.

Figure 1*Letter Identification Pre and Post Assessment Scores*

An independent groups t-test revealed that there was not a statistically significant difference in research-based interventions of Letter Identification ($M = 9.71$, $SD = 7.39$, $n = 7$) as compared to teacher-created interventions in Letter Identification ($M = 8.20$, $SD = 5.26$, $n = 5$) with small effect size, $t(10) = 39$, $p < .05$, $d = .24$. This is considered a small effect size, therefore the difference is trivial between research-based interventions and teacher-created interventions in Letter Identification.

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Figure 2*Letter Sound Recognition Pre and Post Assessment Scores*

In Figure 2 the blue bars represented students' Pre-Test scores from the research-based intervention on Letter Sound Recognition. The orange bars represented the students' Post-Test scores on Letter Sound Recognition. The second graph showed scores from the teacher-created intervention on Letter Sound Recognition with blue bars representing students' Pre-Test scores and orange bars representing students' Post-Test scores. Figure 2 displayed that students made growth on letter sound recognition in both interventions.

An independent groups t-test revealed that there was not a statistically significant difference in research-based interventions of Letter Sound Recognition ($M = 10.29$, $SD = 5.96$, $n = 7$) as compared to teacher-created interventions in Letter Sound Recognition ($M = 6.20$, $SD = 5.72$, $n = 5$) with 0.14 effect size, $t(10) = 119$, $p < .05$, $d = .70$. This is considered a strong effect size between research-based and teacher-created interventions in Letter Sound Recognition. A strong effect size shows the importance of the difference in the two interventions.

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Findings

The action research project was chosen to address the question: Are research-based early literacy interventions more effective than teacher-created early literacy interventions? The results explained that the students in both intervention groups made growth in letter identification and that the students in both intervention groups made growth in letter identification and that their scores were close. Both interventions showed increased awareness of letter identification and letter sound recognition which was the focus of the intervention.

Frequencies were used to show student growth of letter names and sounds, which included number of errors, rate of improvement of each student, and a checklist for the researcher. The development and improvement in letter identification was seen by progress monitoring administered weekly and on the pre-test and post-test given during the intervention.

The letter sound recognition effect indicated a strong effect size. This indicated that students in the research-based letter sound intervention made larger gains in recalling the letter sounds than the students in the teacher-created intervention. Research showed that phonemic awareness had a powerful influence on early word decoding skills. Included in phonemic awareness skills are letter sounds, onset-rime, and decoding. The variables of the intervention, Classroom A and Classroom B, were comparable as they both showed growth of the focus of the interventions.

Changes were seen in Pre-test and Post-test scores with percentages correct. Development of letter identification and letter sound recognition could be observed by the teachers using weekly progress monitoring data which was gathered for eight weeks. In Classroom A (research-based intervention) 57% of students made growth of 80% accuracy or

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

above. In Classroom B (teacher-created intervention) 20% of students made growth of 80% accuracy or above. Although both students in Classroom A and B made growth, students in Classroom A were more accurate in letter identification and letter sound recognition.

Struggling students at the early literacy level benefit from early intervention and extra practice (Menzies et al, 2008). Interventions provided to young learners can be highly effective in preventing reading difficulties and also reducing the deepness of learning issues for those that continue to have reading problems (Menzies et al, 2008).

Limitations of the Study

The limitations to the action research included participation sizes of the two classrooms. Having more students would have been beneficial. The students varied in gender but were all from a small, rural public school in Iowa. Gathering data from urban schools would show results with new variables. Students in Classroom A and B were identified for Special Education, however, their level of abilities and prior knowledge varied.

Further Study

The students in the action research project received special education services in one of two classrooms with various abilities. In further action research studies on early literacy interventions the participants could be grouped into ability levels at the beginning of the study to see the growth or non-growth made during interventions. It is necessary to follow the progress of the students who participated in the study to ensure they maintain the growth made during the intervention. A follow-up study could describe the instruction and intervention that students received and continue to follow them as they progress through the next year of school.

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

Conclusion

This action research was completed to determine if research-based early literacy interventions were more effective than teacher-created interventions on letter identification and letter sound recognition. The teacher-researcher conducted the study to determine which type of intervention improved students' fluency and accuracy in both areas. Research showed that students with low levels of reading achievement continue to be students who require assistance throughout their school years (Wanzek, 2010). Researchers state that students who received intensive, early reading interventions improved in reading outcomes which reduced the performance gap (Austin et al., 2017). Despite which intervention was given to the special education classes progress was made in letter identification and letter sound recognition for every student who participated. According to researchers, interventions need to include: 1) a system of ongoing assessment implemented to monitor student progress and skill acquisition, 2) instruction with high intensity in a low student-teacher ratio, and 3) explicit instructional approach used with students who have difficulty in phonemic awareness or understanding the alphabetic rule (Wanzek et al., 2009). The interventions included in this action research project included all three areas.

RESEARCH-BASED EARLY LITERACY INTERVENTIONS

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RESEARCH-BASED EARLY LITERACY INTERVENTIONS

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RESEARCH-BASED EARLY LITERACY INTERVENTIONS

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