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The effect of music intervention on kindergarten phonological awareness skills

Brittney Welch

The Effect of Music Intervention on Kindergarten Phonological Awareness Skills

By

Brittney Welch

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This Graduate Field Experience
For Brittney Welch
Has been approved for Cardinal
Stritch University by

_____
Luann Dreifuerst

_____
(Date)

Abstract

The purpose of this study is to determine if a music intervention in a Kindergarten classroom will result in an increase in students' phonological awareness abilities. Five kindergarten students participated in a six-week study in which they received teacher-led, small-group interventions for 20 minutes three times a week. The students showed significant growth in segmenting, rhyming, and syllable segmentation as a result of the intervention. Music instruction was concluded to be an effective tool for delivery of phonological awareness instruction due to the relationship between music processing and language processing.

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Chapter One

Introduction

In this study, five children from a Midwestern city were included in an intervention targeted on phonological awareness skills. Three of the students were female and two were male and all students qualified for free and reduced lunch, indicating that their families lived below the poverty line. The students attended a choice school, which served African-American students, Latino students, and Hmong students. Of the students included in this study, Three were African-American and two other Latino/as. This study took place within the boundaries of an existing Kindergarten classroom in which the students were all a part of. The students had been in class together with the same teacher for close to two years. The students were nearing completion of 5-year-old Kindergarten.

These students were chosen for inclusion in the study due to their low performance on skills like rhyming, segmenting, blending, phoneme isolation, and syllable counting which are all skills that are foundational for reading and literacy development. These skills are required to be taught by the Kindergarten Common Core standards in which the English Language Arts standards are split up into three reading strands. The foundational skills strand has the following phonological awareness components:

- RF.K.2 - Demonstrate understanding of spoken words, syllables, and sounds (phonemes).
- RF.K.2a – Recognize and produce rhyming words.
- RF.K.2b – Count, pronounce, blend, and segment syllables in spoken words.

- RF.K.2c – Blend and segment onsets and rimes of single-syllable spoken words.
- RF.K.2d – Isolate and pronounce the initial, medial vowel, and final sounds (phonemes) in three-phoneme (consonant-vowel-consonant, or CVC) words.
- RF.K.2e – Add or substitute individual sounds (phonemes) in simple, one-syllable words to make new words.

The intervention in this study is designed to target these specific standards in order to get students to mastery before first grade. In chapter two, I will explain the studies that helped me formulate the model of my research while in Chapter three, I will explain in detail the structure, sequence, and procedure for the study as well as the implementation and methods of data collection in the classroom. Chapter four will present the data collected and conclusions formed, comparing students phonological awareness abilities from the start of the study to the conclusion of the study. Finally in Chapter 5, the results of my research and a discussion of the strengths and weaknesses of my study will be presented with suggestions for further interventions needed for this group of students as well as recommendations for future studies in this area of instruction.

Chapter Two

A Review of the Literature

The art of early childhood education is mastering the learning process and effective instruction of emergent readers. As an emergent reader, a child is faced with the task of mastering multiple concepts and facets of the English language. According to the congressional National Reading Panel (2000), reading instruction is comprised of five big ideas: phonemic awareness, alphabetic principle, fluency with text, vocabulary, and comprehension. All these domains need to be taught in an early childhood classroom to ensure successful development of the skills necessary to become literate.

In this study, developing a child's phonological awareness was the focus; that is, developing his/her ability to hear and manipulate the sounds in spoken words, as well as the understanding that spoken words and syllables are made up of sequences of speech sounds (Yopp, 1992). In order to determine best practices for teaching phonological awareness, teachers and educational leaders rely on research. The analysis of previous research studies revealed the success of changes in whole-group literacy instruction as well as targeted small-group intervention, and the research also showed potential for the most growth in students' phonological awareness, specifically phonemic awareness. Phonemic awareness relies upon a students' ability to manipulate and differentiate the sounds in spoken language. This focus on auditory skills as a precursor to reading lent itself to the incorporation of music instruction as a vehicle for phonological awareness growth.

This chapter examines the previous research studies on the use of music instruction to improve phonological awareness in emergent readers. First, the importance of phonological

awareness ability as a factor in reading success in children will be determined. Next, the relationship between music ability and phonological awareness ability will be examined. Finally, the successes and limitations of previous music interventions to target early reading skills will be discussed.

The Need for Phonological Awareness Instruction

Two recent studies have examined the importance of developing a young child's phonological awareness abilities in order to reduce future risk of developing reading difficulties. A 2001 research study by Ehri et al focused on phonemic awareness and its prediction of later reading success. Phonemic awareness refers to the ability to focus on and manipulate phonemes - the smallest unit comprising spoken language - in spoken words. This study, as well as other studies measuring phonological awareness, uses a variety of tasks to measure a student's ability. These tasks include:

- phoneme isolation - identifying the beginning, middle or ending sound in a word;
- phoneme identification - recognizing similar sounds in words (ex. which sound is the same in *bike, boy* and *bell)*;
- phoneme categorization - recognizing the odd sound in a sequence of words(ex. which word does not belong *bus, bun,* or ***rug***);
- phoneme blending - listening to a sequence of separately spoken sounds and combining them to form a word (ex. which word is /b/ /a/ /t/ ***bat***);
- phoneme segmentation - breaking a word into its sounds (ex. break down the word fox **/f/ /o/ /x/**); and

- phoneme deletion - recognizing which word remains when a specified phoneme is removed (ex. what is *smile* without the /s/? ***mile****).*

Phonological awareness is a more encompassing term referring to phonemic awareness as well as the awareness of larger spoken units such as syllables and rhyming words (Ehri, 2001). The study was a meta-analysis evaluating the effects of phonemic awareness (PA) instruction on learning to read conducted by the National Reading Panel. 52 studies were analyzed and the impact of PA instruction on children's acquisition of phonological awareness was large and statistically significant. Studies included in this meta-analysis were experimental studies that administered PA instruction to students, by using a control group receiving non-PA instruction or no instruction and that measured the impact of PA instruction on reading outcomes. PA instruction was found to help various types of children including normally developing readers, at-risk and disabled readers, emergent readers, and students of low socioeconomic status (Ehri et al, 2001).

The results of the study found that phonemic awareness, and more broadly phonological awareness, is one of the best predictors of how well children will learn to read. The researchers found that PA instruction's impact may be greatest in preschool and kindergarten, and become smaller beyond first grade. The study found benefits of PA instruction were replicated multiple times across experiments and thereby provide solid support for the claim that PA instruction is helping children acquire reading and spelling skills. The researchers also found that students were most successful in interventions that focused on only one or two PA skills rather than multiple skills at a time; this approach allowed for greater mastery and less confusion for students (Ehri et al, 2001).

In 2001 a group of speech and language pathologists noted that they have an active role in the prevention, identification and remediation of reading disabilities, which often have concomitant oral language deficits. Hugh Catts, Marc Fey, Xuyang Zhang, and J. Bruce Tomblin researched a wide range of early literacy indicators to determine which measures were most useful in uniquely predicting risk for reading difficulties. Problems in oral language are typically observable before children begin formal reading instruction; therefore isolating the key predictors predicting risk for reading difficulties is helpful to early childhood educators. 328 students who were identified as having language and/or nonverbal impairments from a previous epidemiologic study conducted by the Child Language Research Center (CLRC), a federally funded center for the study of language impairments in children, were chosen as participants in this study. Also chosen for this study were 276 typically developing children from the study, bringing the total number of participants to 604 children (Catts et al, 2001).

Students were given a battery of tests including: a conventional test of language abilities, measure of narrative abilities, and measures of phonological awareness, rapid automatized naming, letter identification, and nonverbal cognitive abilities. Due to the large quantity of participants, students were tested between November and May. The results of the study identified 183 students as having reading difficulties in second grade and 421 children without. This proportion was higher than from a representative sample, which was expected due to the large proportion of children with language and/or nonverbal deficits used in the study. Scores were weighted to ensure results were representative of good and poor readers from the general population; when weighted, the prevalence of reading difficulties in the sample was 15.1% (Catts et al, 2001).

After examining the kindergarten measures, five significant variables uniquely predicted the probability of reading difficulties in second grade. The best predictor was letter identification, followed closely by sentence imitation, mother's education, deletion and rapid automatic naming. The researchers concluded that children who have a probability of reading difficulties greater than .30, based on their model equation using each assessment, but who do not otherwise qualify for speech-language intervention based on follow-up testing should receive language and literacy intervention in the classroom beyond regular classroom curriculum. To address the weaknesses in oral language and phonological awareness, phonological awareness and sound-letter correspondences should be targeted more directly than is typical in most classrooms (Catts et al, 2001). Although phonological awareness was not found to be the best predictor of students' reading success, elements of phonological awareness ability were listed in the top five indicators of success according to Catts et al (2001). These include, sentence imitation and phoneme deletion. When taken in combination, these two studies show the usefulness of phonological awareness instruction to develop students' early reading ability.

Relationship Between Music Ability and Phonological Awareness Ability

A 2002 study by Anvari, Woodside, and Levy, examined the relations among phonological awareness, music perception skills, and early reading skills in a population of 100 4- and 5-year-old children. Research has proposed that auditory skills used in processing language mirror the skills necessary for music perception such as rhythmic, melodic, and harmonic discrimination (Anvari et al, 2002). The children studied were administered a set of music tasks that focused on rhythm, melody, and chord processing, a set of phonemic

awareness tasks, and a standardized measure of reading development (WRAT 3). Anvari's study aimed to examine the relation between musical processing and phonemic awareness, as well as to examine how these factors are related to reading development. The sample consisted of 50 4-year-olds and 50 5-year-olds from a variety of schools and daycare centers (Anvari et al, 2002).

The children were tested over the course of five 30-minute sessions. Tasks were given to children individually with practice rounds to ensure understanding. The phonological awareness tasks covered these skills: rhyme generation, oddity in beginning, middle, and ending sound (which has a different beginning sound can-cat-car-sun), and blending onset and rime (/c/-/at/). In addition, children were given the Rosner Test of Auditory Analytic Skills, a standardized test which measures identifying, segmenting, deleting, and recombining the component syllables and sounds in a word. In addition to these phonemic awareness tasks, reading, vocabulary and music skills were measured. The students were tested on the following music skills: same/different rhythm discrimination, same/different melody discrimination, same/different chord discrimination, rhythm production, and chord analysis (Anvari et al, 2002).

The results of this study indicated that music perception skill is reliably related to phonological awareness and early reading development. This relation suggests that they may share some of the same auditory mechanisms. Phonological awareness requires the listener to be able to segment speech into its component sounds, and to recognize sound categories across variations in pitch, tempo, speaker and context. The perception of music also requires the listener to be able to segment the stream of tones into relevant units, and to be able to recognize compositions across variations in pitch (key), tempo, performer, and context (Anvari

et al, 2002). A student's music perception skill predicts reading ability even after the variance shared with phonemic awareness is removed; implying, that phonemic awareness and music perception ability tap some of the same basic auditory and/or cognitive skills needed for reading (Anvari et al, 2002).

Another experiment conducted in the same year as Anvari et al (2002) set out to examine the relationship between phonological awareness and musical aptitude. The study conducted by Dr. Zehra F. Peynircioglu, Dr. Aydyn Y. Durgunoglu, and Dr. Banu Oney-Kusefoglu measured phonological awareness task performance: children with high musical aptitude vs. children with low musical aptitude. The examiners controlled for any influence of schooling procedures by using only children who could not yet read; meaning, any growth in phonological awareness task ability would be from the musical intervention, not word pattern recognition (Peynircioglu et al, 2002).

The children in the researchers study were 40 children whose ages ranged from three to six years in various public and private kindergartens, preschool programs, and day-care centers in the greater Washington DC area. All were native English speakers and none knew how to read. Half of the study participants ranked high in musical aptitude and half ranked low, as determined solely by performance on an aptitude test measuring pitch and rhythm, the two major components of musical aptitude. Any previous musical experience the children may have had was not taken into account (Peynircioglu, 2002).

The examiners measured results by asking children to perform two different tasks, phoneme deletion and tone deletion. The study found that on both tasks students with a higher musical aptitude performed better on the verbal phonological awareness tasks. The main

finding was a link between musical aptitude and phonological awareness. The researchers concluded that high musical aptitude which indicates sophisticated pattern analysis skills seems to enhance sound manipulation in general, including the ability to manipulate linguistic sounds (Peynircioglu, 2002).

Two later studies built on the relationship between musical aptitude and phonological awareness ability established by both Anvari et al and Peynircioglu et al. In 2005, Johnathan Bolduc (2005) examined the relationship between pitch awareness and a child's phonological awareness skills; if a young child has strong pitch processing skills, he/she would be better able to apply those skills to language in the form of phonological awareness processing. The thirteen students in the study were in the same preschool program at the same school in France. The students participated in a musical awakening program every two weeks for 30 minutes each session. Students were tested for pitch awareness using the Primary Measures of Music Audiation Test (PMMA). Students were asked to identify two-sound sequences as the same or different. For phonological awareness ability, students were tested using a French language test for phonological ability. Students were given a set of six tasks to assess their ability. These tasks included syllable identification, initial syllable matching, rhyme identification, initial phoneme identification, initial phoneme categorization, and initial phoneme (Buldoc, 2005).

The results of the study showed that students who scored above average on pitch tasks also scored above average on the phonological awareness tests; the lower the pitch processing scores a child had, the lower his/her phonological test results were as well. Results showed a significant correlation between pitch processing and phonological skills (Buldoc, 2005).

Marie Forgeard conducted the last study that measured music ability in relation to phonological awareness along with colleagues, Gottfried Schlaug, Andrea Norton, Camilla Rosam, Udita Iyengar, and Ellen Winner at Harvard University. They expanded the hypothesis to compare the correlation between music aptitude and phonological awareness skills in normal-reading children as well as dyslexic children. The examiners set out to find a relationship between music ability and reading skills. Ten children were tested for reading ability in a longitudinal study over 14 months. Six children formed the music group as they had received an average of 20 weeks of instrumental training; four children were the control group having received no music training. Children's reading skills were measured using three subtests of the Woodcock Reading Mastery Tests. This study, although using a small sample size, found that auditory musical skills are strongly related to reading abilities in normal-reading children. In the Word Attack subtest, music skills accounted for almost all of the variance between groups with the musically inclined students significantly out-performing their peers (Forgeard et al, 2008).

The study found that in normal-reading children, melodic discrimination abilities predicted both phonological and reading skills but rhythmic discrimination abilities only predicted reading skills. These relationships were stronger in children with music training, suggesting that music training may help develop language-related skills. In children with dyslexia, auditory musical discrimination abilities predicted phonemic awareness, which in turn predicted reading abilities (Forgeard et al, 2008).

In all studies that sought to establish a relationship between music ability and phonological awareness ability, a positive correlation was found. An increased musical aptitude correlated with an increase in phonological awareness and reading ability. Forgeard et al (2008)

expanded the investigation of the relationship to a population of students with dyslexia and the relationship was found to be the same. This relationship forms the basis for future musical interventions to aid reading ability and phonological awareness.

Music Interventions to Aid Phonological Awareness and Early Reading Skills

One of the first to study music's effects in a classroom setting was Douglas Fisher's study in 2001. He focused on four classrooms at the same school over two years, following four teachers and 80 students through Kindergarten and first grade. The aim of the study was to determine the effect of a music-enriched classroom versus a non-music-enriched classroom on an English-language learner (ELL) student's literacy performance. All students spoke Spanish at home and qualified for free or reduced lunch indicating low socio-economic status. They were randomly assigned to one of the four classrooms; two of the classrooms were music-enriched and two were not. All four teachers had a three-hour literacy block including time for reading aloud, guided reading, writing, independent reading, and working with words and followed the same curriculum at the same pace, as planned together. Two of the teachers used music as an instructional material during the literacy block while the other two only had a CD player in the classroom for playing books on tape – no music (Fisher, 2001).

Students were assessed at the beginning of Kindergarten and again 19 months later at the end of first grade. Students were given three standardized assessments: the Student Oral Language Observation Matrix (SOLOM) to measure oral language proficiency, the Yopp-Singer Test of Phoneme Segmentation to measure phoneme segmentation ability, and the Developmental Reading Assessment (DRA) to measure text re-telling and comprehension. The researcher also observed each classroom's literacy block twice per month each month

unannounced. The teachers who used music in their classroom started each day with a song which typically focused on self-esteem, pride and feeling good, whereas the teachers without music did not. Another difference in instruction between the two types of classrooms was incorporating music into the daily word work; the musical teachers revealed mystery words through songs to activate student engagement and increase word comprehension and familiarity. Also, listening centers in the music-enriched classrooms offered variations of books in which print was sang to them as well as spoken to them (Fisher, 2001).

At the start of the study, none of the 80 students demonstrated oral fluency in English and no significant differences in results of the three tests were identified. At the end of the study 71, or 89%, of students remained at the school. At the end of the study, students in music-enriched classrooms averaged 13.2 on SOLOM compared to an average of 8.4 for students in the non-music-enriched classrooms. The students' performance on the Yopp-Singer test mirrored that of the SOLOM in that musically experienced students outperformed their counterparts. The DRA results determined that ten students in the musical classrooms were reading at grade level and only one from the non-musical classrooms. These findings suggest music can be used to benefit students' language development when integrated into literacy instruction in a planned and meaningful way (Fisher, 2001).

A few years following the Fisher study, another study was conducted to measure a music intervention's effects on students' phoneme-segmentation ability. Dr. Joyce Eastlund Gromko (2005) studied Kindergarten students in order to determine whether music instruction would lead to significant gains in the students' phonemic awareness, particularly in their phoneme-segmentation fluency. The study aimed to compare two types of classrooms: music-

enriched classrooms vs. non-music-enriched. The study analyzed the effect music instruction had on the children's phoneme segmentation fluency using the Dynamic Indicators of Basic Early Literacy Skills test (DIBELS), given three times throughout the year. The students were from eight different classrooms, from two different schools in the Midwest. At one elementary school, four intact classrooms, containing a total of 43 students, were taught music by one of four advanced music-methods students from a nearby university. At the other elementary school, 60 Kindergarten students in four intact classrooms served as a control group, receiving no music instruction (Eastlund Gromko, 2005).

Each treatment classroom received music instruction for 30 minutes from one of the advanced music students. The music lessons in the treatment group began by teaching the children a cultural folk song. Once the students learned the song, they were then taught accompanying body percussion and kinesthetic movements. The movements reinforced the song's beat, word rhythm, and pitch variance. The body percussion and kinesthetic movements sometimes involved the addition of instruments to aid in the tracking of the song's beat, rhythm and pitch. Finally, children touched a graphic chart while singing that featured symbols to represent the songs' beats, rhythms and melody. Just as emerging readers learn to associate sounds to letters, these beginning readers of music began associating symbols to the variances in the song's sound. In conclusion of the study, all children in the treatment and control groups were post-tested on three sub tests of the DIBELS: letter-naming fluency (LNF), phoneme-segmentation fluency (PSF), and nonsense-word fluency (NWF). When first given the pretest, the treatment group scored lower than the control group. This could be attributed to the control group's lower socioeconomic status as determined by Free and Reduced Lunch

Percentage of the school. Of the three DIBELS subtests examined, only the phoneme-segmentation fluency scores were significantly different between the two groups. Students at the treatment school showed significantly higher gains in phoneme-segmentation fluency with the addition of music instruction when compared to the control group who did not receive music instruction (Eastlund Gromko, 2005).

In order to control for any intervention resulting in the increase in students' skills, Franziska Degé and Gudrun Schwarzer (2011) conducted an experiment that randomly placed preschool students in the music program, the phonological skills program, or a sports training program (from which no effect was expected) and assessed for phonological awareness growth. 41 students from three different schools participated in the study; each school had a music group, a phonological skills group, and a control group to minimize effects resulting from differences in school. Each preschooler received program training for ten minutes every day for 20 weeks. The researchers expected results from the music and phonological groups to mirror each other, thus testing the hypothesized relationship between language and music processing mechanisms, specifically the similar relationship between sound categories (phonemes) and musical sound categories (notes) (Degé and Schwarzer, 2011).

Students were given a pre-test and a post-test. In a pretest, no differences were found among the three groups in regard to age, gender, intelligence, socioeconomic status, and phonological awareness. Students in the music group participated in a variety of activities including: joint singing, joint drumming, rhythmic exercises, meter execution, introduction to beginning notation skills, dancing, and playful familiarization with intervals. The phonological skills program contained listening exercises, syllable exercises, phoneme recognition exercises,

syllable exercises, and the introduction of the concepts “word” and “sentence.” The sports training taught exercises to improve balance, physical strength, endurance, coordination, fine-motor abilities, body perception, and relaxation. The phonological skills assessment tested students using four subtests of the Bielefelder Screening (BISC); the subtests measured rhyming, synthesis of phonemes into words, segmentation of words into syllables, and phoneme recognition in words (Degé and Schwarzer, 2011).

At the conclusion of the study, a positive effect of the music program and the phonological skills program was found on phonological awareness skills. Preschoolers in the music and phonological groups increased significantly in their phonological awareness, whereas such an increase was not found in the control group. Considering that the phonological skills program was explicitly designed to train phonological awareness, it is notable that the music program resulted in a similar effect size. This similarity adds evidence to the “shared sound category learning mechanism hypothesis” for language and music. The researchers suggest using music training as an alternative approach to train phonological awareness or as a complement to existing programs (Degé and Schwarzer, 2011). All three of these studies conducted found an increase in phonological awareness skills following the introduction of a music-enriched program or classroom.

Variations of Music Interventions

There are a few more studies that varied in their approach to music interventions. A study by Dr. Katie Overy and colleagues (2003) aimed to determine whether music instruction would lead to significant gains in Dyslexic students’ phonological awareness. Dyslexia is characterized by difficulties perceiving rapidly presented sounds, which impairs phonological

perception and therein literacy development. The study aimed to determine if the use of music lessons in the classroom would have a positive effect on phonological skill development, reading skills, and spellings skills. The hypothesis presented was analyzed in three different studies: once with a group of children screened for dyslexia, a music intervention study conducted solely with dyslexic children, and a final study comparing the two groups' results (Overy et al, 2003).

The first study utilized a classroom of 28 students whose average age was 6.7 years. The school was participating in a music instruction program, in which classroom teachers were trained to conduct singing-based music lessons with their pupils for one hour per week – three 20 minute sessions. The students were given a pre-test and post-test to test musical skills as well as phonological skills. The phonological skills were tested using the Weschler Objective Reading Dimensions (WORD) tests of single-word reading and spelling, as well as the phonologic segmentation task from the Dyslexia Screening Test (DST) that each student took. Students were tiered based on their results from the phonological pre-test into no-risk, mild-risk and strong-risk groups. Researchers found that no significant improvements were made in reading skills, but the strong-risk and mild-risk groups made significant improvements in spelling skills. In addition, all three groups made significant improvements in phoneme segmentation skills. Researchers concluded that a small-group led by a musically trained teacher, using rhythmic musical material may have a positive effect on reading and phonological skills (Overy et al, 2003).

In the second study, data from nine dyslexic boys, average age 8.8 years, from two different schools were examined. The two schools already provided high levels of literacy

support and regularly scheduled music lessons. The study spanned 30 weeks and compared a control time of 15 weeks with no additional music intervention to a period of 15 weeks of additional music intervention. The interventions were 20 minute sessions, held three times per week, in the child's regular classroom environment. Progress was again measured using the WORD tests for reading and spelling and the phonological segmentation task from the DST. The results of the music intervention study matched that of study one; phonological and spelling skills were significantly improved, however reading skills were not. Researchers concluded that this boost in spelling rather than in reading was a result of the similar relationship between the two areas – they were both phoneme-to-grapheme skills, rather than grapheme-to-phoneme skills which require greater knowledge of decoding strategies and visual recognition (Overy et al, 2003).

In a variation of music intervention on young readers, the children in another study by Johnathan Buldoc (2012) were given a music intervention with the addition of nursery rhymes. This study aimed to determine the most efficient set of learning conditions to develop phonological and musical processing skills using nursery rhymes as a tool for learning. Eight kindergarten classrooms in a single public elementary school were assigned to one of the following conditions: music, language, combined music and language, and passive listening (control). Each condition involved the instruction or listening of nursery rhymes. Condition one involved musical activities to complement the nursery rhyme, condition two incorporated language activities, condition three combined elements from the first two, and condition four nursery rhymes were simply played as background during free play time. The students were

assessed before and after the intervention to measure their phonological awareness and musical processing abilities (Bolduc, 2012).

Intervention sessions were held once a week for 40 minutes over ten-week period. Each session involved the instruction of a new nursery rhyme. For each group of students the first ten minutes of the session was the same, an introduction to the nursery rhyme and vocabulary instruction of unfamiliar words. The remaining 30 minutes of the sessions varied according to the learning environment assigned to that classroom. The control group received no targeted instruction; they simply listened to a recording of the nursery rhyme during free play with no further activities involved (Bolduc, 2012).

The study measured children's improvement in phonological awareness, invented spelling, and verbal memory. Only children in the music and combined conditions significantly improved across all three measures (Bolduc, 2012). Children in the language condition also improved considerably in phonological awareness and invented spelling. Only children in the two groups involving musical conditions and passive listening improved their musical processing skills, however results were not significant. Children's phonological and music processing abilities can be improved with explicit instruction in a musical environment (Bolduc, 2012).

The most recent study involving music intervention by Bhide, Power and Goswami (2013) compared the effects of a music intervention with a computer software program aimed to target phonological skill. The musical intervention in this study focused on rhythm as well as incorporated factors of syllable stress and rise time discrimination. This musical intervention's effects were compared to a computer program designed to enhance reading and phonological skills. Nineteen teacher-described struggling readers participated in the study; ten were

assigned the musical intervention and nine were assigned to the computer program. Students were given reading tests before and after the study and did in fact score in the range of poor readers before the study began (Bhide et al, 2013).

At the conclusion of the study, researchers found the two methods of intervention had comparable benefits on students' phonological awareness. The musical intervention led to literacy gains of comparable effect sizes to direct training in letter-sound correspondences. The researchers also found that improvement in rhythmic entertainment was strongly correlated with an increase in the overall reading score between pre- and post-test. This study shows that a musical intervention based on rhythm and linking the structures of music and language can have benefits for the development of literacy and phonological awareness (Bhide et al, 2013). These variations in music interventions still found that the benefits of music intervention on an emerging learner's phonological abilities are observable and that using music as a tool for phonological instruction is just as impactful as other methods of phonological awareness instruction.

Conclusion

Phonological awareness is one of the best predictors of young children's future reading and literacy success (Ehri et al, 2001). If identified early on in a child's development and literacy instruction, weakness in phonological awareness ability can be targeted and early childhood educators or speech language pathologists can intervene to reduce the child's chance of developing reading difficulties later on in his/her schooling (Catts et al, 2001). The skills needed for success in phonological awareness tasks were shown to mirror those necessary for music perception; phonological awareness involves segmenting speech into phonemes, whereas

music perception involves segmenting a stream of tones into composite units or notes (Anvari et al, 2002). This shared set of skills is what led researchers to examine the relationship a young learner's music ability has on his/her phonological awareness ability. Dr. Peynircioglu et al (2002) found a positive correlation between strong musical aptitude and strong phonological awareness ability (Peynircioglu et al, 2002). Bolduc (2005) more specifically found that a student's ability to process pitch differentiation in music correlated positively with his/her phonological skills (Buldoc, 2005). Dr. Marie Forgeard and colleagues (2008) expanded this correlation from normal-reading children to students who struggle with the learning difficulty Dyslexia. Her study found that musical discrimination skills were able to predict a child's phonemic skills and reading abilities even in the population of students with Dyslexia (Forgeard, 2008). Using this relationship between music skills and early literacy skills, researchers went on to design interventions to improve students' phonological processing skills and emergent reading skills. Both Douglas Fisher's music intervention (2001) and Joyce Eastlund Gromko's intervention (2005) used whole classrooms, music-enriched versus non-music-enriched, as well as control groups to determine if music-enriched instruction affected the students' abilities. Fisher found an increase in oral language fluency and reading level in the group that received music-enriched instruction (Fisher, 2001). Eastlund Gromko's intervention used music lessons and accompanying body percussion and kinesthetic movements to significantly improve phoneme segmentation abilities (Eastlund Gromko, 2005). Building on the results of these interventions, Degé and Schwarzer (2011) tested the results of students receiving phonological instruction or musical instruction exclusively and found a significant increase in phonological processing skills as a result of both types of instruction (Degé and Schwarzer, 2011). Research

also found that the results of a concentrated small-group intervention by a musically trained teacher with normal reading students, students with Dyslexia, or a mixture of both found significant improvement in phoneme segmentation skills and spelling skills (Overy et al, 2003). Buldoc determined nursery rhymes were an effective tool for delivery of a music-enriched phonological intervention (Buldoc, 2012). Further proving the effectiveness of music intervention on phonological awareness ability, Bhide et al (2013) compared the results of a music intervention to a computer software program designed to target phonological awareness skills and found comparable effects between both methods (Bhide et al, 2013). Overall, music can be used as a way to enhance and improve phonological instruction in early childhood classrooms either through whole-group literacy instruction or concentrated small-group intervention.

Chapter Three

Sample Population

Five Kindergarten students were given a six-week music intervention in an effort to boost their phonological awareness skills. The intervention group was held three times a week for 20 minutes each session. Students were chosen from one classroom at a school in Milwaukee, Wisconsin. The school consists of four classrooms – two classrooms containing four-year-old Kindergarten and two classrooms containing five-year-old Kindergarten. The participants in this study were in five-year old Kindergarten, and all participants were six years old. Of the five students in the study, two had been enrolled in four-year-old Kindergarten the year before at the same school with the same teacher. Two of the participants were male and the other three female. The school serves student from all parts of Milwaukee and has a diverse population of students – African-American, Latino, and Hmong. Two participants in this study were Latino/a and the other three were African-American.

Students were chosen by the classroom teacher for a targeted intervention in an effort to raise their phonological awareness abilities. The six-week study took place at the end of the school year running from April 28th to June 7th. These students were chosen based on data collected from classroom assessments and unit tests that measured aspects of phonological awareness (PA) including rhyming, syllable counting, segmenting, blending, and CVC (consonant-vowel-consonant) word sound identification. Of the thirty students in the class, these five were still struggling to master PA concepts that would be vital to future literacy and writing success and were selected by the classroom teacher for inclusion in this study. These

skills are also part of the Common Core State Standards for Kindergarten. All students had parental permission for inclusion in the study.

Data Collection

At the start of the study students were given a pre-test to measure six components of phonological awareness. Students were tested individually, in isolation from the rest of the class. At the conclusion of the study students were given the same test to measure any change in ability over the course of the study. The test is included in the Appendix.

The seven components measured were:

- Blending Sounds – "What word is formed when you blend these sounds together? /f/ /o/ /x/?" *fox.*
- Segmenting Sounds – "Can you segment the word *cat* into its sounds?" */c/ /a/ /t/.*
- Syllable Count – "How many syllables are in the word *elephant?" Three.*
- Rhyming – "Can you tell me a word that rhymes with *man?*" *pan*
- Beginning Sound Identification – "What is the beginning sound of this word?"
- Middle Sound Identification – "What is the middle sound of this word?"
- Ending Sound Identification – "What is the ending sound of this word?"

Procedures

The intervention sessions were 20 minutes long and occurred three times per week over the six-week span of the study. Sessions took place during the course of the normal school day on Monday, Wednesday and Thursday. During naptime, the teacher and five students went into an adjoining room for music intervention. Students were used to the inclusion of small-group instruction in their daily routines, so participation in these group activities were welcomed by

the students and were not seen as an extra chore or task. Each intervention followed the same schedule with varying activities. The first five minutes of the study were dedicated to rhythm instruction and practice. During this time students would copy the teacher's pattern of claps, stomps, and knee slaps, create their own rhythms, identify matching and different rhythms or patterns, and execute a rhythm while reading beginning music notation (rests and beats). The next ten minutes were spent on explicit instruction of one of the phonological skills being measured. The teacher modeled the skill, coached students through guided practice implementing the skill, and then observed and helped students to complete an independent activity, game, or worksheet directly correlated to the focus skill for the day. The last five minutes were spent singing and learning songs, along with accompanying kinesthetic movements or motions, which focused on phonological awareness skills.

Students' scores on the pre-test were used to determine the focus of the interventions. Each week had a different skills focus. Table 1 lists the focus topic for each week of the intervention. Activities during each of the interventions during that week focused on the same skill, but consisted of different activities. These topics had all been taught during the school year as a part of the Kindergarten curriculum, so all participants in the study had previous exposure to the content being taught and evaluated.

Table 1

WEEK	SKILL FOCUS
1	Blending and Segmenting Sounds
2	Beginning and Ending Sound Identification
3	Middle Sound Identification

4	Rhyming
5	Syllables
6	Syllables and Review of all Topics

Chapter Four

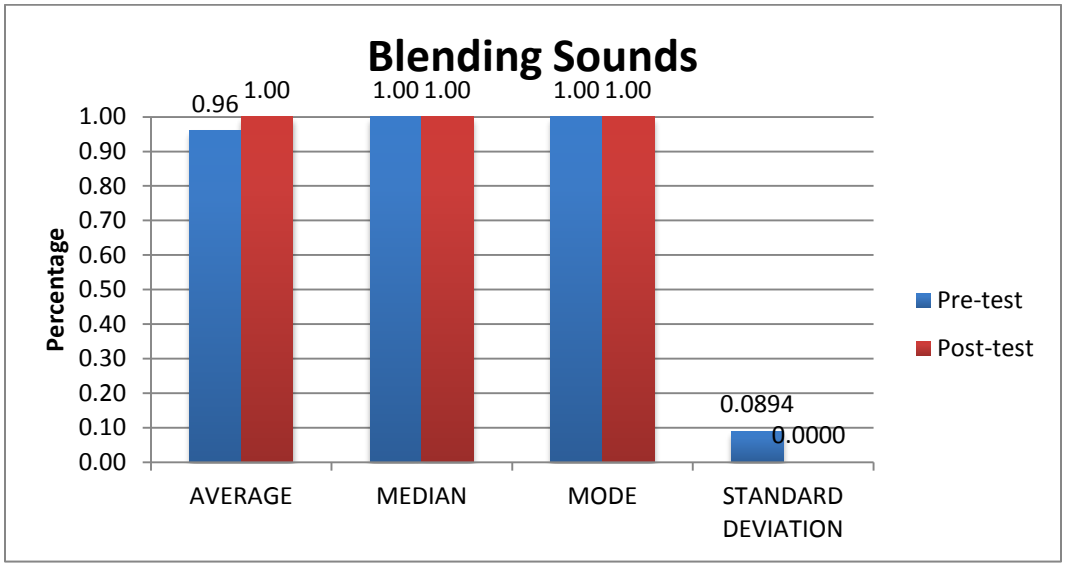
Results

Students' abilities on seven phonological awareness skills were measured at the start and conclusion of the study. Table 2 displays the students' scores as their percent correct. The data from each subtest is reported below.

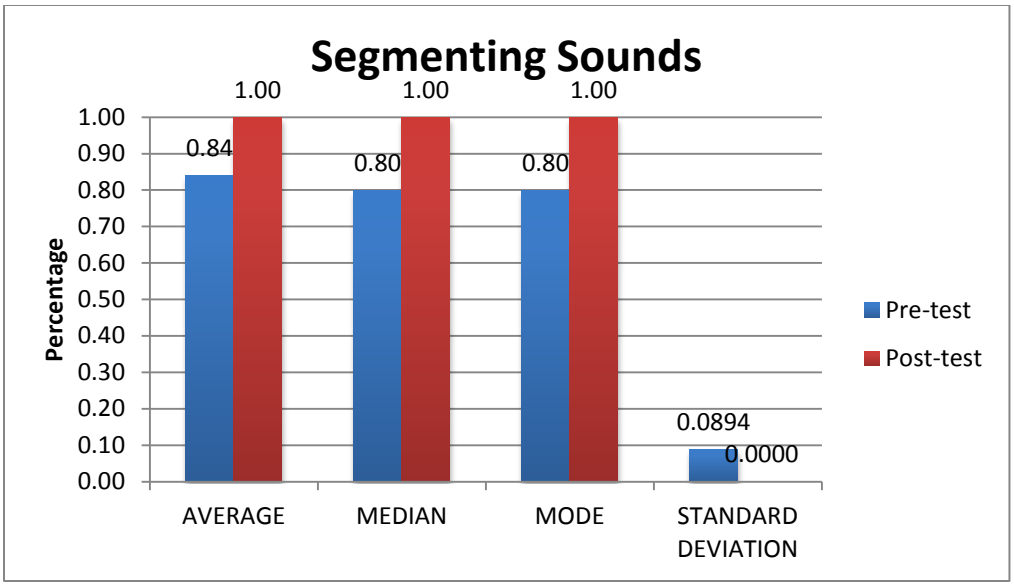
Table 2

	Blend Sounds	Blend Sounds	Segment Sounds	Segment Sound	Syllables	Syllables	Rhyme	Rhyme	Beg Sound	Beg Sound	Mid Sound	Mid Sound	End Sound	End Sound
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Joe	1.00	1.00	0.80	1.00	0.00	1.00	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mike	0.80	1.00	0.80	1.00	0.20	0.80	0.80	1.00	1.00	0.50	0.00	0.00	0.50	1.00
Mya	1.00	1.00	0.80	1.00	0.20	0.80	0.00	1.00	1.00	1.00	0.50	0.50	0.00	1.00
Jazlyn	1.00	1.00	1.00	1.00	0.20	1.00	0.40	1.00	1.00	1.00	0.50	0.50	1.00	1.00
Nyla	1.00	1.00	0.80	1.00	0.40	1.00	0.80	1.00	1.00	1.00	0.50	1.00	1.00	1.00
AVERAGE	**0.96**	**1.00**	**0.84**	**1.00**	**0.20**	**0.92**	**0.56**	**1.00**	**1.00**	**0.90**	**0.50**	**0.60**	**0.70**	**1.00**
MEDIAN	**1.00**	**1.00**	**0.80**	**1.00**	**0.20**	**1.00**	**0.80**	**1.00**	**1.00**	**1.00**	**0.50**	**0.50**	**1.00**	**1.00**
MODE	**1.00**	**1.00**	**0.80**	**1.00**	**0.20**	**1.00**	**0.80**	**1.00**	**1.00**	**1.00**	**0.50**	**1.00**	**1.00**	**1.00**
STD. DEV.	**0.0894**	**0.0000**	**0.0894**	**0.0000**	**0.1414**	**0.1095**	**0.3578**	**0.0000**	**0.0000**	**0.2236**	**0.3536**	**0.4183**	**0.4472**	**0.0000**
P value	**0.1869504**		**0.00806504**		**0.00042191**		**0.0256872**		**0.1869504**		**0.1869504**		**0.104**	

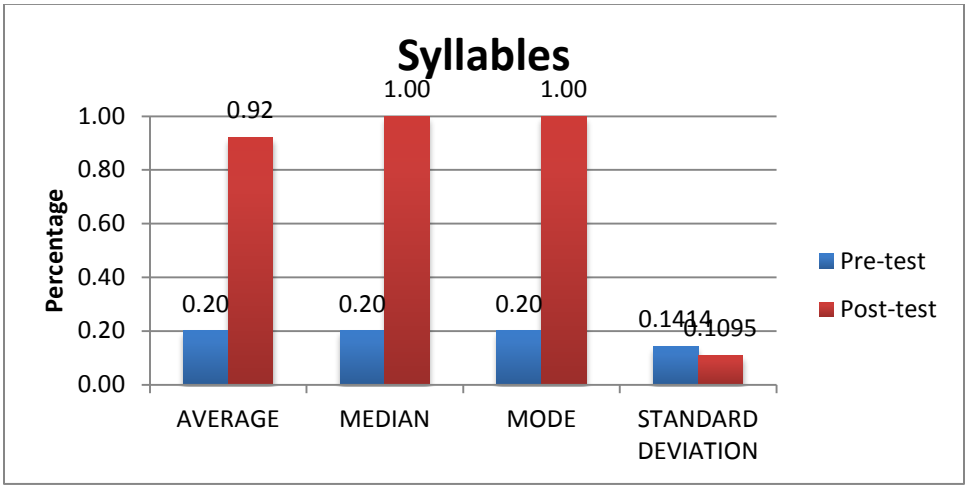
Significant at p<0.05	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**



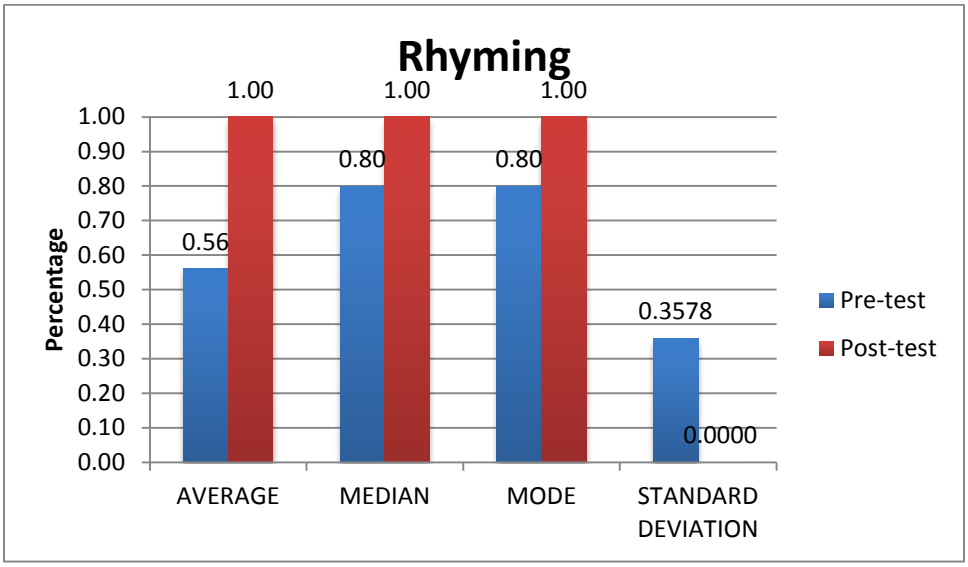
The first subtest measured students' abilities to blend individual letter sounds into a word. Students were asked to blend five different words. The average score on the pre-test for this component was 96 percent. The median and the mode were both 100 percent. The standard deviation was 8.9 percent. At the conclusion of the six-week music intervention, students all scored 100 percent on this subtest resulting in a mean, median, and mode of 100 percent and a standard deviation of zero. The p-value for this subtest is 0.187. At a level of significance $p<0.05$, this result is not significant.



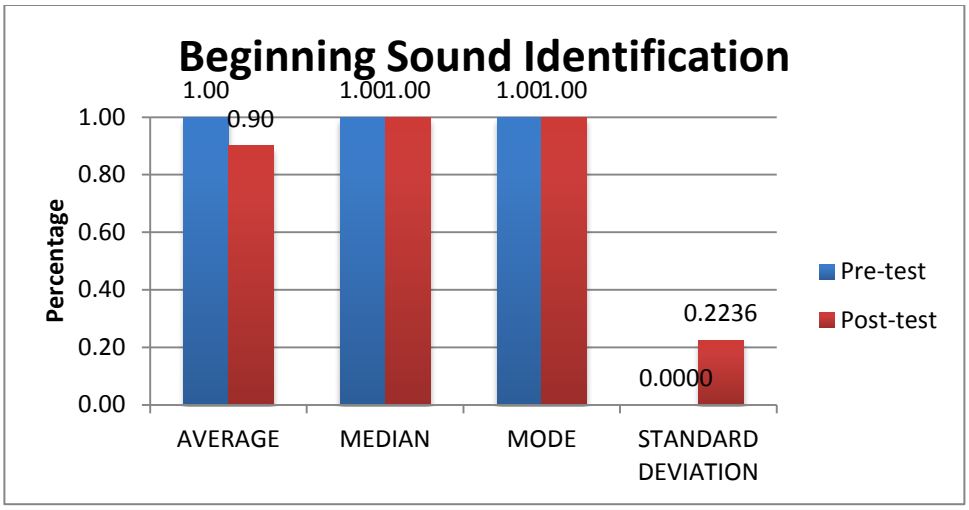
The second subtest measured students' abilities to segment CVC words into their individual phonemes. The students were asked to segment five words. The average on the pre-test for this component was 84 percent. The median and the mode were both 80 percent. The standard deviation was 8.9 percent. At the conclusion of the six-week music intervention, students all scored 100 percent on this subtest resulting in a mean, median, and mode of 100 percent and a standard deviation of zero. The p-value for this subtest is 0.00807. At a level of significance $p<0.05$, this result is significant.



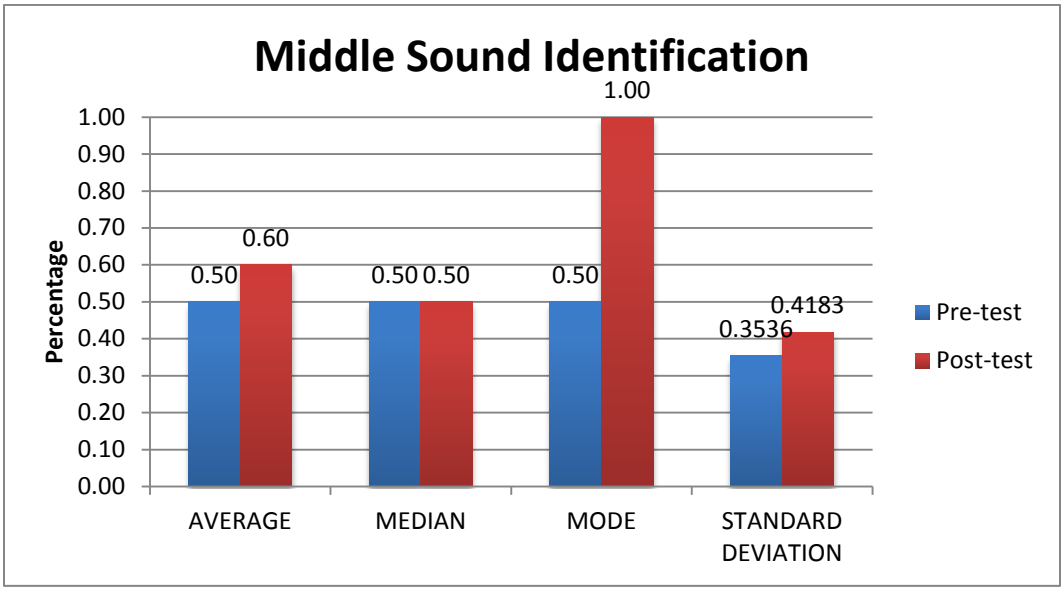
The third subtest measured students' abilities to isolate and count the number of syllables in a word. Students were asked to isolate and count the syllables in five words. The pre-test had an average, median, and mode of 20 percent and a standard deviation of 14 percent. At the conclusion of the study, the average was 92 percent and both the median and the mode were 100 percent. The post-test had a standard deviation of 10.9 percent. The p-value for this subtest is 0.000422. At a level of significance $p<0.05$, this result is significant.



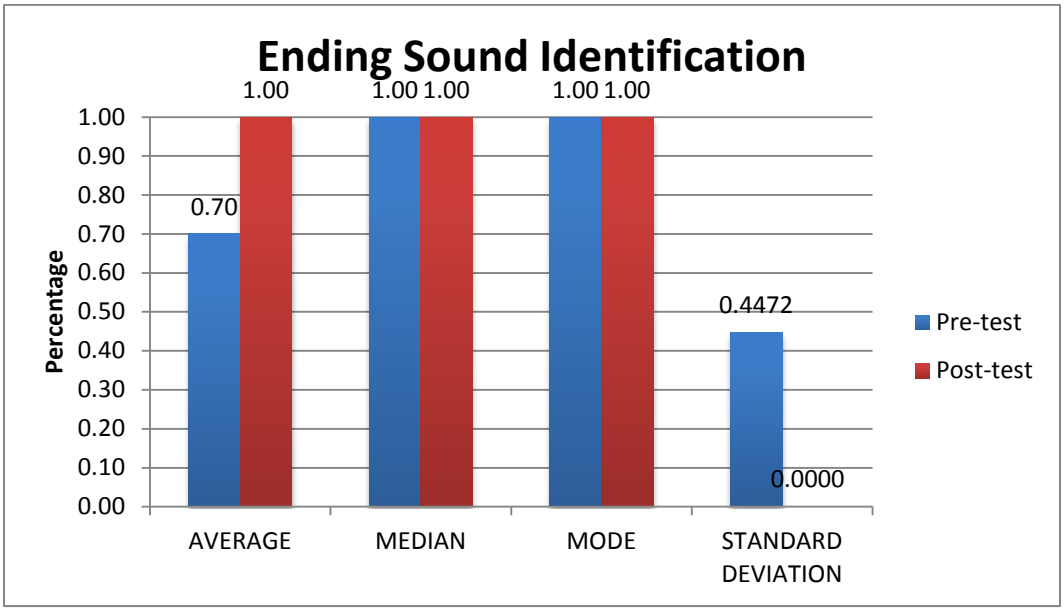
The fourth subtest asked students to identify a rhyming word with the five words given. The pre-test resulted in an average of 56 percent and a median and mode of 80 percent. The standard deviation was 35.8 percent. At the conclusion of the six-week study, all students scored 100 percent resulting in a mean, median, and mode of 100 percent and a standard deviation of zero. The p-value for this subtest is 0.0257. At a level of significance $p<0.05$, this result is significant.



The fifth component asked students to identify and write the beginning sound of a word when shown a picture. Students were asked to perform this task for two different words. The pre-test results were a mean, median, and mode of 100 percent and a standard deviation of zero. The post-test saw a decrease in the average – 90 percent – but the median and mode remained at 100 percent. The standard deviation for the post-test was 22.4 percent. The p-value for this subtest is 0.187. At a level of significance $p<0.05$, this result is not significant.



The sixth component asked students to identify the middle sound of two words when shown a picture. The pre-test had a mean, median, and mode of 50 percent. The standard deviation of the pre-test was 35.4 percent. The post-test average grew to 60 percent, the median stayed at 50 percent, and the mode jumped to 100 percent. The standard deviation for the post-test was 41.8 percent. The p-value for this subtest is 0.187. At a level of significance $p<0.05$, this result is not significant.



The seventh and last component of the study's assessment asked students to identify the ending sound of two words when shown a picture. The mean on the pre-test was 70 percent. The median and mode of the pre-test were both 100 percent. The standard deviation was 44.7 percent. Students all scored 100 percent on the post-test resulting in a mean, median, and mode of 100 percent and a standard deviation of zero. The p-value for this subtest is 0.104. At a level of significance $p<0.05$, this result is not significant.

Conclusion

The results of this study show significant growth in three of the seven subtests - segmenting, rhyming, and syllables. At the conclusion of the intervention all subtest scores were over 80% for each student, with the exception of three subtests. Two of these below proficient scores were on the middle sounds subtest and the last was on the beginning sound portion. However, the student who performed below 80% on beginning sounds missed the correct answer due to a letter reversal “d” for “b” and not due to his lack of knowledge of the beginning sound.

A discussion of the results and the implication for further research are included in the next chapter.

Chapter Five

Connections to Existing Research

This study aimed to test the hypothesis that music as a means for delivery of phonological awareness would result in higher gains in students than traditional intervention methods. Previous research studies proved that phonological awareness instruction is key to future reading success in students of all types (Ehri et al, 2001). The research stated that PA instruction would have the biggest impact in preschool and kindergarten. Research by Anvari has proposed that auditory skills used in processing language mirror the skills necessary for music perception such as rhythmic, melodic, and harmonic discrimination (Anvari et al, 2002). This study aimed to replicate the success of previous research by targeting specific phonological awareness tasks in a music-enriched way during small-group intervention. The students included in the study were at a critical stage in their literacy development. These foundational skills are necessary for reading success in first grade and beyond.

Explanation of Results

Overall, this study found that students showed significant improvement on three subtests of the phonological awareness assessment. A significant result shows that the results of this intervention were strongly associated with the gains students had made. Students made significant gains in segmenting, rhyming, and syllables. In each of the seven subtests, the average of student scores rose, with the exception of the beginning sounds subtest, meaning that overall students made improvements from the beginning of the study to the conclusion of the study. The drop in the mean, or average, of scores on the beginning sounds subtest was due

to a reversal of the letter “b” to “d,” and not because of a student’s lack of knowledge of the beginning sound of the word bat. The pre-test scores, however, were already nearing proficient with the exception of syllables. Regardless of the high pre-test scores, three of the subtests still saw significant improvement as a result of the music intervention. These improvements in phonological skills align with the results of previous studies linking music and rhythm processing with the ability to segment and manipulate phonemes in spoken words.

Strengths and Limitations

The students included in this study were in the last six weeks of their second year of Kindergarten instruction and had therefore already received comprehensive and consistent phonological instruction. Music as a tool to teach these skills was an effective and non-traditional method, which resulted in gains in the lowest students in a short amount of time. The strength in this study is the delivery of fundamental skills in an engaging and non-traditional way that results in gains for the most struggling students. The students had two years of comprehensive phonological awareness instruction, yet these interventions over a period of six weeks at the end of their second year in Kindergarten still improved their skills. The group of students in this study was small and they were all students in the same classroom at the same school.

Implications for Future Research

In future studies, a larger group of students from across demographics and schools should be included to widen the results and implications of the study to a greater population. Also, students at more emergent stages of reading and literacy skills should be included in an intervention of this type to more conclusively determine the strength of a music program as a

tool to teach early literacy and phonological skills in direct comparison to more traditional methods of instruction. The significant gains in elements of phonological awareness show music as a valuable tool for intervention and a non-traditional method of instruction to engage even the lowest-performing students and teach skills that crossover from music processing to language processing.

Recommendations for Students

The students in this study would benefit from prolonged exposure to intervention or instruction of this type. The use of kinesthetic movement and music aided students' abilities to retain the information, as well as, help them when processing. For example, segmenting and blending with the use of arm motions and a tune, anchored the students abilities and they were able to apply these motions to any word to segment and hear the individual phonemes. These skills continue to be measured and required by the Common Core standards, so teachers and parents should continue to incorporate movement and music to ensure student success.

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Appendix A

Name_____ Date_____ Circle One: Pre/ Post

Phonological Awareness Skills Assessment

<table>
<tr>
<td><u>1. I can blend sounds to make a word.</u>
Directions: Say each sound separately, record word student produces.
1. /f//o//x/ _____
2. /m//a//t/ _____
3. /k//i//d/ _____
4. /r//u//g/ _____
5. /n//e//t/ _____</td>
<td><u>2. I can segment sounds in a CVC word.</u>
Directions: Say each word, have students separate identify each phoneme.
1. mad _____
2. bed _____
3. hop _____
4. pit _____
5. tug _____</td>
<td><u>3. I can count the number of syllables in a word.</u>
Directions: Say each word, have students count number of syllables.
1. elephant _____
2. cat _____
3. monkey _____
4. octopus _____
5. armadillo _____</td>
</tr>
<tr>
<td>6.I can create a rhyme.
Directions: Have student dictate a rhyming word.
man _____
pop _____
ten _____
hit _____
bun _____</td>
<td colspan="2"><u>7. I can isolate the beginning sound of a word.</u>
<u>8. I can isolate the middle vowel in three letter words.</u>
<u>9. I can isolate the ending sound of a word.</u>
Directions: Have students fill in the missing letter.
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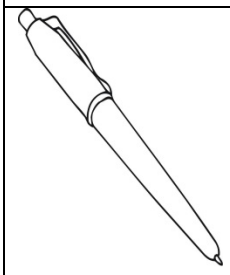
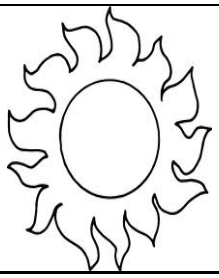
<tr><td>  </td><td>p __ n</td><td>  </td><td>d __ g</td></tr>
<tr><td>  </td><td>su __</td><td>  </td><td>ba __</td></tr>
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