DEVELOPING PRE-KEYBOARDING SKILLS
IN FOUR-AND FIVE- YEAR OLD CHILDREN
BY USING MUSIC AND FINGERPLAY

MASTER'S THESIS

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ABSTRACT

DEVELOPING PRE-KEYBOARDING SKILLS IN FOUR-AND FIVE-YEAR OLD CHILDREN BY USING MUSIC AND FINGERPLAY

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This study examined the effects of utilizing music/song and fingerplay to teach pre-school children the proper finger movement that corresponds to the phonemic sounds of the letters on a computer keyboard. Two classrooms were involved in this study. One classroom was taught the finger movements by singing The Finger Game Song. The other classroom was taught the finger movements without music/song. The class that learned the finger movements with music/song was much more successful than the class that learned the finger movements without music/song.

The study illustrates that pre-keyboarding skills can be taught at an early age in hope of enhancing actual keyboarding training in later years. The use of phonemic sounds instead of letter names also suggests that emergent readers can benefit from using these important sounds of speech.
ACKNOWLEDGMENTS

A special thank you is in order to Dr. Kathryn Kinnucan-Welsch, my advisor, for providing her time and guidance throughout the writing of this thesis. I appreciate the input and expertise she provided to enable the completion of this study.

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CHAPTER I
INTRODUCTION

Computer technology in the next century will be readily accessible to children at a very young age. The 'Information Superhighway' increasingly connects homes, schools, business and government to one another through links capable of transmitting text, voice and pictures (Armstrong, 1995). The increasing impact of computer usage as an instructional tool clearly indicates the need for all students to efficiently operate an electronic keyboard (Parker, 1992).

Keyboarding is the term used to describe the activity of entering information on electronic equipment through the use of a typewriter-like keyboard (Kisner, 1984). It is an essential skill needed to gather or disperse the global information that is available by the touch of a few buttons. Yet, without formal instruction, children continue to peck away at the keyboard, one finger at a time as they have done for decades. (Anderson-Yates & Baker, 1996; Freeman, 1932). Today, computers not only allow students to transfer their thoughts into print, but they also provide the opportunity to explore avenues in learning with the touch of their fingers. Proper keyboarding technique can enable a child to utilize a computer more efficiently.

Keyboarding is a psychomotor skill, and proper technique is a necessity for proficiency of this ability (Kisner, 1984). Correct technique and finger movement plays
an important role in developing lifelong habits in relation to the keyboard. Teaching proper finger movement instead of allowing the hunt and peck method would give children the solid foundation needed in mastery of the keyboard (Prigge & Braathen, 1993).

Research has shown that musical training at a young age enhances pre-reading skills such as spatial reasoning and pitch discrimination (Lamb & Gregory, 1993). Early musical training has been shown to strengthen the neural connections and perhaps establish new pathways in the young brain (Schlaug & Steinmetz, 1991). These pathways may improve motor control because they allow swifter communication between the hemispheres of the brain. Integrating music, rhythm, and movement into a young child’s early education has also proven to be beneficial to the learning process (Mori, 1996).

Incorporating music into fingerplay activities may enable children to acquire proper finger movements that correspond with the computer keyboard. Considering the research on benefits of early training in music, it appears reasonable to examine whether music can facilitate the learning of pre-keyboarding skills in young children.

Problem Statement

As the next millennium approaches, computers are expected to play an increasing role in our society. Children must become more efficient at accessing an ever growing
base of knowledge at a younger age. To help facilitate this skill, young children must develop pre-keyboarding skills.

Purpose of Study

The purpose of this study was to examine the effects of utilizing music/song and fingerplays to teach pre-school children the proper finger movement that corresponds to the phonemic sound(s) of the letters on a computer keyboard.
CHAPTER II
LITERATURE REVIEW

The purpose of this chapter is to review the literature regarding the use of music and fingerplay with pre-school age children to learn pre-keyboarding skills. This chapter is divided into three sections. The first section explains the need for learning to keyboard as a result of today's computer technology. The second section discusses the importance of using music to enhance learning. The final section describes the relationship of phonemic sounds and keyboarding.

Typewriter and Keyboarding

Over the years, numerous studies have examined the use of the typewriter and computer keyboard in various aspects of a child's learning. Dating back to the 1930s, a study was conducted at the University of Chicago to investigate the effect of elementary school children using a typewriter as a supplement to handwriting (Freeman, 1932). The study also measured the effect of using the typewriter on the progress of various school subjects and the attitudes of children toward their work. The research was conducted from 1929-1931. It involved first through fifth grade students from the six largest cities in the East and Middle West. Results from the two-year study concluded that throughout the grades, pupils who were allowed to use a typewriter produced a
greater amount of written material than the pupils in the control group. Findings also showed that handwriting skills were not diminished and there was no loss in handwriting quality. Throughout the study, teachers regarded the typewriter as a valuable educational instrument and pupils looked upon it with marked favor. Ninety-three percent of the teachers who participated two full years with the study recommended the continuance of typewriting machines in their own grades. Another important recommendation from the study was to provide students with more direction in learning to use the typewriter. In the study, students were given the opportunity to use the typewriter but were not given formal lessons on using this tool. They acquired their skills by using the "hunt-and-peck" method. One conclusion to note is teachers felt learning proper finger positioning and learning to use various fingers while typing could benefit students' future success and ease at the typewriter.

As computer technology continues to grow, so does the need for mastery of the keyboard. As Freeman studied the importance of typing in 1930, keyboarding today has become the most basic and essential computer skill. Keyboarding can no longer be considered a skill for a select population. It is a necessity for everyone (Parker, 1992). The uses and opportunities available by having all aspects of life interconnected via the computer is mind boggling and only limited by an individual's skill to access this vast
information (Armstrong, 1995). It is only logical to provide our young children with the necessary tools to master keyboarding at the youngest age possible.

Keyboarding can be a difficult skill to learn. Without early keyboard training during early computer usage, students can develop bad habits of pecking randomly at the letters on a keyboard. These habits can become increasingly difficult to break when formal keyboarding is then introduced into a student’s curriculum (Anderson-Yates & Baker, 1996). Anderson-Yates and Baker concluded that if the “hunt and peck” method was established over the years, then it became extremely difficult to “break the habit” as students grew older and attempted to develop proficiency at keyboarding. With the “hunt and peck” method, students’ skill level was usually capped at 40 words per minute. Fatigue was also more prevalent when this method of keyboarding was used. On the other hand, studies have found that students have less fatigue and type more words per minute when proper fingering was used (Anderson-Yates & Baker, 1996; Prigge & Braathen, 1993).

Kercher and McClurg (1985) conducted a study comparing three different teaching techniques in keyboarding skills with fifth-grade students in the state of Wyoming. The first group was given a typing book and told to proceed at their own pace. The second group used a traditional typing text, and the third group was provided individual instruction. Findings indicated that elementary students showed the greatest success with
formal instruction. Kercher and McClurg further concluded that mastery of this skill plays an important part in confidence level of students. This in turn may reflect in the quality of students’ work.

Kercher and McClurg (1985) also discussed when keyboarding should be taught. While no specific grade level was given as to the correct time to teach keyboarding skills, certain prerequisites were mentioned. One prerequisite was the importance of developing sufficient fine motor skills to master keyboarding. Before students at any grade level use computers, proper keyboarding technique and skills should be taught (Prigge & Braathen, 1993). Mastery of proper finger movement that corresponds to the proper letter on a keyboard may be beneficial for small hands prior to actual keyboarding. Teaching pre-keyboarding skills at an early age may be a factor for keyboarding success in the upper elementary grades (Kercher & Mc Clurg, 1985). Developing pre-keyboarding skills at the pre-school level could be the missing link needed to assure this success.

Educators need to introduce the proper finger movements that correspond with the letters on a keyboard to our young children prior to computer usage. We should incorporate this skill into the learning curriculum so it becomes as natural as saying the ABC’s. We must develop a pre-keyboarding curriculum that will enable our young children to make a natural transition when formal keyboarding is then introduced. There has been little research done in this area.
Early Musical Training and Brain Development

Recent research has explored the relationship between early musical training and brain development. Musicians and non-musicians from Germany were compared to see what role music plays in processing information in the brain (Schlaug & Steinmetz, 1991). The study compared the brain structure of 27 musicians with the brain structure of 27 non-musicians. It was found the planum temporale, or the brain structure that is associated with auditory processing, was different between the groups. According to Schlaug and Steinmetz, those with musical training had larger left-hemispheres of the brain. Musicians who had begun musical training before the age of seven had the most significant difference. Their corpus callosum, the bundle of nerves that connect the analogous structures in the brain, was 10% - 15% thicker in musicians that started playing at an early age. Schlaug and Steinmetz concluded that early learning is thought to “speed-up” communication between the hemispheres. This research team also suggested that the fine motor skill of finger movements play a role in brain development.

A study of the relationship between phonemic and musical sound discrimination indicated a correlation between the two variables (Lamb & Gregory, 1993). Phonemic discrimination is the ability to distinguish between the smallest units of sound. In Great Britain, 18 first graders were studied to determine the relationship of musical and phonemic discrimination to reading ability. According to Lamb and Gregory, discrimination of musical sounds is directly related to music performance; however, the
most influential factor is specific awareness of pitch changes. The study also showed a strong relationship between early musical training and the pre-reading skill spatial reasoning.

Mori (1996) conducted a study with 5- and 6-year old children in Japan to justify the importance of music and movement in their curriculum. Mori studied how music, rhythm, and movement can motivate and improve coordination in young children. Beginning at a young age is stressed throughout Mori’s study. Mori used Warabe-Uta as one example. Warabe-Uta mixes song and melodies with accents that can be sung by anyone. Movements are coordinated to go along with each melody. Mori concluded that singing with movement enhanced rhythm and motivated children. She suggested that movement and song are essential components in shaping the young mind. According to Mori, music and movement require children to build coordination between sound and motion.

Producing specific sounds at different speeds also appears to affect the processing of auditory stimuli (Jenkins, Merzenich, Jacobson, Miller, Schreiner & Tallal, 1995). This study involved training procedures to help children overcome a temporal processing deficit. Games were devised to modify speech and speech-like sounds at various speeds. Performance was recorded as children processed these different sounds. The study concluded that changes in speed and speech representation could improve temporal processing deficits.
Phonemic Awareness

Phonemic awareness is the ability to examine language independently of meaning and to manipulate its component sounds (Cunningham, 1988). A phoneme is a member of the set of the smallest units of speech that serve to distinguish one utterance from another in a language of dialect (Webster’s New Edition, 1995). The English Language consists of 26 letters and 44 pure sounds needed to say the entire English lexicon (Cunningham, 1988). The following notation, //, indicates the phonemic sound to be used for a particular letter or letter combination.

Phonemic awareness is not synonymous with phonics. It involves segmentation, sound/symbol identification, and awareness of sound patterns in our language. Most kindergartners have mastered the complexities of speech; however, they are not aware that our spoken language is made up of discrete words, which are made up of syllables and in turn are composed of the smallest units of sound, phonemes. Research strongly indicates that this awareness, that spoken language is made up of discrete sounds, appears to be a critical factor in reading success (Adams, 1990).

Phonemic awareness has been identified to be a powerful predictor of reading success (Juel, 1988; Lomax & McGee, 1987; Stanovich, 1993-94). Researchers have also suggested that a strong sense of phonemic awareness is a better predictor of reading success than measures such as IQ and general language ability (Juel, 1988; Stanovich, 1993). Tests have shown that a solid foundation in phonemic awareness skills is the best
predictor of success in early reading acquisition (Stanovich, 1993-94). Regardless of instructional technique in learning to read, phonemic awareness is an essential element for progress in reading (Griffith & Olson, 1992).

Summary

Researchers suggest it is time to change the paradigm of how educators teach children to keyboard. The keyboard is the current device used to link students with today’s computers. It would appear essential to empower children with the tools necessary for keyboarding success.

Studies have shown the importance of early musical training in young children (Mori, 1996; Schlaug & Steinmetz, 1991). Spatial reasoning, auditory processing, and fine motor skills all increase when young children have early musical training (Schlaug & Steinmetz, 1991).

Integrating music/song into learning the proper finger movements for keyboarding at an early age appears to warrant investigation. A small window in time may exist in a young child’s development when the integration of music and fingering skills will enable them to become quite successful at keyboarding. Most children can sing their ABC’s. As we approach the next century, computer proficiency will become mandatory. Educators can teach children to sing their ABC’s phonetically, by using sound associations rather than letter names and to “finger them out” at the same time. This is a skill that may enhance development of keyboarding. Using phonemic sounds
instead of letter names, and connecting a finger movement to each sound through music, may also reinforce phonemic awareness that has been shown to be crucial in reading success (Juel, 1988; Lomax & McGee, 1987). Teaching The Finger Game Song, a simple fingerplay tune, may enable young children to accomplish the correlation between a phonemic sound and finger movement which is relevant to using a computer keyboard. These early learning tools could help unlock a successful tomorrow for today’s youth.

Based on the review of literature, the following hypothesis will guide this study: There will be a difference in the ability of class A (with song) and class B (without song) to associate the correct finger movement when a specific phonemic sound is heard that corresponds with the correct finger movement on a computer keyboard.
CHAPTER III
METHODOLOGY

The purpose of this chapter is to describe the methodology used in this study. The chapter discusses the subjects, setting, instrumentation and data collection. Treatment, along with research design and procedure are also discussed.

Subjects/Setting

This study focused on four- and five-year old children who attended weekly pre-school sessions at an Early Learning Center. A total of 207 children in this age range participated in the early learning program. There were 76 four-year olds, 40 boys and 36 girls. The five-year old classes consisted of 75 boys and 56 girls for a total of 131 children. On Monday, Wednesday, and Friday, 94 children attended the early learning center. Tuesday and Thursday had 113 children in attendance. The school day was 2 ½ hours. The average class had 19 students. Parents chose to send their children to this pre-school and paid a monthly tuition.

The school was church sponsored, but was not limited to parish members and was not religiously oriented. It was located in a suburb of a major city in the Midwest. The suburban population was over 32,000. The community had over 15% minority population and home prices ranged from $50,000 to over $1,000,000.
Design

This study implemented the Nonequivalent Control Group Design. No pre-test, however, was used. Subjects were heterogeneously grouped. The ages of all subjects were within one calendar year of one another. This type design is recommended for studies with very young subjects, where it is impossible to administer a pretest because learning is not yet manifest (Ary, Jacobs & Razavieh, 1996). The independent variable in this study was music/song. The dependent variable in this study was associating correct finger movement with a specific phonemic sound.

Procedure

Twelve heterogeneously grouped four- and five-year old classes were in the sample preschool. Six of these classes met every Monday, Wednesday and Friday. Enrollment in each class was approximately 19 students. Two classrooms that met on Monday, Wednesday, and Friday were randomly selected to participate in this study. The researcher was given permission to work with both classrooms. Parents were also given the opportunity to choose whether or not their child would participate (see Appendix A). All children in both classrooms participated. One class was taught pre-keyboarding skills by incorporating music/song and fingerplay into the instruction. This group was considered Class A. Class A was taught the Finger Game Song (described below) through whole-group instruction. Children sat as a group on a carpeted area, listened and imitated the researcher as she illustrated what finger to wiggle when a
particular sound was sung. The researcher made sure to turn her back slightly to the
subjects so they would mirror her properly as she moved a specific finger on a
specific hand. This was done to aid subjects who have not developed laterality or
directionality skills. This study did not involve actual use of a computer keyboard. The
children that participated in this phase of the study were unaware that the finger
movements being taught were in direct correlation to the proper finger movements when
using a computer keyboard.

During the first session in the study, subjects in Class A learned the first verse of
The Finger Game Song. The Finger Game Song is sung in alphabetical order but using
the phonemic sounds instead of the letter names. All sounds are repeated more than once.
The first verse included the phonemic sounds /ɑ/, /b/, /ɛ/, /d/, /ɛ/ and /ɡ/ (See Figure
1). Each of these sounds involved movement with the left-hand fingers only. All sounds in
verse one are located on the left-hand side of the computer keyboard. As each sound
was sung, children were taught to wiggle a specific finger, which corresponded to the
correct finger movement on a computer keyboard. After the first verse was taught, the
second verse was introduced.

The second verse introduced the phonemic sounds /h/, /i/, /j/, /k/, /l/, /m/, /n/, /o/,
and /p/ (See Figure 1). All the finger movements involved the use of the right-hand
fingers only. All sounds learned in verse two corresponded to letters on the right side of
the computer keyboard. As each sound was sung, association was made between the
proper keyboarding finger that corresponded to each sound. After the students appeared comfortable with the first two verses, the final verse was introduced.

Verse three involved the sounds /qu/, /r/, /s/, /t/, /w/, /x/, /y/ and /z/ (See Figure 1). Sounds in verse three utilized both the left and right - hand fingers. Children were taught to make an association with a particular sound and the proper keyboarding finger as each sound was sung.

The consonants c, g, and s were sung using two different sounds as the correct finger was wiggled. The vowels a, e, i, and u were sung with two different sounds as the correct finger was moved. The vowel o, was sung with three different sounds as the proper finger was moved (See Figure 1).

The Finger Game Song was always sung two times. There were four lines that were sung prior to starting the game: “We’re going to play the finger game, so sit upon the ground. We’ll wiggle certain fingers, as we sing a certain sound... ready.” Most sounds were repeated three times in the song. Due to the rhythm of the song, however, the phonemic sounds /d/, /k/ and /t/ were sung four times. The phonemic sounds /m/, /n/, /qu/, /w/, /x/, /y/ and /z/ were sung twice. Four lines were then sung at the end of the fingerplay: “And now we know the Finger Game, let’s give ourselves a clap! We’ll wiggle all of our fingers, as we put them in our lap!” This procedure lasted five to seven minutes.
Small group review occurred at the end of week three and week five. At this time, four to five students met with the instructor. Each small group sang the Finger Game Song two times.

Figure 1 displays a chart of the phonemic sounds used in this study. The key word(s) shown to the right of each letter is (are) only for the reader to determine the correct pronunciation.

Figure 1.

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Vowels</th>
</tr>
</thead>
<tbody>
<tr>
<td>/b/ (bat)</td>
<td>/a/ (at, ate)</td>
</tr>
<tr>
<td>/c/ (cat, cent)</td>
<td>/e/ (end, we)</td>
</tr>
<tr>
<td>/d/ (dog)</td>
<td>/i/ (it, like)</td>
</tr>
<tr>
<td>/f/ (fed)</td>
<td>/o/ (dot, open, do)</td>
</tr>
<tr>
<td>/g/ (got, gentle)</td>
<td>/u/ (up, music)</td>
</tr>
<tr>
<td>/h/ (hot)</td>
<td>/a/ (at, ate)</td>
</tr>
<tr>
<td>/j/ (jog)</td>
<td>/e/ (end, we)</td>
</tr>
<tr>
<td>/k/ (king)</td>
<td>/i/ (it, like)</td>
</tr>
<tr>
<td>/l/ (lid)</td>
<td>/o/ (dot, open, do)</td>
</tr>
<tr>
<td>/m/ (mop)</td>
<td>/u/ (up, music)</td>
</tr>
<tr>
<td>/n/ (no)</td>
<td>/a/ (at, ate)</td>
</tr>
<tr>
<td>/p/ (put)</td>
<td>/e/ (end, we)</td>
</tr>
<tr>
<td>/qu/ (quit)</td>
<td>/i/ (it, like)</td>
</tr>
<tr>
<td>/r/ (run)</td>
<td>/o/ (dot, open, do)</td>
</tr>
<tr>
<td>/s/ (sit, days)</td>
<td>/u/ (up, music)</td>
</tr>
<tr>
<td>/t/ (top)</td>
<td>/a/ (at, ate)</td>
</tr>
<tr>
<td>/v/ (vase)</td>
<td>/e/ (end, we)</td>
</tr>
<tr>
<td>/w/ (wag)</td>
<td>/i/ (it, like)</td>
</tr>
<tr>
<td>/x/ (box)</td>
<td>/o/ (dot, open, do)</td>
</tr>
<tr>
<td>/y/ (yellow)</td>
<td>/u/ (up, music)</td>
</tr>
</tbody>
</table>


Subjects in the other classroom were also given whole group instruction. This group was called Class B. They were instructed to move a specific finger when a specific phonemic sound was said. Each sound was repeated three times. The variable of
music/song was not used for Class B. All other teaching techniques remained the same. At the end of week three and week five, this group was also given small group instruction for approximately five minutes. Small group instruction was provided for both groups to allow subjects closer proximity with the instructor.

Data Collection and Data Analysis

Class A and Class B were given two posttests at the end of five weeks of instruction. The posttests required an individualized test for every subject. The first test used the phonemic sounds in the same order that they were learned omitting 11 of the phonemes. The subject was required to move the proper finger that corresponded to the sound given. Responses were recorded on a score sheet for each student (see Appendix B). A total of correct finger movements for each verbalized phoneme was calculated for each child. Totals for Group A and Group B were then calculated. A second posttest involved a random order of phonemic sounds verbalized to each subject. The subject was again required to move the proper finger that corresponded to the sound given. These scores were likewise calculated for each child in both groups (see Appendix C).

A score was also given to responses that were the correct finger but on the opposite hand. This score was included because many preschool age children have not yet mastered laterality and directionality skills. A t-test was used to compare the mean of correct finger movement that corresponds with phoneme association on a keyboard of
Class A to Class B. The mean of correct responses was calculated for both classes. The level of significance was set at $p < .10$ due to the fact that this study is exploratory in nature.

**Null Hypothesis**

There will be no difference in the ability of class A and class B to associate the correct finger movement when a specific phonemic sound is heard that corresponds with correct finger movement on a computer keyboard.

**Limitations**

Although children attending this pre-school were heterogeneously grouped, the cluster sample may have been more homogeneously grouped than one would think. Parents send their children to this pre-school by choice. Families are required to pay a monthly tuition for their child’s early learning experiences. Not all children in the community are given the opportunity to attend this pre-school. Parents with lower incomes may not have the means to afford an entry-level education for their child. Other parents in the community may not feel it necessary to provide this early learning experience for the youngster.

While letter recognition is not a prerequisite for this study, it could play a role in the progress of a child. Also, isolated phonemic sounds can be difficult to project. Producing a phonemic sound may be affected by its phonological context (Yopp, 1992).
The purpose of the study however, was not to master all phonemic sounds or to measure letter recognition. It was to learn the proper finger movement for future keyboarding use. Consequently, strengthening phonemic awareness and increasing letter recognition may result from integrating these skills into the study.

Manual dexterity can also be said to effect performance of a young child’s proficiency at keyboarding (Kercher & Mc Clurg, 1985). This study however, is investigating a technique to empower young children with a foundation for future success in keyboarding.
CHAPTER IV
RESULTS

The purpose of this chapter is to discuss the findings of the study. Based on the study related the use of song to learn proper finger movements which relate to a computer keyboard, the following null hypothesis guided this study: There will be no difference in the ability of class A and class B to associate the correct finger movement when a specific phonemic sound is heard that corresponds with correct finger movement on a computer keyboard.

The data were analyzed by performing a t-test SPSS (SPSS Inc., 1995). These analyses indicated significant differences in several areas. The results are reported in Tables 1-2.

In Test 1, fifteen random phonemic sounds were given to children in the same order they were learned during the interaction phase of the study. Scores for both groups were calculated in two ways. The first way involved correct finger movement on the correct hand. A second score was given if the subject moved the correct finger but on the opposite hand. This procedure was included because laterality and directionality skills play an important role in the master of utilizing the correct hand when mirroring an image. This is a skill not yet manifest in all preschool age children (Gearheart, 1973).

The mean score for Class A was higher than the mean score for Class B when the correct hand and correct finger were given. Class A also had a higher mean score.
when subjects gave the correct finger movement but on the incorrect hand. The mean differences between Class A and Class B were 4.22 and 4.33 respectively.

Table 1. Means and Standard Deviations for Class A and Class B when using Test 1: phonemic sound and finger association was tested in the same order they were learned. (n=18)

<table>
<thead>
<tr>
<th>Test 1</th>
<th>Class A (Experimental)</th>
<th>Class B (Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct finger/Correct hand</td>
<td>M 9.33</td>
</tr>
<tr>
<td></td>
<td>Correct hand</td>
<td>SD 2.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Class A</td>
</tr>
<tr>
<td></td>
<td>Sounds given in same order as learned</td>
<td>(Experimental)</td>
</tr>
<tr>
<td></td>
<td>Correct finger/Incorrect hand</td>
<td>M 12.11</td>
</tr>
<tr>
<td></td>
<td>Incorrect hand</td>
<td>SD 1.84</td>
</tr>
</tbody>
</table>

In Test 2, fifteen phonemic sounds were given in random order. Subjects were asked to identify the proper finger movement with each sound. The mean score for Class A was higher than the mean score for Class B when the correct finger movement was given on the correct hand. The mean score for Class A was also higher than the mean
score for Class B when the correct finger was given but on the incorrect hand. The mean differences between Class A and Class B were 3.88 and 5.55 respectively.

Table 2. Means and Standard Deviations when using Test 2: phonemic sound and finger association was tested in random order. (n=18)

<table>
<thead>
<tr>
<th>Test 2</th>
<th>Class A (Experimental)</th>
<th>Class B (Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sounds given in random order</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct finger/Correct hand</td>
<td>M 7.00</td>
<td>M 3.11</td>
</tr>
<tr>
<td></td>
<td>SD 2.43</td>
<td>SD 1.41</td>
</tr>
<tr>
<td>Sounds given in random order</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct finger/Incorrect hand</td>
<td>M 11.11</td>
<td>M 5.56</td>
</tr>
<tr>
<td></td>
<td>SD 1.60</td>
<td>SD 2.20</td>
</tr>
</tbody>
</table>

The t-test for independent means was performed to examine if music/song had any effect on the subjects’ ability to learn specific finger movements when a specific phonemic sound was heard. Results are listed in Tables 3-4.
Table 3. **Means, Standard Deviations and t-test of equality of means for Class A and Class B: sounds given in same order.**

<table>
<thead>
<tr>
<th>Test 2</th>
<th>Class A (Experimental) (n=18)</th>
<th>Class B (Control) (n=18)</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sounds given in same order as learned</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct finger/Correct hand</td>
<td>M 9.33 SD 2.93</td>
<td>M 5.11 SD 2.03</td>
<td>5.03*</td>
</tr>
<tr>
<td>Correct finger/Incorrect hand</td>
<td>M 12.11 SD 1.84</td>
<td>M 7.78 SD 2.24</td>
<td>6.34*</td>
</tr>
</tbody>
</table>

*p = .000

The results of the t-test in Table 3 indicate that Class A was more successful than Class B in associating proper finger movements when a specific sound was given. The difference between groups on mean correct responses was statistically significant (*p* = .000).
Table 4. Means, Standard Deviations and $t$-test of equality of means

for Class A and Class B: sounds given in random order.

<table>
<thead>
<tr>
<th>Test 2</th>
<th>Class A (Experimental)</th>
<th>Class B (Control)</th>
<th>$t$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=18)</td>
<td>(n=18)</td>
<td></td>
</tr>
<tr>
<td>Sounds given in random order</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct finger/</td>
<td>M  7.00</td>
<td>M 3.11</td>
<td>3.11</td>
</tr>
<tr>
<td>Correct hand</td>
<td>SD 2.43</td>
<td>SD 1.41</td>
<td>1.41</td>
</tr>
<tr>
<td>Correct finger/</td>
<td>M  11.11</td>
<td>M 5.56</td>
<td>5.56</td>
</tr>
<tr>
<td>Incorrect hand</td>
<td>SD 1.60</td>
<td>SD 2.20</td>
<td>2.20</td>
</tr>
</tbody>
</table>

*$_{p} = .000$

The results from the $t$-test in Table 4 indicate that Class A was more successful than Class B in associating proper finger movement when a specific sound was given. The difference in mean correct response between Class A and Class B was statistically significant ($p=000)$.

Results from both testing situations, sounds given in the same order and sounds given in random order, indicate that the difference in mean scores between Class A and Class B is significant. Therefore, the null hypothesis can be rejected.
CHAPTER V

DISCUSSION, IMPLICATIONS, CONCLUSIONS

The process of educating our young is quite different than it was just twenty years ago. Today, computers are used daily in schools across the country. The ability to access a world of knowledge is literally just a finger-touch away for students around the globe. How then can we, as educators, better equip our young people to retrieve the knowledge available to them? Elementary age students are using the computer daily to gather this vast information via the computer keyboard. Most of these young people hunt and peck away at the keyboard letters to complete their assignments. As a result, poor keyboarding habits can manifest at a very young age.

This study was conducted to investigate whether preschool age children could effectively learn to associate and move a specific finger that corresponds to a specific letter sound on a computer keyboard via music/song and fingerplay. The purpose was to examine the effectiveness of pre-keyboarding instruction given to young children prior to teaching formal keyboarding. Thirty-eight students were involved in this study. Class A, which consisted of eighteen students, learned to associate a specific finger movement with a sound by learning a song. Class B learned to associate a specific finger movement without song, no melody was involved. Music/song was the variable in this study.

After five weeks, meeting with each class to review the song two times every Monday, Wednesday and Friday, Class A outperformed Class B in every aspect of the
study. At the end of the five weeks, two posttests were given. Posttest 1 involved associating a specific finger movement when a specific phonemic sound was given. The researcher selected fifteen random sounds but presented them in the same order that the phonemic sounds were sung. Posttest 2 was conducted in the same fashion with the difference being the order of the sounds given. The fifteen randomly selected sounds were not given in the order they were learned.

Posttest 1 and posttest 2 were scored two times. The first score indicated that the subjects moved the correct finger and used the correct hand when a sound was given. A second score was administered for each posttest to determine if the correct finger was moved regardless of the hand that was used. The mean score for correct response when testing the same order the sounds were learned was 9.33 for Class A while Class B had a mean score of 5.11. Class A obtained a mean score of 12.11 when only correct fingering was tested while Class B had a mean score of 7.78. Class A was superior to Class B in all aspects of this study. Class A was capable of associating a specific sound to the correct finger movement that corresponds to a keyboard with more success than Class B.

Informal observations of the two classes also support the importance of music/song and learning. The classes likewise responded to the researcher in different ways. Class A, the class with song as a variable, appeared to look forward to the sessions. The class was excited and anxious to sing the song together. Students appeared attentive
and ready to sing The Finger Game Song. There was good eye contact and participation between the class and the researcher. The classroom teacher likewise projected positive feedback to the researcher. She too, appeared excited by the visits. The researcher noted the teacher actually singing the song in the back of the room by the second week of the visits.

Class B, the group without song, seemed to tire of the visits. As the weeks progressed, the eagerness and participation from the class seemed to diminish. The researcher noted less attentiveness and enthusiasm from Class B. The researcher also noted a different response from the teacher. As the weeks progressed, the teacher in Class B appeared bothered by the short interruption for the session time. She failed to have her class ready for the researcher as the weeks went by. Class B did not appear to look forward to the session time together nearly as much as Class A.

The studies below contained crucial findings that served as a basis for this study. (Lamb & Gregory, 1993; Schlaug & Steinmetz, 1991) Research has shown that music can enhance connections between the hemispheres in the brain. This research helps illustrate that using the medium of music at a very young age is crucial for development of the ‘highways’ within our brain structure. Elongating specific sounds in our language has also been shown to improve auditory discrimination (Jenkins, Jacobson, Merzenich, Schreiner, & Tallal, 1995). Using melody and song to teach phonemic awareness may enable children to master these forty-four phonemic sounds in our language.
Phonemic sounds are an integral part of understanding our English lexicon (Yopp, 1992). Studies have identified phonemic awareness a powerful predictor of reading achievement in first grade (Juel, 1988, Lomax & Mc Gee, 1987). Some even indicated that it is a better predictor than measures such as IQ and general language ability (Juel, 1988). A solid foundation in phonemic awareness skills is the best predictor of success in early reading acquisition (Stanovich, 1993-94). Regardless of instructional technique, phonemic awareness is an essential element for progress in reading (Yopp, 1992).

For the reasons stated above, phonemic sounds were used in this study instead of the letter names in hope of reinforcing these specific sounds of speech. It is the hope that phonemic awareness skills will become enhanced because they were used in The Finger Game Song. The goal of the study, however, was not to teach phonemic awareness.

Observations from the researcher strongly suggest that music and song play an integral part in a young child’s learning. The subjects in Class A clearly had more ‘fun’ learning to associate specific sounds with finger movements via song, than the subjects in Class B, without song. These findings can be related to many facets in educating our young.

In just five weeks, meeting every Monday, Wednesday and Friday for five to seven minutes with each classroom, the mean score of correct answers in Class A was 9.67. The implications from this study are astounding. If a class of eighteen
heterogeneously grouped four and five-year-olds could accomplish such success in five weeks, a program that began in September and ended in June could have remarkable results. Instituting a program into preschool and Head Start curriculums where classrooms learn The Finger Game Song could empower our young children with an essential tool as we enter the next millenium. Like pre-wiring a new home with the necessary equipment to accommodate today’s technology, so too, can we ‘pre-wire’ our young children with pre-keyboarding skills. By knowing the proper finger movement associated with a specific phonemic sound, children will be equipped to make a natural transition when formal keyboarding is introduced. Learning to associate phonemic sounds with the proper finger position on a keyboard can be equated with teaching sign language.

Actual keyboarding can be awkward for small hands, but this study supports the premise that learning to associate finger movements with a song can be accomplished successfully in young children. Mastery of pre-keyboarding skills can help eliminate the hunt and peck method of keyboarding before poor keyboarding habits begin. Throughout this process, it is the hope that phonemic awareness skills will be enhanced, thus leading to future reading success. It is the hope of this researcher to continue this study further and test the results of a yearlong process involving The Finger Game Song.

The researcher would also recommend conducting a pre-test for knowledge on phonemic awareness prior to conducting the study. A pre-test could have helped reinforce
whether or not the groups were similar in phonemic awareness skills. In future research, administering a pre-test could be beneficial in determining if The Finger Game Song enhanced phonemic awareness in the subjects or whether well-developed phonemic awareness helped subjects become successful in learning and performing the song. Regretfully, this testing did not take place in this study. A pre-test, however, was presented by the researcher in the initial proposal.

Computer literacy will be a necessity for all young children. It all starts at the computer keyboard. While ‘pre-wiring’ young children to associate sound/finger relationships, we are also enhancing the fundamental skill of phonemic awareness. These two important ‘keys’ can open learning both through electronic mediums and print. Hopefully it will help unlock an entire world of life-long learning for children.
References


Reading Teacher, 45, 696-703.
APPENDICES
Appendix A

Permission form allowing the researcher to work with each student
To Whom It May Concern,

My name is Kathy Felice and I am working on my master’s degree in education through the University of Dayton. Throughout the next six weeks, I will be conducting a study in regard to the role music plays in shaping a young child’s learning. I plan to work with each class twenty to twenty-five minutes per week. The goal will be to provide your child with pre-keyboarding skills to help master computer keyboarding in future years. I will be teaching students to associate specific finger movements with phonemes. Students will then be asked to individually go through the finger play at the end of the study. Data collected from the study will be compiled for future research, however at no time will specific children be identified throughout the project.

All participation is voluntary. Please sign the consent form below and return to your child’s teacher by February 13, 1998. If you have any questions, feel free to contact me at [phone number] or you may call the school and speak with [music teacher or director], the music teacher or [director], director. Thank you for your cooperation. I am looking forward to working with your child.

Sincerely,

Kathy Felice

[Consent Form]

Yes, I give permission for my child, ________________________, to participate in a study by Mrs. Felice for a thesis project at the University of Dayton.

No, I do not give permission for my child, ________________________, to participate in a study by Mrs. Felice for a thesis project at the University of Dayton.

Parent Signature ___________________________ Date ________________________
Appendix B

Answer Key for Test 1:

Fifteen selected phonemic sounds were given in the same order as learned
Appendix C

Answer Key for Test 2:

Fifteen selected phonemic sounds were given in random order