

The Effect of Multisensory Instruction on Letter Identification  
of Kindergarten Students

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## Abstract

The purpose of this study was to test the null hypothesis that multisensory instruction would not affect a kindergarten student's ability to identify letters. Group one received audio-visual instruction on upper and lower-case letter identification, while group two received multisensory instruction. The measurement tool was Maria Clay's (2013) Letter Identification Subtest from the Observation Survey of Literacy Achievement, Third Edition. This study involved the use of a pretest/posttest design to compare data from January 2016 (before the intervention was administered), to data from March of 2016 (after the intervention was complete). The null hypothesis in this study was supported because there was no statistically significant difference in letter identification between the audio-visual group and the multisensory group. Further research is necessary to determine whether multisensory instruction is the most effective method of instruction for letter identification in kindergarten students.

# CHAPTER I

## INTRODUCTION

### Overview

McCormick and Zutell (2011) explain that a student's ability to read depends on visual letter recognition. According to McCormick and Zutell, studies have shown that the knowledge of letter names is the best predictor of success in reading. They explain that letter recognition is important because students need to recognize letters and their distinguishing features in order to effectively work with print. They point out, "knowledge of letter names does not merely mean a child's ability to recite the alphabet, but rather, being capable of telling the name of a letter when it is seen in print" (p. 448). McCormick and Zutell stress that it is difficult for non-readers to gain control of the skills necessary for reading without the ability to recognize letters. These students are more likely to fall behind their peers in reading acquisition, which leads to gaps in spelling, reading fluency, vocabulary and comprehension skills (Torgesen, 2002).

Each year, Anne Arundel County collects data for the Maryland State Department of Education which shows the readiness of kindergarteners in relation to their care prior to entering kindergarten. At the beginning of the school year, kindergarten teachers measure each child's kindergarten readiness in language and literacy, mathematics, physical well-being, motor development, and social foundations. This data compares children who are taught at home, who have attended a preschool program, or who have attended childcare. These different experiences take children to different levels of readiness upon entering kindergarten, as seen in the Ready at Five, 2013 annual report. For example, a child who is demonstrating readiness is able to exhibit foundational skills

and behaviors that have prepared him for the curriculum-based standards, whereas a child who is displaying minimal foundational skills and behaviors is considered to be at emerging readiness (Ready at Five, 2013). As a result of these different early learning experiences, kindergarten classrooms consist of students who enter school knowing the names of very few letters, while other students may enter kindergarten knowing how to read. In kindergarten, letter recognition is one of the first skills taught. This frequently leads to a discussion among kindergarten teachers about what the most effective way is to teach letters to students with limited prior experience.

As a primary special education teacher for Anne Arundel County Public Schools, the researcher saw firsthand how students enter school with a variety of prior experiences and levels of ability. Each year the kindergarten team of teachers in the researcher's school saw how students who have difficulty learning their letters, also struggle with learning the letter's sound, blending sounds, and then reading words. These teachers also know how the struggle with letter recognition also directly impacts the students' reading and writing skills.

Marcia (1998) explained that Orton supported Gillingham and Stillman's (as cited in Marcia, 1998) findings which directed teachers to assist children in making numerous visual, auditory, and kinesthetic-tactile connections. Preston (1998) emphasizes that multisensory approaches to teaching reading are based on the idea that many students learn best when teachers present their lessons through different modalities. Marcia agrees that, when a teacher uses a multisensory approach, students are learning using two or more modalities at a time. She counselled that multisensory instruction means using visual, auditory, kinesthetic, and tactile senses to learn. Marcia highlighted that, although

it was thought that multisensory methods were only useful for special education students, research has shown that many students can benefit from multisensory instruction.

According to Thorpe and Borden (1985), some of the key benefits of multisensory instruction for students include increased engagement, improved attitudes towards learning, improved information processing, and improved retrieval of learned information. For this study, the researcher engaged kindergarten students with a combination of visual, auditory, and kinesthetic/tactile activities in order to improve their letter recognition abilities.



## **Statement of Problem**

This study was designed to test the null hypothesis that multisensory instruction would not impact a kindergarten student's ability to identify letters.

## **Hypothesis**

This study used the null hypothesis that the given method of instruction will have no effect on the amount of letter identification in kindergarten students. There will be no difference between the amounts of letter identification between the group that received visual and auditory instruction on letter identification skills and the group that received visual, auditory, and kinesthetic/tactile instruction.

## **Operational Definitions**

- Letter recognition was measured by Maria Clay's (2013) Letter Identification Task. This measure is used by kindergarten teachers to monitor a student's progress with his or her letter identification skills.
- Method of instruction for the two groups of students: Students in group one practiced identifying letters using their visual and auditory modalities. Students in group two practice identifying letters using their visual, auditory, kinesthetic, and tactile modalities.

## **CHAPTER II**

### **REVIEW OF THE LITERATURE**

This literature review seeks to explore the effects of multisensory instruction on letter recognition in kindergarten students. Section one provides an overview of the importance of letter recognition. Section two explores the foundations of reading necessary for letter recognition. Section three provides a rationale for multisensory instruction. Section four discusses the benefits of multisensory instruction for letter recognition. Section five explores what multisensory instruction looks like in the classroom, and in section six, a summary is provided.

#### **Importance of Letter Recognition**

Recent research indicates that, “reading depends first and foremost on visual letter recognition” (McCormick & Zutell, 2011, p. 448). Studies have shown that the knowledge of letter names is the best predictor of success in reading. McCormick and Zutell (2011) stress that when children struggle with reading it promotes displeasure, indifference and avoidance for reading. They emphasize that children who fall behind in reading early in their schooling will continue to lag behind their classmates, which is known as the “Matthew Effect”. This is because children who read will tend to read more, but children who struggle with reading tend to read less and their reading skills do not advance (McCormick & Zutell, 2011).

Lennon and Slesinski (1999) suggest that early reading deficits may result in overall problems with academic learning. They agree that, in order to advance, students require direct and intensive instruction at the beginning stages of reading. They believe that intensive instruction provides a diagnostic criterion among students who are easy to

remediate, hard to remediate, or truly learning disabled. They concur that students should receive intensive reading instruction before being classified as special education students (Lennon & Slesinski, 1999).

Bara, Gentaz, Cole, and Sprenger-Charolles (2004) recommend that students should receive instruction that develops their phonological and phonemic awareness. They feel that phonological awareness and phonemic awareness are not enough for students to develop their phonological decoding skills. Their study shows a more effective foundation for students is to receive training in phonological awareness and letter knowledge when learning how to read. McCormick and Zutell (2011) confirm that in order for students to become successful readers they need to acquire phonological awareness, phonemic awareness, and the alphabetic principle.

### **Foundations of Reading Necessary for Letter Recognition**

#### **Phonological Awareness**

According to Caldwell and Leslie (2013), “phonological awareness is the understanding that the English language contains units of sounds that vary in size” (p. 47). They report, “Some of the units have many sounds that are in a syllable and others have just one sound” (p. 47). This study demonstrates that, “Children learn to distinguish the larger units of sound before the smaller units” (p. 47). Caldwell and Leslie conclude that there are three levels of phonological awareness that are important for reading development: the syllable, onset-rime, and phoneme. Current research reveals that children’s phonological awareness should be developed before children start school.

Marcia (1998) emphasizes that children require effective intervention that “stimulates and encourages oral language” (p. 23). This research proposes that in order

to develop a child's phonological awareness, a child needs to hear words that are articulated clearly and have an awareness of speech patterns and phonemes. Marcia suggests that children need to become aware of the placement of their tongue and their mouth and throat muscles while they are speaking. Caldwell and Leslie (2013) agree that phonological awareness has a broader focus which includes identifying and manipulating larger parts of spoken language, such as words, syllables, onsets and rimes, phonemes, and awareness of the other aspects of sounds, such as rhyming, alliteration, and intonation.

### **Phonemic Awareness**

Findings from research on phonemic awareness advise that phonemic awareness can be taught and learned. As children learn to read, their phonemic awareness continues to develop (Armbruster, Lehr, & Osbon, 2000). It is important for students to continually develop their phonemic awareness, so they have an easier time learning how to read (McCormick & Zutell, 2011). Recent studies found that the continual development of phonemic awareness early in school was critical to children's success in learning to read (Graves, Juel, Graves, & Dewitz, 2011).

Phonemic awareness is the insight that spoken words are made up of a sequence of separable sounds (McCormick & Zutell, 2011). Phonemic awareness also involves the understanding that spoken words are made of separate sounds that can be analyzed, manipulated, and represented in print (Lennon & Slesinski, 1999). To build phonemic awareness, children need to hear words as a sequence of sounds and then link those sounds to letters (Armbruster et al., 2000).

According to Foorman et al. (2003), in kindergarten it is important that reading instruction contains phonemic awareness activities that help children grasp the idea of how letters relate to speech sounds. This study shows that what seems to make the biggest difference is instruction where sounds are blended and segmented in speech, and then connected explicitly and systematically to letters in print (Foorman et al., 2003). Current research points out that if children do not know letter names and shapes, they need to be taught them along with phonemic awareness (Armbruster et al., 2000). In addition, phonemic awareness is important because it is the ability to consciously blend sounds into words, segment words into sounds and rapidly name letters (Foorman et al., 2003). This study substantiates that phonemic awareness and the ability to rapidly name letters has to be achieved in order to read words, which requires the reinvention of the alphabetic principle. This research shows that this is because of the intentional connections that have been made between alphabetic letters and the sounds they represent (Foorman et al., 2003).

### **The Alphabetic Principle**

The alphabetic principle is the insight that spoken words can be written by letters (McCormick & Zutell, 2011). In order for children to understand the alphabetic principle, they must understand the concept that letters represent sounds (Gunning, 2010). Marcia (1998) proposes that it is important for teachers to introduce the alphabetic code because not all children can master the code without help. She recommends that the alphabet must be explicitly taught, and the differences between uppercase and lowercase letters must be pointed out. Marcia emphasizes that letter recognition is one of the key tasks of learning to read. This task is difficult because the English language is not

consistent with its one-to-one relationships between letters and sounds (McCormick & Zutell, 2011). This is important because students need to recognize letters and their distinguishing features in order to effectively work with print (McCormick & Zutell, 2011). Letter names provide clues to the sounds associated with the letter, because if a student forgets the sound that a letter represents, the letter's name may help the student remember (Gunning, 2010). As a result, when students learn letter names, they are also learning letter sounds (Gunning, 2010).

Marcia (1998) points out that teachers can also teach common letter patterns, along with the corresponding sounds. McCormick and Zutell (2011) caution that children need to understand the connections between 44 phonemes (sounds) of spoken English and the 26 letters that they represent. This is why that a child who can figure out which sounds are represented by letters has a powerful tool for reading words, according to McCormick and Zutell. On the other hand, a child who cannot figure out letter/sound correspondences will be unable to decode a word that he has not previously read (McCormick & Zutell, 2011). Lennon and Slesinski (1999) warn that when children do not understand the alphabetic principle, they are likely to fall behind their classmates.

### **Rationale**

Students who struggle with reading often have weaknesses in their auditory and/or visual processing (Henry, 2000). They may have weak phonemic awareness skills. This means that they are unaware of the role that sounds play in words. Henry (2000) believes these students have difficulty rhyming words, blending sounds to make words, or segmenting words into sounds. They may also have difficulty acquiring the sight words that children are expected to learn in the primary grades. Furthermore, these

students do not pick up the alphabetic code or system. When these students are taught by a multisensory approach, they have the advantage of learning the alphabetic patterns and words by utilizing all their visual, auditory, kinesthetic/tactile pathways. Henry reminds teachers that, “Orton suggested that teaching the fundamentals of phonic association with letter forms both visually presented and reproduced in writing, until the correct associations were built up” would benefit students of all ages” (p. 4).

### **The Benefits of Multisensory Instruction to Letter Recognition**

According to Lennon and Slensinski (1999), research has found that direct, early instruction based upon a combination of “comprehension based” strategies and “code oriented” strategies that emphasize the alphabetic principle is important in reading achievement. They explained, “code based” approaches like the Orton-Gillingham method advocate the use of “multisensory” instruction to compensate for deficits through the stimulation of multiple senses. One of the advantages of multisensory instruction is that it can engage each child’s different learning style (Shams & Seitz, 2008). Shams and Seitz (2008) indicate that, “Information entering the system through multiple processing channels helps circumvent the limited processing capabilities of individual channels and thus, greater total information can be processed when spread through multiple senses” (p. 415).

Bara et al. (2004) found that, “the effects of adding visuo-haptic and haptic exploration of letters in a reading intervention program for kindergarten students designed to develop phonemic awareness and letter recognition and letter-sound recognition” (p. 435). The results of the study showed that, “Incorporating the visuo-haptic and haptic exploration increases the positive effects of the intervention on the

understanding and use of the alphabetic principle for children and their reading level” (p. 435). At present, there are several multisensory instruction techniques that use a mixture of visual, auditory, tactile-kinesthetic approaches (Shams& Seitz, 2008). Orton concurred with Fernald and Keller’s (as cited in Marcia, 1998) earlier research that showed, “lip and hand kinesthetic elements seem to be the essential link between the visual cue and the various associations” (p. 8). Gillingham and Stillman (as cited in Marcia,1998) believe that “Children should see a letter, trace it, and then say the letter name and the corresponding sound connection in order to learn their letters and corresponding sounds” (p. 10).

Current research validates Orton’s principles of reading instruction within a structured sequential multisensory model. Instruction must be based on learning the structure of the English language and its alphabetic code, and contain phonologically based training (Marcia, 1998). Flynn (2005) notes that the Orton Method stresses the importance of the senses of seeing, hearing and feeling. She explains that learning takes place through visual, auditory, and kinesthetic-tactile modalities. These modalities process information in a way that helps students to compensate for specific processing difficulties. Additionally, the kinesthetic-tactile modality is activated by motor activity through body muscles and speech organs which functions as the “glue that bonds the information to the brain” (Flynn,2005, p.20). Flynn suggests, “Starting with the teaching of individual letters, the visual and auditory pathways are strengthened by the simultaneous introduction of the motor elements of speech and writing” (p. 20). Students benefit because, “Multisensory instruction establishes the association between letter units and their sounds in both directions” (p. 20). Flynn reported, “That this



association is developed when students see a letter and say a sound and then the teacher says a sound and students respond by naming the letter and writing it “(p. 20).

Additional research that supports multisensory approaches includes Thorpe and Borden’s (1985) study which provides an explanation for positive results generated through the use of multisensory instruction. Thorpe and Borden explain that, “children’s visual attention is drawn to manual tasks and that the manual component increases a student’s visual attendance of what is being learned” (p. 279). Their research supports that these findings are powerful because the visual and auditory modalities are thought to be the most efficient of all of the sensory receptors. Thorpe and Borden propose that students, “cannot effectively trace a letter or word without looking at it” (p. 279). Their research suggests that a kinesthetic/tactile element increases the probability of visually attending to the learning task because, “Multisensory approaches produce superior results in on task behaviors and short-term learning” (p. 286). Additionally, Thorpe and Borden propose that the kinesthetic/tactile component keeps students attending to instruction and enhances their learning.

### **Multisensory Instruction in the Classroom**

When teachers use multisensory instruction in their classrooms, they are teaching children to link letters with the written symbol (Henry, 2000). With multisensory instruction, children also link the sound and symbol with how it feels to the letter or letters. As students learn a new letter or pattern (such as t or ch), they carefully trace and then write the letters while saying the corresponding sound. During instruction, the sound may be made by the teacher, the letter name is provided by the teacher, and the letter name is provided by the student. When multisensory instruction is used in the

classroom, teachers and students learn to rely on visual, auditory, kinesthetic/tactile pathways for learning instead of using a traditional method like memorizing sight words or phonetic methods (Henry, 2000).

### **Summary**

In conclusion, the benefits of multisensory instruction on letter recognition for kindergarten students have been discussed in multiple studies. This review explained that multisensory instruction contains visual, auditory and kinesthetic/tactile components. This review also explained that learning takes place through visual, auditory, and kinesthetic/tactile modalities which can engage each student's learning style and increase his or her attention to task.

## **CHAPTER III**

### **METHODS**

#### **Design**

This study was designed to test the null hypothesis, to determine whether multisensory instruction impacts a kindergarten student's ability to identify letters. An experimental independent pretest/posttest design with random assignment of participants to groups was used to conduct this research. In this study, the dependent variable was letter recognition, as measured by Maria Clay's Letter Identification Subtest from the Observation Survey of Literacy Achievement, Third Edition (Clay, 2013). The independent variable was the method of instruction received. During the third quarter of the 2015-2016 school year, group one received instruction designed to engage the student's visual and auditory modalities. Students in group two received multisensory instruction; the purpose of this was to involve their visual, auditory, and tactile/kinesthetic modalities. The length of this study was approximately six weeks, from February to March of the given school year.

#### **Participants**

The participants in this study were kindergarten students enrolled in a National Blue Ribbon elementary school in a primarily middle-class neighborhood in the Southern district of Anne Arundel County, Maryland. The school has 589 students enrolled, and the school's FARM rate is 26%, which is a 7% increase from the previous year.

The school has different clubs and programs that provide learning and enrichment opportunities for students and their families. Some of the programs and clubs that the school offers are "Operation Read," a literacy outreach, "Little Learner," a preschool

program that targets future students and their families, a chemical engineering club, dance team, chorus, 24 Club and mentoring for at-risk students. The majority of the students live within walking distance to the school. Most of the students in this community live in condominiums, townhouses, or single-family homes.

The eight students in this study were from two different kindergarten classrooms. Specifically, participation was based on teacher identification of students who were struggling with their letter identification skills. Teachers used formative assessments and student conferencing to assess their students' ability to identify letters. Names were drawn to randomly assign students to their group, and both groups were taught by the same instructor.

The School Improvement Plan for this school includes analyzing data to ensure that students who are having difficulty demonstrating mastery of Common Core standards are receiving appropriate reading interventions in the classroom or in other settings. The students who were selected from each class were considered at risk by their kindergarten teachers and in need of reading intervention. Group one consisted of three male students and one female student. In group one, there were two African American students and two Caucasian students. Group two consisted of two female students and two male students. In group two, there was one African American student, three Caucasian students, and one student who was considered FARMS.

## **Instrument**

The instrument used in this study was the Maria Clay Letter Recognition Subtest from the Observation Survey of Early Literacy Achievement, Third Edition (Clay, 2013). According to the Buros Mental Measurement Yearbook (2003), this assessment is an appropriate measure for students in kindergarten through third grade and consists of six subtests. The letter identification subtest is designed to determine which alphabetic symbols students can identify. Reviews for this assessment are pending for the Twentieth Mental Measurements Yearbook and will be available when completed.

The Observation of Early Literacy Achievement was reviewed and rated as a screening tool by the National Center for Response to Intervention. The NCR II assigned the assessment the highest possible rating and can be used by school psychologists, special educators, and classroom teachers as an evidence-based screening instrument for at-risk students. The observation survey is a teacher-administered standardized assessment (Clay, 2013).

## **Procedure**

### **Formation of Groups and Testing Administration**

Two samples of at-risk students were identified as experimental and control groups. Each sample consisted of four students who were five and six years old. Each of the eight students was assessed in January on lowercase and uppercase letters of the alphabet using Marie Clay's (2013) Letter Identification task. The students were tested individually in a quiet resource classroom while sitting alone with the researcher at a kidney-shaped table. Students were presented with a page of mixed uppercase letters.

The students were asked to name the uppercase letters. Their responses were recorded on a student response sheet. Then students were presented with a page of mixed lowercase letters. Their responses were recorded on a student response sheet. Each student was given a numerical score representing the correct number of letters identified, and the assessment results served as baseline data.

For this study, students were randomly assigned to two treatment groups. After pretesting, the instructor randomly assigned students to the treatment groups by drawing their names out of a plastic cup. Both the experimental and control groups worked for six weeks (20 days) on learning and practicing letters. The control group was taught letter names through their visual and auditory modalities. The experimental group was taught letter names using visual, auditory, kinesthetic, and tactile modalities (multisensory). After six weeks of instruction, students were again assessed in March, just as they were in January. The instructor developed the lesson plan for both conditions and piloted the lesson plan prior to instruction.

### **Similarities in Instruction Received by Both Groups**

After testing and forming the groups included in this study, the homeroom teachers delivered daily phonics instruction to both groups of students in a whole group setting, along with the remainder of their peers. The instruction followed the phonics curriculum which was the Anne Arundel County curriculum for the given school year. The letter recognition lessons which were included in this study were approximately fifteen minutes daily and ran from the end of January 2016 thru the second week of March 2016. Instructional lessons for each group took place in the same classroom at the same kidney-shaped table. Students in both groups also received small group instruction

during literacy center time, when students were grouped according to ability level, using Fountas & Pinnell reading levels. During guided reading, students received further practice of skills that were taught during whole group lessons at their own level for 10-15 minutes, five days per week. Students received further practice on their letter identification skills in their small group for 15 minutes, four days per week. With both groups, the practice was conducted for six weeks as a supplement to phonics lessons. Students also received corrective feedback during their practice sessions. Therefore, both groups in this study received an equal amount of instructional time, both within whole group and small group, the difference being the actual materials and instruction used during the given time frame.

### **Group One: Instructional Methods**

The goal of the instruction given to group one was to utilize the students' visual and auditory modalities while learning the alphabet. The materials for this lesson were one deck of alphabet (with picture) flashcards and three uppercase letter tiles and three lowercase tiles per student. Each lesson began with the teacher leading the students through a flash card drill of the entire alphabet. The students echoed back each of the alphabet card's letter and keyword. The instructor then introduced three focus letters per lesson. The letters were chosen in sequential order. The instructor provided three uppercase focus letters and three lowercase letters to each student. The instructor then engaged the students in a game of "I Spy". The instructor would say, "I Spy" a lowercase a." The instructor would then say, "Once you find the lowercase a, turn it over." "I Spy a lowercase c; once you find the lowercase c, turn it over." "I Spy" an uppercase B; once you find the uppercase B, turn it over". (This dialogue would continue

until all six of the uppercase and lowercase letters were turned over.) The instructor would then have the students slide all of the face down alphabet cards into the center of the table.

Next, the instructor would engage the students in a game of “Freeze.” Each student took turns flipping over one letter card and then named that letter. If the student correctly identified the letter, he or she kept the letter. If the student did not correctly identify the letter, the teacher said, “Freeze, let’s see if anyone can help.” The student then solicited help from another group member to help identify and name the letter. The same focus letters were used for two consecutive lessons. When the next three focus letters were introduced, these letters were used for the “I Spy” and “Freeze” activities.

### **Group Two: Instructional Methods**

The aim of the multisensory instruction for group two was to engage the students’ visual, auditory, and kinesthetic/tactile modalities while incorporating hands on manipulatives and materials into each letter identification lesson. The materials for this lesson were five cookie sheets filled with green, red, white, blue, and beige sand; tactile uppercase and lowercase letters; sand paper squares with uppercase and lowercase letters printed on them; whiteboards with dry erase markers; preprinted alphabet cards with dry erase markers for letter formation practice preprinted letter cards with a plastic overlay that students traced with their fingers and a deck of flash cards.

During instruction, three letters were focused on for two consecutive days. The letters of the alphabet were taught in sequential order. The instructor varied the materials and supervised the activities daily at the kidney-shaped table. While the students were rotating through the different activities, the instructor monitored the group in order to



make sure the students were slowly tracing the letters, properly sky writing their letters, and saying the correct letter name. In order to ensure that the students were saying and tracing the letter properly, the instructor showed the students a flashcard with the letter and the picture of the keyword. (For example, the flashcard for the letter Aa would also have a picture of an apple.) The students traced the letter Aa and said the letter name and the keyword three times and then rotated to the next activity. At the next activity, the students then traced and named the letter Aa and the keyword three times before they rotated to the next activity.

The students rotated through three different activities for each letter. Before introducing the next letter, the instructor changed the materials that the students used in order to keep their interest. The instructor asked the students what color sand they would like and then switched trays. The instructor also substituted sand paper with the letters printed on it for the store-bought tactile letters. The instructor introduced the next flashcard, the letter (Bb) and keyword (ball), and monitored the students as they traced and named the Bb letter/keyword combination (three times). The students then rotated to the next activity. The instructor introduced three letters a session using the same script and routine, and the same letters were used for two consecutive sessions.

### **End of Study: Posttests**

After both groups received instruction for the same amount of time, posttests were administered in order to compare student achievement. The scores from the Maria Clay (2013) Letter Identification Subtest from group one were compared to the scores of group two at the conclusion of the study in order to see which method of instruction more

effectively aided knowledge of letter identification by the end of the six-week period.

## CHAPTER IV

### RESULTS

The purpose of this study was to test the null hypothesis that multisensory instruction would not impact a kindergarten student's ability to identify letters. Two groups of kindergarten students received two types of instruction in letters; group one received audio visual instruction, and group two received multisensory instruction. Pretest and posttest results from Maria Clay (2013) Letter Identification subtest are presented in Table 1 below.

Table 1

*Pre and Posttest Results in Kindergarten Students Receiving Two Types of Letter Identification Instruction*

Test	Group	Mean	N	St. Dev	t	Significance
Pretest Uppercase	Audio/Visual	18.0	4	2.16	1.71	0.14
	Multisensory	13.3	4	5.12		
Pretest Lowercase	Audio/Visual	15.8	4	5.56	0.94	0.38
	Multisensory	12.0	4	5.72		
Pretest Total	Audio/Visual	33.8	4	7.72	1.28	0.25
	Multisensory	25.3	4	10.81		
Posttest Uppercase	Audio/Visual	22.8	4	2.75	0.23	0.83
	Multisensory	23.3	4	3.40		
Posttest Uppercase	Audio/Visual	24.8	4	2.12	0.86	0.42
	Multisensory	22.3	4	5.38		
Posttest Total	Audio/Visual	49.8	4	5.44	0.84	0.43
	Multisensory	45.5	4	8.51		

The hypothesis that there will be no difference in the performance on letter identification for a group taught by audio visual and group taught by a multisensory instruction approach was supported.

## **CHAPTER V**

### **DISCUSSION**

The purpose of this study was to test the null hypothesis that multisensory instruction would not impact a kindergarten student's ability to identify letters. Two groups of kindergarten students received instruction on letter identification skills. One group received audio-visual instruction, while the other group received multisensory instruction. Neither group differed significantly in either the pretest or posttest on uppercase, lowercase, and total score. The null hypothesis in this study was supported because there was no statistically significant difference in letter identification between the audio-visual group and the multisensory group on a pre/posttest analysis. The data collected does show, however, that there was an increase in scores for each individual student.

#### **Implications for Teaching**

Since both groups of students demonstrated improvement, these results suggest that frequent small group instruction helped increase a student's letter identification skills. The small group size and the frequency of instruction helped students in both groups learn their letters. The students were provided with additional instructional time which contributed to their letter identification skills. Another reason that the small group instruction was beneficial is that the instructor could individualize instruction by providing one-on-one instruction to students when they did not know a letter. The instructor was also capable of providing students with immediate error corrections. During both small groups' instructional time, there was more student engagement and fewer disruptions.

While there was not a significant difference between the two groups, there was a higher level of interest and excitement in the multisensory group's materials. The students loved the sand trays filled with different colored sands. The sand trays provided a tactile learning experience as students traced upper and lowercase letters with their pointer fingers. For this reason, kindergarten students should be given the opportunity to learn their letters through multisensory experiences.

Overall, the multisensory instruction centers that students rotated through were more exciting and memorable experiences for them. The students were able to see the letter and say the letter name while exploring the letter tactically and kinesthetically. The multisensory activities gave students the opportunity to identify letters through different pathways and then form their own connections for each letter. By providing different sensory experiences, teachers can help their students learn and retain information. However, teachers must act as facilitators to make sure that students use the multisensory materials for the intended instructional purpose. While facilitating a lesson, the teacher needs to be aware that students are saying the correct letter name for the letter symbol that they are tracing. The teacher also needs to make sure that students are looking at the letter that they are tracing.

### **Threats to Validity**

One threat to internal validity of this study is the small sample size. In this study there were eight participants, which made it impossible to have a completely random sampling system. A larger sample size may have yielded different results. Due to the small sample size, non-educational factors outside of school may have impaired the

ability to generalize results to other populations. For example, some students have support at home and practiced their letter identification skills with parents daily.

Two other threats to the validity of this study were consistent participation and sample selection. There were several days when students were absent. If the same student was absent for several days, he/she missed complete instruction for three letters. Additionally, the scheduling of the study was difficult to control in an unpredictable school environment. For example, snow days, absences, and school events were out of the researcher's control and interfered with the consistent scheduling of the intervention groups as planned by the researcher.

Due to the nature of this study, a true random sample was not attainable. The students were selected by their teacher based on formative classroom assessments. By using the table of random numbers, the members of the sample would have been selected by chance. A table of random numbers insures that each student has an equal and equivalent chance of pulling his or her name out of a hat. Another threat to validity was the length of the study. If the instruction had taken place over a longer time and the two methods of instruction do have different effects, the posttest may have been significantly different between the two groups.

### **Connections to Previous Studies/Existing Literature**

This study connects to previous studies and literature in several ways. For example, Armbruster et al. (2000) stress that phonemic awareness be taught and learned. They point out that if children do not know letter names and shapes, they need to be taught them along with phonemic awareness. In this study, the participants were taught letter names and shapes during small group instruction. The control group learned letter

names and shapes through their visual and auditory modalities, while the experimental group learned letter names and shapes through their visual, auditory, and kinesthetic-tactile modalities.

Foorman et al. (2003) advise that phonemic awareness is important because it is the ability to consciously blend sounds into words, segment words into sounds, and the ability to rapidly name letters. In this study, students were chosen because they could not identify all of their letters. The instruction was designed to give students in both groups multiple exposures to the daily “focus letters” in order to aid students in their letter identification skills. In this study, students in control and experimental group received instruction that explicitly taught the same three letters in order to help students develop their ability to rapidly name letters.

Another connection this study makes to existing literature is when Marcia (1998) proposed that it is important for teachers to introduce the alphabetic code because not all children can master the code without help. Marcia recommends that the alphabet must be explicitly taught, and the differences between uppercase and lowercase letters must be pointed out. In this study, both instructional groups were explicitly taught uppercase and lowercase letters. The control group was taught uppercase and lowercase letters through their visual and auditory modalities. The experimental group was taught uppercase and lowercase letters through multisensory (visual, auditory, kinesthetic/tactile) instruction.

### **Suggestions for Future Research**

The research in this study implies that future research and investigation should be conducted on the effects of multisensory instruction on letter recognition in kindergarten students. The following are things should be done differently:

- Extend the time frame from six weeks to one school year. This study only looks at the short-term effects of multisensory instruction. If the study were longer, the null hypothesis may be rejected, and there may be a statistical difference found between the auditory-visual group and the multisensory group. A longer study may demonstrate a statistical difference that shows that students benefit from multisensory instruction.
- Create a larger sample size. Extending the time frame of the study to cover a school year would create a larger sample size with a more diverse selection of students.
- Rewrite the problem statement to include sounds. (The effects of multisensory instruction on letter recognition and sounds on kindergarten students). The students who participated in this study also need to have their letter and sound connections developed.
- Create interview questions for students. This would provide teachers with information about which activities the students liked the best and why they like these activities.



## References

- Armbruster, B., Lehr, F., & Osbon, J. (2000). *The research building blocks for teaching children to read*. Jessup, MD: National Institute for Literacy at Ed Pubs.
- Bara, F., Gentaz, E., Cole, P., & Sprenger-Charolles, L. (2004). The visuo-haptic and haptic exploration of letters increases the kindergarten-children's understanding of the alphabetic principle. *Cognitive Development, 19*(3), 433-449. Retrieved from <http://seach.ebscohost.com/login.aspx/direct=true&db=eric&AN=EJ73H53>
- Buros Institute of Mental Measures. (1940). *Mental measurements yearbook with tests in print*. Lincoln, NE: Buros Institute of Mental Measurements. Retrieved from <http://burosunl.eu/buros/jsp/search.jsp>
- Caldwell, J., & Leslie, L. (2013). *Intervention strategies to follow informal reading inventor assessment*, (3<sup>rd</sup> Ed.). Boston, MA: Pearson.
- Clay, M., (2013). *An observation survey of early literacy achievement*. Portsmouth, NH: Heinemann.
- Flynn, E. (2005). *The abcs of o-g, the Flynn system*. Multisensory Learning Associates, Rehoboth, MA.
- Foorman, B. R., Chen, D., Carlson, C., Moats, L., Francis, D. J., & Fletcher, J. M. (2003). The necessity of the alphabetic principle to phonemic awareness instruction. *Reading and Writing: An Interdisciplinary Journal, 16*(4), 289-324.
- Graves, M., Juel, C., Graves, B., & Dewitz, P. (2011). *Teaching reading in the 21<sup>st</sup> century, motivating all learners*. Boston, MA Pearson Education
- Gunning, T. (2010). In Ramos A. (Ed.), *Creating literacy instruction for all students* (Seventh Edition Ed.). Boston, MA: Pearson.

- Henry, M (2000). *Just the facts...multisensory teaching*. Baltimore MD: The International Dyslexia Association. Retrieved from <http://www.winterdys.org>
- Lennon, Init., & Slesinski, J. E. (1999). Early intervention in reading: Results of a screening and intervention program for kindergarten... *School Psychology Review*, 28(3), 353.
- Marcia, H. K. (1998). Structured, sequential, multisensory teaching: The Orton legacy. *Annals of Dyslexia*, 48(1), 1-26
- McCormick, S., & Zutell, J. (2011). In Ramos A. (Ed.), *Instructing students who have literacy problems* (6th Ed.). Boston, MA: Pearson.
- Preston, L.D. (1998), *Multisensory approaches to reading*, Retrieved from <http://www.med.ufl.edu/mdtp/resources/MultisensoryReading.htm>
- Ready at Five. (2013). Anne Arundel County, Retrieved from <http://www.readyatfive.org>
- Shams, L., & Seitz, A. R. (2008). Benefits of multisensory learning. *Trends in Cognitive Sciences*, 12(11), 411-417.
- Thorpe, H., & Borden, K. (1985). The effect of multisensory instruction upon the on-task behaviors and word reading accuracy of learning disabled children. *Journal of Learning Disabilities*, 18 (5).