The Effects of Multi-Sensory Structured Literacy Instruction on Promoting Word Recognition in Elementary Schools

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The Effects of Multi-Sensory Structured Literacy Instruction on Promoting Word

Recognition in Elementary School

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Abstract

All students and adults need reading skills. Word recognition skills are necessary to

build reading fluency and comprehension abilities. This paper describes how to identify

students struggling with word recognition and provides a model for supporting these

readers. Due to COVID social distancing restrictions, two third-grade students in a rural

public school were identified as not meeting the grade-level reading targets and received

multisensory, structured literacy instruction to improve word recognition abilities. The

data from the research project supported the use of the instructional model to improve

word recognition skills. One area that arose from the research is the efficacy of

beginning the structured reading intervention at a younger age.

        Keywords: word recognition, multisensory structured literacy lessons, struggling

        readers

Reading has been, and will always be, a crucial building block for children to become successful learners. Reading is a complex process that comprises various skills including, vocabulary, phonics, phonemic awareness, fluency, and comprehension (Schmitz, 2011). As children develop these skills, they improve their reading fluency. If a student struggles with acquiring any of these skills, the process of reading becomes more difficult. In the early grades, kindergarten through third grade, students practice the skills needed for reading. Starting in fourth grade, reading instruction changes drastically (Blachman et al., 2004). Students in fourth grade and beyond move from learning how to read to reading as a means of learning information. If students are missing or have weak reading skills, more of their cognitive skills are required to focus on decoding text, which makes comprehending the meaning of the passage more difficult.

Word recognition skills are needed for all students to build reading fluency and comprehension.   These skills require students to have strong phonological awareness skills, such as hearing beginning/ending/middle sounds in words, rhyming, and understanding syllables (The Center for Effective Reading Instruction, n.d.). Another critical skill to strengthen word reading skills is phonemic awareness, a subskill of phonological awareness, breaking apart, blending, or manipulating/deleting sounds they hear in words without seeing any text. Research has shown, when students miss these pieces, more time is spent decoding text instead of comprehending the meaning of the passage. Weaknesses of these skills can be strengthened by using multisensory, structured literacy lessons (Spear-Swerling, 2018).

A rural school district that has preschool through twelfth grade in one building

had concerns with high numbers of students not meeting grade-level benchmarks targets

in reading. The school district requires students in kindergarten through sixth grade to

perform at the 65th percentile or higher in reading on benchmark assessments

administered three times per year. Currently, more than half of the elementary students

are reading at proficiency levels below the goal. After reviewing benchmark data and

phonemic awareness test results, the intervention team identified gaps in students'

phonological awareness skills. The gaps in skills led to slower rates of word recognition

which caused students to struggle with comprehension. The question that arose from the

data was, "How could students increase their word recognition skills?" Research showed

students build missing reading skills through the use of multisensory, structured literacy

lessons. The school district implemented the SLANT System (Geller Educational

Resources, Inc. 2017). Students with the lowest reading test scores received small group

reading intervention, which followed the SLANT System.

Theoretical Framework

The Cognitive Load Theory (CLT) has been a theoretical framework used when

researching instructional methods and student learning.   CLT has three types of cognitive

load, (1) intrinsic, (2) extraneous, and (3) germane cognitive load (Sweller et al. 1998).

Intrinsic load comprises task complexity and the number of elements interacting in the

learning activity (Sweller, 2010). The extraneous load comes from the instructional

format, which can cause difficulties (Brunken et al., 2018). CLT looks for ways to

reduce the extraneous load (Sweller, 2010). Germane load is the amount of working

memory needed to process the relevant information associated with the learning task

(Brunken et al., 2018). The germane cognitive load is not an independent source of

cognitive load, instead a resource for the working memory (Sweller, 2010). A revised

CLT model states that only two components exist, intrinsic and extraneous (Choi et al.

2014; Kalyuga 2011). Brunken et al. states (2018), "Germane cognitive load is now

considered as germane resources that reflect the amount of working memory capacity

dedicated to learning" (p.505). The greater the cognitive load, the more working memory

required to process the information.

Learning to read is not a primary process for the brain, unlike learning to talk.

Primary information and knowledge are processed by the brain easily and without a

conscious effort by the learner (Sweller, 2020). This type of information does not need to

be taught; rather it is acquired, like babies who say their first words. Secondary

knowledge is more challenging to acquire, even though smaller chunks of information are

involved (Sweller, 2020). Reading is a secondary process that requires the learner to

consciously attend to the explicit instruction for the skill to be learned. Greater demands

are placed on the working memory of the learners during this process.

CLT was used as a lens for researching multisensory, structured literacy lessons

as an instructional method for promoting word recognition. The multisensory portion of

the lesson adds a kinesthetic activity. Adding a kinesthetic activity to instruction

influences the activation of prior knowledge (Rusinko, 2011). Structured literacy lessons

are designed to follow a specific, repetitive sequence. By following the consistent lesson

structure, working memory load is decreased (Rusinko, 2001). The working memory

load has been extended by Dehn (2008) to include phonological working memory.

Students use the phonological working memory to develop sight word recognition,

vocabulary and grapheme/phoneme identification (Rusinks, 2011). As students practice

the grapheme/phoneme connection in small chunks by reading real/nonsense words and

sentences/ stories using the lessons' graphemes, they build automaticity in decoding.

When the automaticity of decoding increases, the student's working memory is used to

increase reading fluency and comprehension (Rusinko, 2011). The working memory can

process reading skills with less cognitive load by following a repetitive lesson sequence

and including kinesthetic activities.

Review of Literature

Introduction

Specific skills are needed for students to build reading fluency. When skills are

not developed, students struggle at all levels with reading. Cognitive functions associated

with reading are a clue to determine if there is a specific delay leading to poor reading

skills. This literature review suggests strategies that support students struggling with

reading. Students can increase their reading fluency with support and specific skills

practice, moving them closer to achieving grade-level reading fluency.

Skills Needed for Reading

To master the reading process, students need to develop multiple skills. Proficient reading entails matching letters with their corresponding sounds and combining one's background knowledge and experiences with context cues encountered in print to comprehend what is being read successfully (Adams, 1990; Byrne, Fielding-Barnsley, Ashley, & Larsen, 1997). Reading skills are broken down into five key components. A meta-analysis of the literature based on scientifically based reading instruction identified five skills that should be targeted as part of formal instruction due to their importance in learning to read (National Institute for Literacy [NIL], 2001; National Reading Panel [NRP], 2000). These skills include vocabulary, phonics, phonemic awareness, fluency, and comprehension (Schmitz, 2011). Vocabulary development begins before students begin school. As parents talk, read and interact with their children, they begin to develop their oral vocabulary (Moody et al., 2018). Vocabulary knowledge is woven into the remaining reading elements to build a child's reading abilities.

Readers need phonics skills to read. Phonics assists a student with understanding the connection between written language (i.e., letters) and their corresponding sound(s) in oral language (Schmitz, 2011). Graphemes (letters) are connected to specific sounds. When students see letters in groupings, they blend the phonemes to read words.

Phonics includes visual and auditory skills. Phonics skills begin during the preschool years or earlier when students begin to identify individual graphemes. In

kindergarten, students connect graphemes to specific phoneme/s and start blending them to read real and nonsense words.

Closely linked to phonics is phonological awareness. Phonological awareness is the ability to pay attention to and manipulate various segments of sound units and connect the sounds to letters that make up words (Foorman et al., 2016; Gillon, 2004; McBride-Chang, 2004; Snow et al., 1998). Phonological awareness includes listening skills, such as matching words with the same beginning/ending/middle sound. Students also develop the ability to manipulate sounds in words, change cat to mat by putting /m/ in place of /c/. Other phonological awareness skills include rhyming, alliteration, the number of words in a sentence, the syllables within terms, and more advanced levels of awareness such as onset-rime awareness and full phonemic awareness (The Center for Effective Reading Instruction, n.d.). A sub-skill of phonological awareness is phonemic awareness. These skills promote auditory recognition of the sounds and segments of sounds in spoken language (Schmitz, 2011). As students move through a progression of phonemic awareness skills, they practice auditory skills of segmenting individual sounds in words, blending sounds into words, and breaking down sounds in words. Higher-level phonemic awareness skills include deleting and manipulating sounds in words. For example, the word is spin, what is the new word if there is no /s/ at the beginning of this word or the word is stop, what is the word if the /p/ is changed to /m/? Phonological awareness skills, specifically phonemic awareness skills, are vital for students to grow as fluent readers.

Reading fluency and comprehension are the remaining two skills students need to achieve grade-level reading fluency. Fluency involves the ability to automatically decode and recognize words (Hudson et al., 2005; Kuhn & Stahl, 2003) and read connected text smoothly, rapidly, and with minimal errors (Al Otaiba et al., 2018). Comprehension is described as the purpose of reading (NIL, 2001; NRP, 2000). At the beginning of formal reading instruction, students devote much of their reading practice to decoding short, simple text that is easy to comprehend. As the text becomes more complex, students spend less time decoding and more time comprehending. Readers who need to devote attention to word decoding and word recognition of complex text have less working memory capacity for determining the meaning of the text (Andresen et al., 2019). The brains of fluent readers are freed up to focus on text comprehension (Schmitz, 2011). As students build their fluency and comprehension skills; they move from learning how to read to gaining information by reading.

Struggling Readers

Reading is a complex process, and approximately 25% of children experience difficulty learning to read, which moves them into a broad category of struggling readers (Moats, 2007). The term struggling reader has a variety of definitions, depending on which skills of the reading process the reader lacks. One explanation states poor readers are identified by teachers who can decode or identify individual words (NIL, 2001) but have poor comprehension skills (Matheson, 2018). Decoding words is one step in the reading process, however, to be a fluent reader, students must be able to construct

meaning from text A fluent reader must be to decode and construct meaning from text (Schmitz, 2011). The inability to build meaning leads teachers to label the student a struggling reader. Struggling readers have deficiencies in executive functions compared to their peers (Matheson, 2018; Howard et al., 2016). Executive functions are cognitive actions used to plan and execute reading strategies (Matheson, 2018) and enable readers to activate, manipulate, and sustain information in their mind (i.e., working memory) (Howard et al., 2016). Readers rely on their executive functions more when tasks require effort and less when tasks are automatized. (Matheson, 2018). Text comprehension is weakened when students use their working memory to focus on decoding skills. Blachman et al. (2004), stated that students who struggle with reading have difficulty processing phonological features of the language. The term struggling readers has various definitions, but in each description, a reading skill deficiency causes the student not to achieve grade-level reading fluency.

The Brain and Learning

The brain is continually changing, although, for many years, the impression was that the brain was stable during the maturity of one's life (Jensen, 2005). The human brain can adapt due to the influence and organization of how the brain is formed. This continuous reorganization of the brain allows real-life use to affect how your brain thinks and acts (Jensen, 2005). With this information in mind, we can look at children's brains from age five through their teenage years. Language is fully developed at the age of five, but the brain continues to grow as the child explores and engages in the world around

them (Jensen, 2005). Interestingly, according to the Harvard Graduate School of

Education, there are two growth spurts during this time at ages six and again at age 11 or

12 (Fischer & Bidwell, 1991).

When taking this information and thinking about how this leads to academic

knowledge, and precisely the memory capacity and word recognition, children are far

more successful when given repetition and engagement (Jensen, 2005). We can expand

the brains of children with structured, engaging, and repetitive teaching strategies. A

teacher must keep in mind that although repetition is helpful, boredom can play a role.

Therefore, repetition of a new skill paired with various tasks can keep engagement at its

peak. In the book, Teaching with the Brain in Mind (Jenson, 2005), there is a teaching

model to support these concepts of enrichment for brain growth and change.

Although our brains are not static, there are many brain functions that require

executive functioning to learn in any environment. The brain's executive functions are a

set of domains that manage behaviors, emotions, and cognitive functions (Rao, 2020).

These four domains: inhibition, shift, emotional regulation, and self-monitoring, can

hinder the ability to gain and retain information when dysregulated. The brain can be

overstimulated when emotions are heightened, stressed or overwhelmed for students with

developmental disabilities and can hinder their ability to focus their attention on

academic tasks, particularly word recognition and memory recall abilities (Jensen, 2005).

Repetition and increased engagement in activities can support children with

developmental difficulties to have a predictable environment vital for their learning.

When a child feels safe and secure emotionally and physically, the learning capacity

increases and can support the brain from feeling overstimulated (Jensen, 2005).

Identifiable Causes for Struggling Readers

Research has shown possible causes for struggling readers. The student's

environment outside of school is one cause. Some children who start school with fewer

early literacy skills typically increase their skills slower than their peers (Ball &

Blachman, 1991; Good et al., 1998). Reading success depends on the development of a

child's oral language structures (Nevills & Wolfe, 2009). During the early childhood

years, limited communication with adults delays verbal language skills, causing students

to lack background skills needed for learning to read. Environmental causes are difficult

to identify. Students identified with learning disabilities, including dyslexia, process

information differently than their non-learning-disabled peers (Baird et al. 2009).

Importance of When to Strengthen Reading Skills

Reading skills are needed during school and into a student's adult life. If

struggling readers do not develop reading skills in the primary grades, their reading

struggles intensify. The need for young children to gain accurate and fluent word-level

skills has been reinforced by many researchers (Adams, 1990; Ehri et al., 1991; Perfetti,

1985; Pressley, 2002; Share & Stanovich, 1995; Vellutino et al., 1994; Williams, 1994).

Students who do not have a solid base for decoding words by the end of first grade may

struggle with reading achievement in years to come (Gough et al., 1991). Blachman et al.

(2004) have found two reasons for the importance of developing fluent reading skills in

the early years. First, epidemiological data indicate that if children's reading skills have

not improved by the end of the third grade, these children will have considerable

difficulty overcoming their slow and unsuccessful start in reading (Blachman et al.,

2004). The second reason to get struggling readers reading by the end of third grade is

reading instruction changes drastically in fourth-grade (Blachman et al., 2004). Students

lacking the necessary reading skills beyond fourth-grade face even higher reading

challenges as they age.

Strategies

Students who are struggling readers are in the greatest need of structured reading

instruction (Moats, 2017). Structured literacy approaches are recommended for students

with dyslexia and other poor decoders (Spear-Swerling, 2018) who need more intensive

support. Incremental Phonics Instruction (Ellis & Ralph, 2000), Proactive Beginning

Reading Instruction (PBRI; Mathes et al., 1999), the SLANT System for Structured

Language Training (Geller Educational Resources, Inc. 2017), or the Institute for Multi-

Sensory Education (Orton-Gillingham) are all examples of structured literacy models

which meet the needs of these students. Structured literacy lessons teach the letter/sound

relationship. Small sets of grapheme–phoneme are introduced for children to practice

naming, reading in words and short sentences. After intensive training with this first set

of graphemes, subsequent sets of new graphemes are incrementally added to the baseline

set. Each time a set of new graphemes is added, the complete set of graphemes is

repeatedly practiced in words and sentences to allow children the opportunity to apply

and consolidate all grapheme–phoneme correspondence and blend rules that have been acquired (Ellis & Ralph, 2000). Students also practice high-frequency words, language concepts, and spelling rules. All skills are tied back to the grapheme-phoneme sets practiced by the students.

Based on this literature review findings, my action research project will use structured literacy lessons to increase word recognition skills of students who are not meeting grade-level reading proficiency. The skills taught in the SLANT System will give students the tools to improve their word recognition abilities.

Methodology

This research project was conducted to determine the impact multisensory, structured literacy lessons had on third-grade students' word recognition skills. Qualitative data was collected using pre- and post-intervention interviews administered to students and teachers. Daily running records tracked skill development and guided lesson skill planning. Quantitative data came from fall and winter standardized benchmark tests for oral reading fluency, administered through AIMSweb Plus. SLANT Systems and Path to Reading Excellence in School Sites (PRESS) tests provided quantitative diagnostic data.

The population for the research was found in a small, rural school district. The district houses preschool through twelfth-grade students in one building. An average of 520 students attended in-person instruction during the first quarter of the 2020-2021 school year. The school district has 49% of the kindergarten through twelfth-grade

student body qualify for free and reduced lunch. The district also has 58% of the students

open enrolled from surrounding school districts. The elementary grades have two

classrooms per grade. Each grade receives music and physical education every day.

Participants for the action research project were from the third-grade. The third-

grade class consisted of 29 students and two teachers. Special education services were

provided to 24% of the class, while 27% of the class received Title One support. The

third-grade included twelve female students, seventeen male students, and two white

female teachers. Due to COVID-19 social distancing guidelines, only two students could

be in the space with the researcher for intervention. The two students were identified as

not meeting grade-level proficiency using AimswebPlus fall reading benchmark test.

Both boys had similar areas of need identified in their diagnostic testing.

At the beginning of the school year, students completed the AIMSwebPlus

reading benchmark test that tested oral reading fluency, vocabulary, and comprehension

skills. Students not meeting grade-level reading proficiency were administered the

PRESS and SLANT diagnostic assessments for phonemic awareness, phonological

awareness, phonics, and word recognition in a one-to-one format. The two

aforementioned students did not meet the third-grade standards for reading proficiency

and had similar diagnostic test errors. After the students were identified for the research

project, parent permission was obtained through phone calls and verbal acknowledgment

of the project written explanation. Both classroom teachers gave written permission to

participate in my research.

Student and teacher pre- and post- surveys were conducted individually. Students

were asked how they felt about their reading abilities, how they read unfamiliar words,

and if they enjoyed reading. Student responses were recorded in a Google survey (see

Appendix A). Both classroom teachers completed a Google survey that asked if students

were reading at grade level, the students' guided reading level, and what strategies were

used to read new words (see Appendix B). The final assessment tool used was a running

record. During each lesson, notes were recorded on errors/successes for each portion of

the lesson and how they read the words/sentences/stories. Student growth, or lack of

growth, determined what would be reviewed and when to move to the next unit.

In October 2020, the students started to attend intervention sessions. The students

were scheduled to meet with me five days a week for twenty-five minutes. Due to

students being sent home multiple times for possible COVID exposure, the research

window was extended through December 2020 to complete the minimum number of

intervention sessions. The SLANT System provided the format for two-day lesson

plans.

Day One Lesson Plan Outline:

- Quick Review: 1-2 minutes

- New Sound Unit/New Rule: 5-10 minutes

- "Look and Say" and "I Say It...You Say It…": 3-5 minutes

- "Gotta Know Words": 2-5 minutes

- Reading Connected Text/Comprehension: 5-10 minutes

- Phonemic Awareness: 2-3 minutes

The Quick Review was a time to review errors from the previous lesson. Next,

the New Sound Unit/Rules section introduced new phoneme(s), new language concepts,

and spelling rules. Phonemes are the sounds produced for a specific grapheme or

combination of graphemes. Graphemes are written letter(s). The students were shown

the grapheme card, the modeled pronunciation of the phoneme, and the students repeated

the phoneme while writing the grapheme five times while saying the phoneme. Spelling

words using the graphemes introduced were recorded on SLANT spelling paper (see

Appendix C). As the students said each phoneme of the word, they recorded the

graphemes using a pen. New language concepts and spelling rules were introduced

during this part of the lesson. The following two sections of the lesson, "Look and Say"

and "I Say It.. You Say It..", had students reviewing phonemes as the grapheme card was

flashed quickly and writing and saying any phonemes the students missed. "Gotta Know

Words" are sight words that do not follow the rule for the lesson but were needed for

reading sentences and stories (see Appendix D). Students repeated the word, spelled the

word as they wrote the word five times. Comprehension is woven into the lesson when

students read stories made up of words using only the graphemes studied. The final

section of the day one lesson was phonemic awareness skills practice. Time ranges for

each section of the lesson varied depending on the student's skill proficiency.

Day Two Lesson Plan Outline:

·   Quick Review: 1-2 minutes

·   "Martian Words": 3-5 minutes

·   "I Say It...You Say It…": 2-3 minutes

·   "Gotta Know Words": 2-3 minutes

·   Dictation of Sentences: 5-10 minutes

·   Phonemic Awareness: 2-3 minutes

Day two started with the same type of review as day one, 1-2 minutes. The second section was "Martian Words" (see Appendix E). This section used letter cards to create consonant/vowel/consonant (CVC) words displayed for students to blend the phonemes and read the new word. The term "Martian Words" was used since the words could be nonsense words used by Martians or real words. The following two sections were repeated from day one, "I Say It.. You Say It.." and "Gotta Know Words."   Writing dictated sentences had students use all the skills from the day one and two lesson. A sentence was dictated, students repeated the sentence, put counters on their desk to represent each word of the sentence, the sentence was written in pen and then the students read the sentence back. Phonemic awareness practice is again the last section of the lesson. After day two, the lesson cycle started over with day one. Some units needed to be repeated more than once before a new unit was introduced.

In December 2020, post-intervention assessments were administered. Winter

benchmark testing for oral reading fluency was completed using AIMSwebPlus. Each

student read two different stories, each one minute. Both students were also screened

using the SLANT diagnostic tool. Students read a list of real and nonsense words to

check for mastery of the skills introduced in the units completed. Examples of these

skills were: students only saying the short vowel sound when reading CVC words, and

students correctly write to match the saying above. Pre and post data collected from the

various assessment tools were compared after the intervention period ended.

Analysis of Data

The purpose of this study was to examine the effectiveness of the SLANT System

reading program on word recognition skills of students not meeting grade-level reading

targets. By providing students with multisensory, structured literacy lessons, students'

word recognition skills would increase. Qualitative data was collected using student and

teacher surveys and running records. The quantitative data for this research was collected

by completing the fall and winter reading benchmark assessments using AIMSwebPlus.

The SLANT System diagnostic tools gave quantitative data on specific reading skill

deficiencies of the identified students. The third-grade students for the study, had below

grade-level reading abilities and needed specific support producing CVC words.

Student and Teacher Surveys

The subjects answered pre-and post-intervention questions about their reading

skills. The surveys were given to gather information about the student's feelings toward

reading and word recognition abilities. Classroom teachers completed pre-and post-

intervention surveys addressing the students' reading skills. The tables below represent

the data collected from the surveys.

Figure 1
Student Responses to Pre-Intervention Survey Results

Survey Question Answer Choices	Student One	Student Two
It is fun reading with you. Do you enjoy it for the most part? • Yes • No • Maybe	No	Maybe
How do you figure out what a word is, if you do not know the word?	Skip the word until the end of the page, then go back and sound word out	Skip the word or sound word out
How do you rate your word reading skills? • **3** - I can read almost all/all words without extra time • **2** - I can figure out words with extra time • **1** - I have a very hard time reading words	2	2

The student pre-intervention surveys were verbally administered to each student

in a one-on-one format. The results of the surveys revealed how each student rated their

own abilities in reading. Student One did not like to read before starting the

intervention. Student Two had a different feeling about reading, maybe he enjoyed

reading. Both students used the same strategy of skipping unfamiliar words or sounding

out the word. Student One added the strategy to use context clues to determine what

word made sense in the sentence. Students One and Two shared the same response for

the final question rating their word reading skills. They reported that extra time was

needed to correctly identify new words in text. The survey results confirmed the

similarities of the two students identified in the benchmark and diagnostic testing.

Figure 2
Teacher Responses to Pre-Intervention Survey

Survey Question Answer Choices	Student One's Teacher	Student Two's Teacher
What can you tell me about your student's reading abilities in class? • 3 - Strong • 2 - Adequate • 1 - Needs improvement	2	1
Does your student read at grade level? • Yes • No	No	No
What book level?	G	H
What strategies, if any, do you observe your student using to read real/nonsense words?	I do not see him using any specific strategies.	I see him sounding out words.

The two teachers completed a Google survey after agreeing to be part of the

research project. The results from the teacher pre-intervention surveys provided

information on the students' classroom performance in reading. Even though Student

One was not reading at grade level, the teacher stated his reading abilities were adequate

for the beginning of the school year. Teacher Two reported her student was not reading

at grade level, and his reading skills needed improvement. Both teachers completed a

guided leveling assessment to determine independent and instructional reading levels of

text for their students. The Fountas and Pinnell leveling guide was used to determine

book levels. Student one's independent reading level was G, and his instructional level

was H. Student Two's independent reading level was H, and his instructional level was

I. Both students were reading independently at a mid-year first-grade level. At the time

of the pre-intervention survey, student one's teacher did not observe the students using

any strategies to solve difficult words. Student Two's teacher reported he sounded out

words. The information from both student and teacher surveys provided a path for the

intervention.

Figure 3
Student Responses to Post-Intervention Survey Results

Survey Question Answer Choices	Student One	Student Two
Which of the following are most true for you: • 3- It is easy for me to figure out new words. • 2 - It is hard, but I can figure out new words. • 1 - I find it hard to read new words.	2	2
How do you figure out what a word is if you do not know the word?	I sound the words out.	I sound the words out.
Is it easier to read words when you are reading now compared to at the start of the year? • 3 - Much easier • 2 - The same as before • 1 - Still difficult	3	3

After completing two months of reading intervention, the students verbally

answered post-intervention survey questions in a one-on-one interview. Student

responses were recorded digitally. The two students reported identical answers for all of

the survey questions. Reading remained challenging, but the two students said they could

figure out new words. They both said sounding out words was their word recognition

strategy. The students reported reading was much easier now as compared to the

beginning of the school year. The students' post-intervention survey responses provided

information to determine the effectiveness of the multi-sensory, structured literacy

lessons.

Figure 4
Teacher Responses to Post-Intervention Survey

Survey Question Answer Choices	Student One's Teacher	Student Two's Teacher
What can you tell me about your student's word recognition abilities in class? • 3 - Strong • 2 - Adequate • 1 - Needs improvement	1	1
Does your student read at grade level? • Yes • No	No	No
What is your student's current book level?	J	H
What strategies, if any, do you observe your student use to read real/nonsense words?	Sounding out words, skipping words to use context clues and asking a friend.	Continues to sound out words.
Has your student's word recognition skills improved in the classroom? Evidence to support growth or lack of growth.	Yes He reads with more confidence and has increased his oral reading fluency.	No He demonstrates inconsistent word reading skills. He adds/deletes sounds in words.

Post-intervention classroom performance data were voluntarily collected from the classroom teachers using a Google survey. Both teachers reported the students needed to improve their word recognition skills. In the classroom, neither student was reading at a third-grade reading level. Student one advanced three book levels, reading independently at a level J. Student two remained at level H for his independent reading level. The teachers indicated the students sounded out unfamiliar words. Student one's teacher added that her student was observed using context clues or asking a friend for help with difficult words. The teacher for student one stated her student's word reading skills improved based on an increase in his oral reading fluency (ORF) score and the confidence he shows when asked to read. ORF was the number of words read correctly in a set amount of time. Student two's teacher observed inconsistent results when her student reads. She felt his recognition skills did not improve when he made reading errors in familiar words and added/deleted sounds as he read text passages. The two teacher surveys provided data on the students' word recognition skills in the classroom.

Oral Reading Fluency (ORF)

Quantitative data was collected from the fall and winter reading benchmark tests. Students read for one minute on two different stories at a third-grade reading level. Different stories were presented during the two testing periods. AIMSwebPlus generated an ORF score based on a formula of the total number of words read and errors. The test score represented the number of words read correctly in one minute.

Figure 5

AIMSwebPlus Fall ORF Target VS Student ORF
Scores

Fall ORF Results

Student ORF Scores ▬ Fall ORF Target Score 112

125

100

75

Possible ORF Scores

50

25

24

26

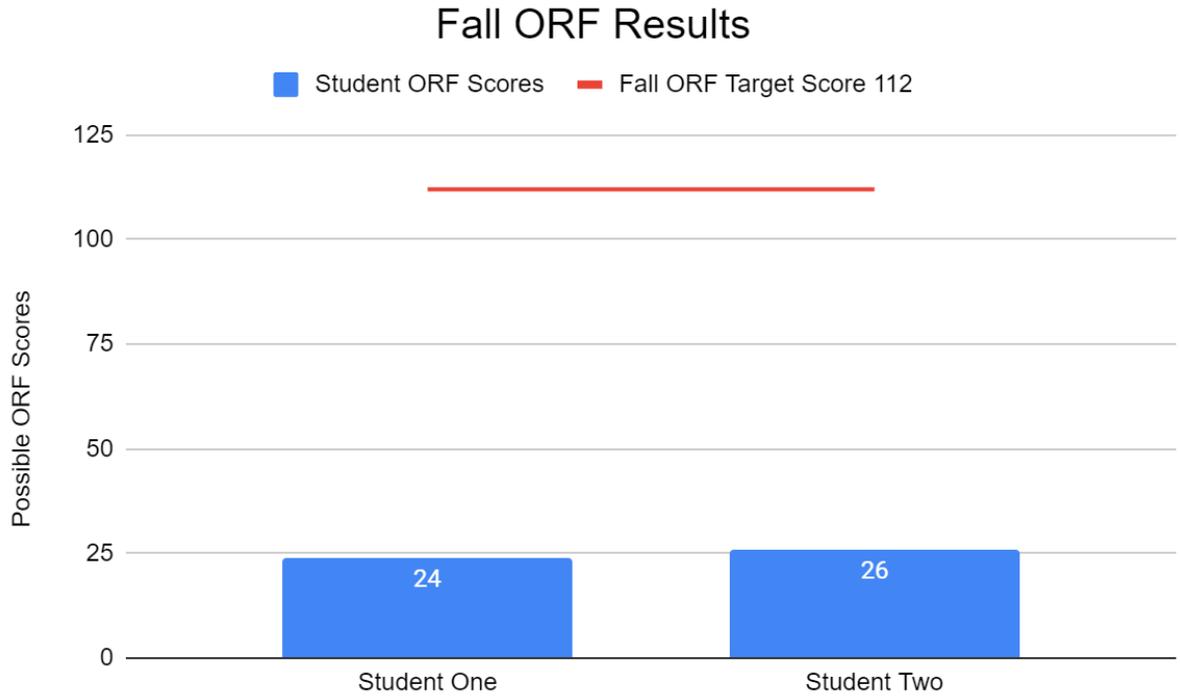0

Student One   Student Two

Figure 6
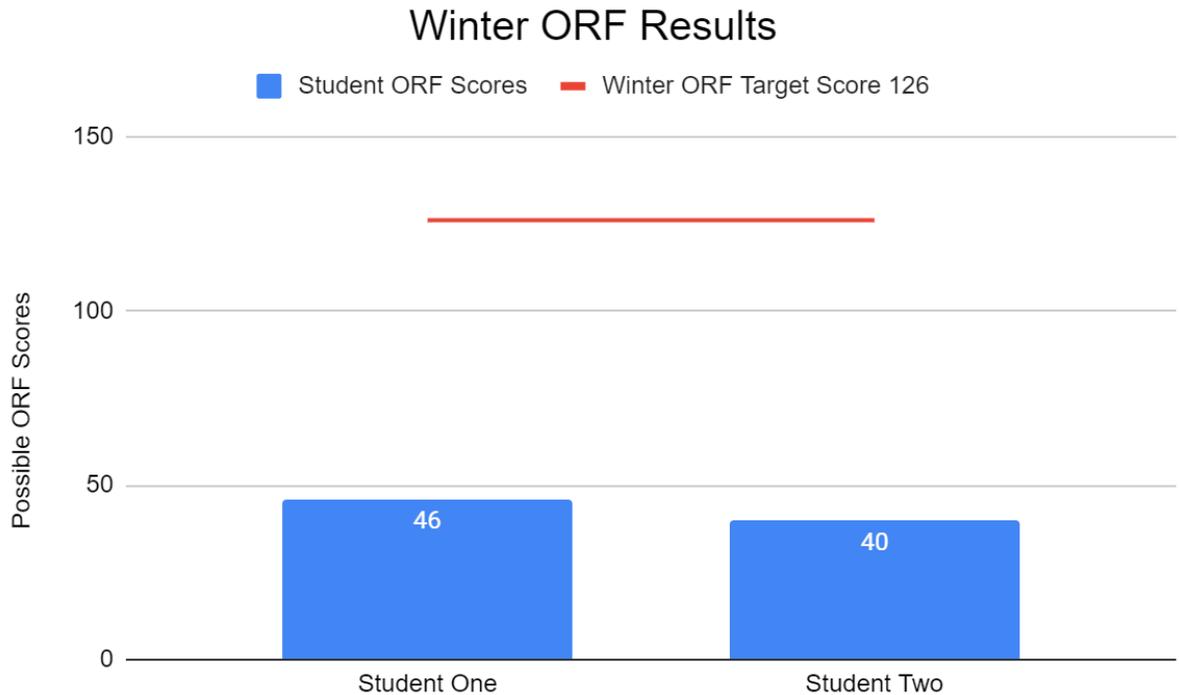AIMSwebPlus Winter ORF Target VS Student ORF Scores

Figure 5 and Figure 6 represent the third-grade ORF target scores for the fall and winter testing period and individual student test results. Both students' scores were below the expected target for both testing periods. The two students were reading below grade level but did show growth in their reading fluency by reading more words correctly in the same amount of time.

Another quantitative tool used to collect data was the SLANT System diagnostic tool. The SLANT System offered stages one through seven for assessing students. Each stage was linked to specific language and spelling rules. The students' results placed their reading skills in stage one. Skills in stage one include: identify the difference

between consonants and vowels, reading CVC words without sounding out each

phoneme, using short vowel sounds in CVC words and writing dictated sentences. Stage

one skills are taught in first-grade and early second grade.

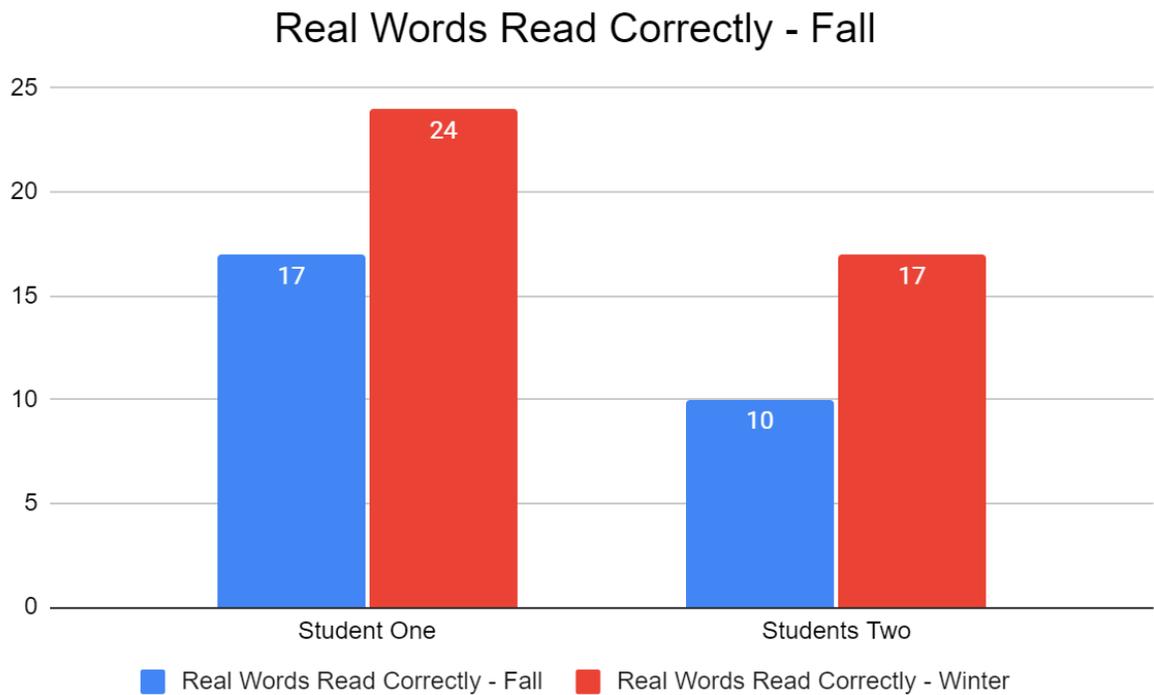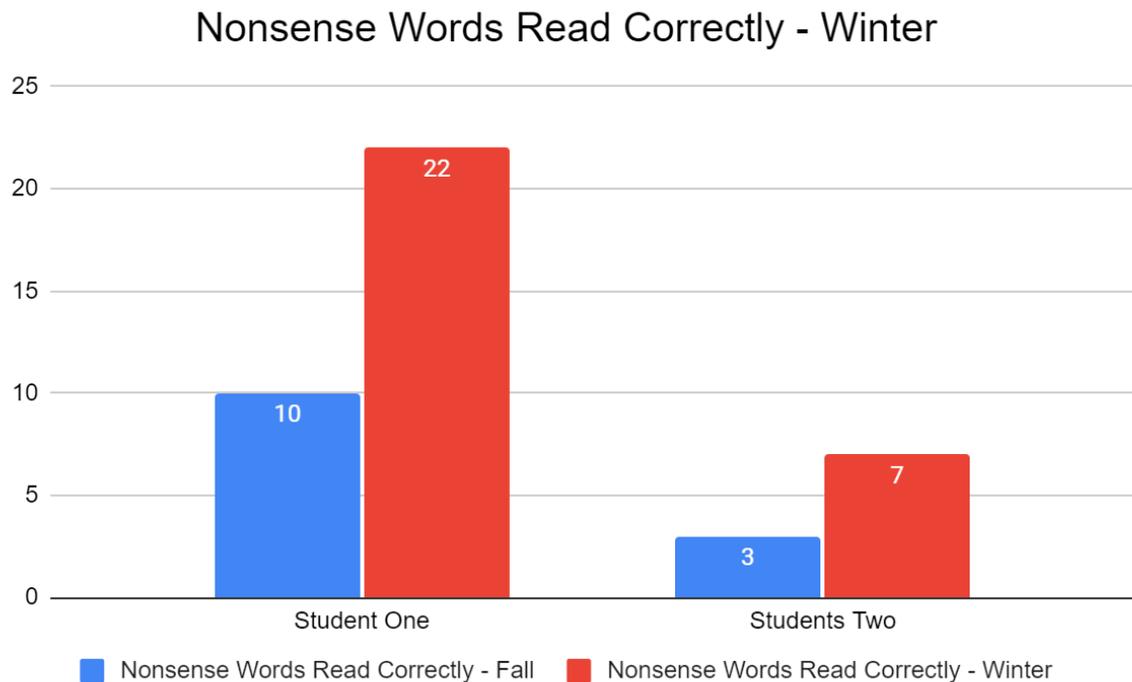Figure 7
SLANT Real Word Reading Results

Figure 8
SLANT Nonsense Word Reading Results

Both students demonstrated in the pre-and post-intervention assessment the ability

to read real words at a higher stage than their ability to read nonsense words correctly.

Successfully reading both real and nonsense words meant the students applied the skills

from stage one. Unlike testing for guided reading levels, the students could not use

context clues to pronounce the real or nonsense word. Post-intervention data

demonstrated the students increased their ability to read more real and nonsense words.

The increased number of words read correctly showed the students' applied reading skills

from stage one.

Did the SLANT System increase word recognition skills of students not reading at

grade level? The data from the research showed an increase in the number of words read

correctly by the students. The increases documented in the data were not enough growth

for the students to achieve grade-level reading proficiency. Would students build their

word recognition skills enough to read at grade level proficiency if they received more

intervention using the SLANT System? More research is required to answer this

question.

Action Plan

Conclusion

The action research project aimed to determine the effectiveness of increasing the

word recognition skills of students by implementing the SLANT System multisensory,

structured literacy lessons. Fall reading benchmark data was collected using

AIMSwebPlus, followed by SLANT diagnostic testing to identify research subjects.

Students received twenty-five minutes of reading intervention focused on

grapheme/phoneme connections, gotta know word recognition, blending phonemes, and

comprehension. Winter reading benchmark assessments and diagnostic tests were

administered at the conclusion of the research. The data collected answered the research

question and created a new question.

Data from the SLANT diagnostic tool and ORF scores showed that student word

recognition skills increased after reading intervention. Student One and Student Two

started at different levels of word recognition proficiency. Both students increased their

recognition skills of real and nonsense words after participation in the SLANT lessons.

Student One showed a twenty-eight percent increase in both types of words. Student

Two's real words increased forty-eight percent for real words and increased sixteen

percent for nonsense word recognition.   The students increased the number of words

read correctly on the ORF test. Of the two students, Student One started with a lower

ORF score but showed a sixteen percent increase after intervention was completed.

Student Two exhibited a nine percent increase in his ORF score. These increased

numbers support the effectiveness of structured literacy instruction on word recognition

skills.

Student survey results also supported the effectiveness of the structured reading

lessons. The pre-intervention survey indicated both students said they needed extra time

and a variety of strategies to read unfamiliar words. Their post-intervention responses

narrowed the strategy they used to sounding out words. The students reported this

strategy was effective and required less distraction from text content. Reading words was

still challenging for the students, but they indicated reading is easier after completing the

intervention lessons.

The results from the teacher survey did not provide data to support the

effectiveness of the SLANT lessons. The teachers indicated the students still needed

improvement in reading abilities. They reported both students were reading at a lower

guided reading book level than expected for that time of the school year. Student One's

teacher reported her student exhibited more confidence in his reading abilities but Student

Two's teacher shared that her student continued to make unexpected reading errors with

familiar words. The teachers observed improvements in reading skills but not enough

growth to reach a third-grade reading level.

The action research conducted was faced with limitations. COVID restrictions made completing the research difficult. Social distancing guidelines limited the participation numbers. The participants in the research were limited to two students and one instructor. Students who needed to quarantine during the research period meant breaks between instruction and rehearsal of skills. The limited length of this action research project did not allow enough time to develop automatic decoding abilities to meet the demands of third-grade reading curriculum. Even if the action research project's timeline were extended, the COVID-related issues would have continued.

Recommendations

Multisensory, structured literacy lessons provided a concrete approach to teaching reading. This model for reading support gave students the basics of decoding and comprehension, which are skills they were not developing in core classroom instruction. The SLANT lessons were used in the intervention program to build these missing reading skills for students identified as needing tier two and tier three support. Structured reading lessons allowed the students to master each skill level before adding more language and spelling rules. The students in the action research project mastered beginning-level skills during the research period. The limited-time did not allow them to progress to more advanced reading skills needed in third-grade. Older students had more language concepts and spelling rules to master, causing them to need more time to catch-up to grade-level demands. Even though the data showed small gains for the students in this research project, SLANT lessons would be the most effective approach to supporting struggling readers of all ages.

One question that came up from this research was, "When is the best time to start implementing structured reading instruction?" Younger students had fewer skills to master with the potential to achieve grade-level proficiency. Grapheme/phoneme connections are a critical concept for kindergarten students. Students not building the decoding skills of consonant/vowel/consonant (CVC) words in kindergarten will need more support in subsequent grades. The older the student, the more complex the language and spelling skills needed for reading success. Students who do not have a solid base for decoding words by the end of first grade may struggle with reading achievement in years to come (Gough et al., 1991). Previous research on reading development supports an early intervention model. This research project supported the literature review finding the lack of decoding skills at early ages caused reading difficulties in older grades. More research is needed to determine the ideal grade-level to begin intervention.

In conclusion, the SLANT System for multisensory, structured literacy lessons did increase the word recognition skills of students needing additional reading support. Decoding automaticity increases the amount of the students' working memory used for reading fluency and comprehension (Rusinko, 2011). Structured reading lessons provided the means to fill in the missing reading skills, leading students to achieve mastery of grade-level reading requirements.

References

Adams, M. (1990). *Beginning to read: Thinking and learning about print. Cambridge*,

MA: Bolt, Beranek and Newman, Inc.

Andresen, A., Anmarkrud, Ø., & Bråten, I. (May 2019). Investigating multiple source use

among students with and without dyslexia. *Reading and Writing, 32*(5), 1149-

1174.OI:10.1007/s11145-018-9904-z

Al Otaiba, S., Rouse, A., Baker, K. (Oct 2018). Elementary grade intervention

approaches to treat specific learning disabilities, including dyslexia. *Language,

Speech & Hearing Services in Schools (Online), 49*(4), 829-842.

I:10.1044/2018_LSHSS-DYSLC-18-0022

Baird, G., Scott, W., Dearing, E., & Hamill, S. (2009). Cognitive self-regulation in 111

youth with and without learning disabilities: Academic self-efficacy, theories of

intelligence, learning vs. performance goal preferences, and effort attributions.

Ball, E., & Blachman, B. (1991). Does phoneme awareness training in kindergarten make

a difference in early word recognition and developmental spelling? *Reading

Research Quarterly,* 26, 49-66.

Blachman, B., Schatschneider, C., Fletcher, J., Francis, D., & Clonan, S. (Sep 2004).

Effects of intensive reading remediation for second and third graders and a 1-year

follow-up. *Journal of Educational Psychology, 6*(3), 444-461.

DOI:10.1037/0022-0663.96.3.444

Brunken, R., Korbach, A., Park, B. (June 2018). Differentiating different types of

      cognitive load: a comparison of different measures. *Educational Psychology*

      Review, 30(2), 503-529. DOI:10.1007/s10648-017-9404-8

Byrne, B., Fielding-Barnsley, R., Ashley, L., & Larsen, K. (1997). Assessing the child's

      and the environment's contribution to reading acquisition: What we know and

      what we don't know. In B.A. Blachman (Ed.), *Foundations of reading acquisition*

      and dyslexia (pp. 265-285). Mahwah, NJ: Lawrence Erlbaum Associates,

      Publishers.

The Center for Effective Reading Instruction (n.d.). *Reading Rocket*.

      https://www.readingrockets.org/teaching/reading101-

      course/modules/phonological-and-phonemic-awareness-introduction

Choi, H., Van Merrienboer, J., Paas, F. (2014). Effects of the physical environment on

      cognitive load and learning: towards a new model of cognitive load. *Educational*

      Psychology Review, 26, 225-244.

Dehn, M. (2008). Working memory and academic learning. Hoboken, NJ: John Wiley &

      Sons.

Ehri, L., Rieben, L., & Perfetti, C. (1991). Learning to read: Basic research and its

      implications. Hillsdale, NJ: Erlbaum.

Ellis, A, & Ralph, M. (2000). Age of acquisition effects in adult lexical processing reflect

      loss of plasticity in maturing systems: Insights from connectionist networks.

Journal of Experimental Psychology: Learning, Memory, and Cognition, 26(5),

1103–1123.

Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton, C. A., Dimino, J., et al.

(2016). Foundational skills to support reading for understanding in kindergarten

through 3rd grade (NCEE 2016-4008). U.S. Department of Education. Institute of

Education Sciences, National Center for Education Evaluation and Regional

Assistance. Washington, DC: Government Printing Office.

Geller Instructional Resources, Inc. (2017). The SLANT system for structured language

training. https://www.slantsystem.com

Gillon, G. (2004). *Phonological awareness: From research to practice*. New York, NY:

The Guilford Press.

Good, R., Simmons, D., & Smith, S. (1998). Effective academic interventions in the

United States: Evaluating and enhancing the acquisition of early reading skills.

School Psychology Review, 27, 45-56.

Gough, P., Juel, C., Rieben, L., & Perfetti, C. (1991). Learning to read: Basic research

and its implications. Hillsdale, NJ: Erlbaum.

Howard, S., Powell, T., Vasseleu, E., Johnstone, S., & Melhuish, E. (2016). Enhancing

Preschoolers' Executive Functions Through Embedding Cognitive Activities in

Shared Book Reading. *Educ Psychol Rev, 29:*153–174. DOI 10.1007/s10648-016-

9364-4

The Institute for Multi-Sensory Education, https://www.orton-gillingham.com

Jensen, E. (2005). *Teaching with the brain in mind* (2nd ed.). Alexandria, VA: ASCD.

Kalyuga, S. (2011). Cognitive load theory: How many types of load does it really need? *Educational Psychology Review, 23*, 1-19.

Mathes, P., Torgesen, J., Menchetti, J., Wahl, M., & Grek, M. (1999). *Proactive reading.* Available from P. G. Mathes, Institute for Reading Research, Southern Methodist University, P.O. Box 750381, Dallas, TX 75275.

Matheson, I. (2018). Unpacking reading comprehension by text type: An examination of reading strategy use and cognitive functioning in poor and typically-achieving comprehenders (Publication No. 10805786) [Doctoral dissertation, Queen's University (Canada)]. ProQuest Dissertations Publishing.

McBride-Chang, C. (2004). *Children's literacy development*. New York, NY: Oxford Press.

Moats, L. (Summer 2017). Can prevailing approaches to reading instruction accomplish the goals of RTI? *Perspectives on Language and Literacy; Baltimore*, *43*(3). 15-22.

Moats, L. (2007). Whole-language high jinks: How to tell when "scientifically-based research" isn't. [paper] Washington, D.C.: Thomas B. Fordham Institute

Moody, S., Hu, X., Li-Jen, K., Jouhar, M., Xu, Z. (Dec 2018). Vocabulary instruction: A critical analysis of theories, research, and practice. *Education Sciences; Basel, 8*(4). DOI:10.3390/educsci8040180

National Institute for Literacy. (2001). *Put reading first: The research building blocks for teaching children to read*. Jessup, MD: ED Publishers.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. Washington, DC: U.S. Government Printing Office.

Nevills, P., & Wolfe, P. (2009). *Building the reading brain: PreK-3*. (2nd Ed.) Thousand Oaks, CA: Corwin Press.

Perfetti, C. (1985). Reading ability. New York: Oxford University Press.

Pressley, M. (2002). Reading instruction that works: The case for balanced teaching. New York: Guilford Press.

Rao, J., Dr. (2020, May 11). Brain Development: Neuro-Behavioral Perspectives in Retrieved July 06, 2020, from University of Hertfordshire

Schmitz, S. (2011). The development of phonological awareness in young children: examining the effectiveness of a phonological awareness program. (Publication No. 3461354) [Doctoral dissertation, The University of Nebraska]. ProQuest Dissertations Publishing.

Share, D., & Stanovich, K. E. (1995). Issues in Education.

Snow, C.E., Burns, M.S., & Griffin, P. (Eds.). (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.

Spear-Swerling, L. (2018). Structured literacy and typical literacy practices: Understanding differences to create instructional opportunities. Teaching Exceptional Children, 51, 201-211

Sweller, J. (Feb 2020). Cognitive load theory and educational technology. *Educational*

   Technology, Research and Developmen,t 68(1), 1-16. DOI:10.1007/s11423-019-

   09701-3

Sweller, J. (Jun 2010). Element interactivity and intrinsic, extraneous, and germane

   cognitive load. *Educational Psychology Review, 96*(2), 123-138.

   DOI:10.1007/s10648-010-9128-5

Sweller, J., Van Merrienboer, J., Paas, F. (1998). Cognitive architecture and instructional

   design. *Educational Psychology Review, 10*, 251–296.

Rusinko, J. (2001). *A proposed theoretical model of literacy learning using multisensory*

   structured language instruction (MSLI) [Doctoral dissertation, Antioch University

   Seattle Seattle, WI].

Vellutino, F., Scanlon, D., Tanzman, M., & Lyon, G. (1994). Frames of reference for

   the assessment of learning disabilities: New views on measurement issues.

   Baltimore: Paul Brookes.

Williams, J., Lehr, F., & Osborn, J. (1994). Reading, language, and literacy: Instruction

   for the twenty-first century. Hillsdale, NJ: Erlbaum.

Appendix A

Student Google Survey

Questions:

PRE

It is fun reading with you. Do you enjoy it for the most part?

How do you figure out what a word is, if you do not know the word?

How do you rate your word reading skills?
       3 - I can read almost all/all words without extra
       2 - I can figure out words with extra time
       1 - I have a very hard time reading words

POST

Which of the following are most true for you:
       3- It is easy for me to figure out new words.
       2 - It is hard, but I can figure out new words.
       1 - I find it hard to read new words.

How do you figure out what a word is if you do not know the word?

Is it easier to read words when you are reading now compared to at the start of the year?
       3 - Much easier
       2 - The same as before
       1 - Still difficult

Appendix B

Teacher Google Survey

Questions:

<u>PRE</u>
What can you tell me about <u>(student's name)</u> reading abilities in class?
      3 - Strong
      2 - Adequate
      1 - Needs improvement

Does <u>(student's name)</u> read at grade level? (Yes/No, what level)

What strategies, if any, do you observe <u>(student's name)</u> use to read real/nonsense words?
(List the strategies, along with no strategies used.)

<u>POST</u>
What can you tell me about <u>(student's name)</u> word recognition abilities in class?
      3 - Strong
      2 - Adequate
      1 - Needs improvement

Does <u>(student's name)</u> read at grade level? (Yes/No, what level)

What strategies, if any, do you observe <u>(student's name)</u> use to read real/nonsense words?

Has <u>(student's name)</u> word recognition skills improved in the classroom? Evidence to
support growth or lack of growth.

Appendix C

SLANT System Sound Spelling Page

SLANT System®

Name: _____

Date: _____

Sound Spelling Paper

Appendix D

SLANT System "Gotta Know Words"

Gotta Know Words
Compiled From Stage 1-7

a	come	live	woman
the	some	love	women
and	their	above	door
is	your	again	floor
has	from	against	buy
I	two	push	laugh
he	could	pull	busy
his	would	full	Wednesday
as	should	father	February
to	or	move	clothes
of	where	prove	sew
she	does	lose	iron
was	who	whose	heart
for	saw	been	hearth
are	only	friend	eye
put	goes	though	through
what	done	build	half
have	none	people	calf
you	gone	rough	ninth
were	any	tough	answer
her	many	enough	cough
they	pretty	sure	beautiful
said	too	sugar	shoe
do	both	whole	canoe
one	says	flood	straight
once	know	blood	ocean
four	very	often	island
there	give	listen	muscle
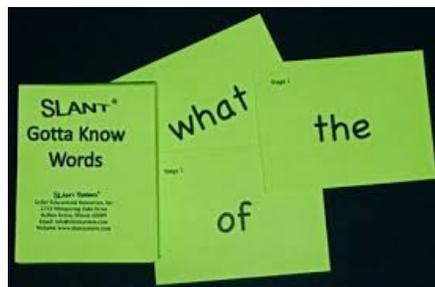
Appendix E

SLANT System "Martian Words" Examples

d	a	g

n	i	f

b	o	t