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The Effect of Melodic and Rhythmic Interventions on Typical Hearing and Deaf/Hard-of-Hearing Preschool Children's Acquisition of Selected Vocabulary Words

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THE EFFECT OF MELODIC AND RHYTHMIC INTERVENTIONS ON TYPICAL HEARING AND DEAF/HARD-OF-HEARING PRESCHOOL CHILDREN’S ACQUISITION OF SELECTED VOCABULARY WORDS

By

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This thesis is dedicated to my Mom, for her overwhelming love and support and to my Dad whose presence is still with me in the front row of every performance.
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ABSTRACT

The purpose of the present study was to examine the effect of melody and rhythm on typical hearing and deaf/hard-of-hearing preschool children’s acquisition of selected vocabulary words. Participants (N = 30) were preschool children 3 to 4 years of age with typical hearing (n = 15) and varying levels of hearing loss (n = 15). After consultation with early childhood specialists and pilot testing participants’ knowledge of vocabulary, 24 target words were selected from the Peabody Picture Vocabulary Test. Four target words from the categories: plants, birds, animals, woodwind/string instruments, percussion instruments and vegetables were assigned to one of four conditions: (1) no contact control—words not purposefully taught, (2) contact control/conversational—words taught using speaking voice, signs, and visual aids, (3) melody—words taught through singing, signs, and visual aids, and (4) rhythm—words taught through rhythmic chants, signs, and visual aids. Analyses revealed that hearing participants made significant gains from pre- to post test under the rhythmic, contact control/conversational and melodic conditions. Further analysis revealed that their pre- to posttest gains under the contact control/conversational condition were significantly greater than their gain scores under the melodic and no contact control conditions. Additional analysis revealed that participants with hearing losses made significant gains from pre to posttest under the rhythmic and conversational/signed conditions. Further analysis revealed that their pre-to posttest gain scores under the rhythmic condition were significantly greater than their gain scores under the contact control/conversational, melodic, or no contact control conditions. This last finding corroborates previous research that indicates rhythmic cueing can be an effective mnemonic device for sight word recognition, particularly for children with hearing losses.
CHAPTER I
INTRODUCTION

Most children learn language through direct and indirect verbal interactions with their caregivers. When young children engage in conversations with adults who model the rules of the language consistently, the children will ultimately decipher the rules and use them appropriately in their own communication. Throughout infancy and the toddler years, participation in interactions with caregivers is critical for language development. When an infant is born with a significant hearing loss and is not able to receive or process the caregiver’s vocal communications, the results can have serious consequences for a child’s academic, cognitive, and social development (Meadow, 1980).

Delays in language development are not the direct result of a child’s hearing loss, but primarily due to the lack of an appropriate language model. A small percentage of infants who are deaf/hard-of-hearing are born to deaf parents. They will likely develop a solid foundation for language development because they have a strong model of American Sign Language (ASL), which is the native, visual and manual language of deaf people in the United States (McAnally, Rose, & Quigley, 1987). However, 90% of children with hearing loss in the United States are born to hearing parents and regular exposure to language is often unavailable or limited during the child’s critical period of language learning (Goldin-Meadow & Mayberry, 2001). The failure to develop an effective and sophisticated language at an early age has negative consequences for all areas of their development. Meadow (1980) noted that the primary deprivation of deafness is not the loss of sound—it is the deprivation of language.

Children Who Are Deaf/Hard-of-Hearing

In 2002, the U.S. Department of Education reported that approximately 70,000 students aged 6 to 21 received special education services under the category of hearing impairment (U.S. Department of Education, 2002). However, the number of children with hearing loss is undoubtedly higher, since many of these students may have other disabilities as well and may be served under other categories. Hearing impairment is a term used to refer to any degree of hearing loss in an individual. While the phrase hearing impairment is often used as an educational label, it is not the term preferred by many individuals with hearing losses. Individuals with substantial hearing losses who use ASL and are part of
the deaf culture refer to themselves as *Deaf* with a capital “D.” These individuals do not consider themselves to be “impaired” in any way and take pride in their cultural identity (Adamak & Darrow, 2005). *Hard-of-hearing* is a phrase used to define someone who has hearing loss, but not so profound as to interfere with the processing of speech (Adamak & Darrow, 2005). Throughout this thesis, the term *deaf/hard-of-hearing* will be used to describe participants with varying levels of hearing losses.

Hearing losses range from mild to profound, depending upon how well a person can hear the frequencies and intensities most associated with speech. Hearing loss can be described as “congenital,” meaning the loss occurred before or at birth, or “adventitious,” meaning the loss occurred after birth. Hearing loss is also described according to the part of the ear that is affected (Schirmer, 2001). An individual can have bilateral hearing loss, meaning loss in both ears, or unilateral hearing loss, in which only one ear is affected. It is important to note that very few people are completely without hearing and most individuals who are deaf/hard-of-hearing have some residual hearing. Early detection of a hearing loss and appropriate interventions, including special education services and the use of amplification devices, can reduce the negative effects of hearing loss (Schirmer, 2001).

**Early Intervention and Language Development**

Due to the fact that language is predominantly communicated orally and understood aurally, having a hearing loss can have profound effects on one’s expressive and receptive communication skills (Adamak & Darrow, 2005; McNally, Rose & Quigley, 1987; Schirmer, 2001). A multitude of factors impact the effects of a hearing loss. The most critical variables that influence language development are: age of onset—the age at which the hearing loss was diagnosed, the type of hearing loss, whether or not the child receives appropriate amplification through devices such as hearing aids, whether or not the child’s parents are deaf, and the parents’ preferred system of communication (Adamak & Darrow, 2005).

The majority of children born with profound deafness develop language abilities at approximately half the rate of their peers with normal hearing (Miyamoto, Houston, Kirk, Predew, & Svirsky, 2003). However, early detection and intervention are believed to be vital steps in maximizing language outcomes during the critical period of language learning—generally considered to be birth through 6 years of age (Yoshinaga-Itano, 2003). Due to recent research on the benefits of early
identification and intervention, a majority of states currently have mandatory newborn hearing screenings and intervention programs (Center for Disease Control and Prevention, 2005). Interventions include medical and technical assistance, such as surgery for cochlear implants or assistance with hearing aids. The total elimination of hearing deficits through medical intervention is not possible, especially for those with sensorinueral losses; consequently, early intervention educational programs are necessary for children who are deaf or hard-of-hearing. Such programs include various personnel such as teachers of the deaf or hard-of-hearing, early childhood specialists, audiologists, speech therapists, parent educators or sign language specialists (Gfeller, 1990). Families participating in early intervention programs typically seek the advice of professionals to choose services they feel will benefit their child and family. The goal of early intervention is to increase language development by providing confidence and support to families as they learn how to maximize communication with their child (Sass-Lehrer, 2002).

Educational Approaches

Controversy has long existed over which communication system is appropriate for children who are deaf/hard-of-hearing. Included in this controversy is who should decide which communication system a child who is deaf/hard-of-hearing will use. IDEA Sec. 300.116 states that "in determining the educational placement of a child with a disability, including a preschool child with a disability, each public agency shall ensure that the placement decision is made by a group of persons, including the parents, and other persons knowledgeable about the child, the meaning of the evaluation data, and the placement options” (U.S. Department of Education, 2004, ¶ 1). Therefore, decisions about placement and communication modes for a child are complex and should be individualized.

Over the years, specific educational methods and philosophies have been developed to teach language and communication to children who are deaf/hard-of-hearing. The Total Communication philosophy may involve one or several modes of communication (manual, oral, auditory, and written), depending on the particular needs of the child (Solit, Taylor, & Bednarczyk, 1992). During the 1970s and 1980s, the Total Communication approach became a popular option for teaching students with profound hearing losses. Recently, deaf education has seen a new movement toward a bilingual-bicultural (bi-bi) approach. Based on the evidence of the academic success of children born to deaf
parents, this approach assumes that ASL should be the first language of children who are deaf/hard-of-hearing and that English should be taught as a second language (McAnally, Rose, & Quigley, 1987).

In the past, teaching methods for students who are deaf/hard-of-hearing focused specifically on rules of syntax and parts of speech. Current research has changed the way that teaching language is viewed by educators of children who are deaf/hard-of-hearing. Instead of grammatical drills, teachers are now advised to provide opportunities for meaningful communication. The natural approach to language development encourages the child who is deaf/hard-of-hearing to acquire the rules of language through exposure, imitation, expansion and expression, without the focus on rote memorization (McAnally, Rose & Quigley, 1987). To create meaning in language, children who are deaf/hard-of-hearing must comprehend the language associated with everyday events and use their knowledge, language and communication skills to interact with others (Gaustad & Paul, 1998).

The Use of Music in Language Development

During the early stages of childhood, music is often linked to language development—evidenced by the way babies listen to and produce sound without distinguishing between music and language, singing and speech (Chen, 1997). Speech characteristics such as babbling, which incorporates imitation, repetition, turn-taking and various pitches, may be incorporated into various rhythms and melodies in order to challenge and encourage a child’s verbal behaviors. The close relationship between music and child’s early vocalizations has led to the use of music to promote language development (Chen, 1997).

Researchers have also found implications for the use of music to enhance the development of communication and language skills in young children with language and other developmental delays (Buday, 1995; Colwell, 2002; Gfeller, 1983; Harding & Ballard, 1982; Hoskins, 1988). Madsen (1999) found that music may serve as part of a multi-sensory approach to aid in speech and language skills. Music may also aid in memorization (Buday, 1995; Gfeller, 1983; Gray-Thompson, 1988; Jellison & Miller, 1982; Wolfe & Hom, 1993) provide motivation for participation (Harding & Ballard, 1982; Madsen, 1991), establish a positive atmosphere (Richards, 1975), emphasize spoken language components and improve expressive and receptive language capabilities (Lowe, 1995; Gfeller, 1983; Harding & Ballard, 1982; Madsen, 1999; Wolfe & Hom, 1993). The use of music as a learning aid for
children who are deaf/hard-of-hearing may reinforce language structure and vocabulary through song-signing and song-writing (Darrow, 2000). Furthermore, music can function as a social activity that promotes a structured environment in which children can practice communication skills (Gfeller & Darrow, 1987).

Visual and Kinesthetic Aids in Learning

For language experiences to be meaningful, the language learning tasks should be appropriate for the child’s stage of development. At early stages, mental representation of objects and experiences begin at a concrete level and become more abstract with age. Exposure to real objects and events are the foundation of mental images at the concrete level. By pre-school, most children can represent objects at a symbolic level. During the early stages of language development, visual aids at the object or symbolic level are crucial when teaching concepts. Eventually, the child will master the more abstract levels of representation through words or sign (Gfeller, 1990).

While visual aids are useful when teaching language, kinesthetic aids are valuable as well. In early childhood education, the appropriate sequencing of levels of representation, starting from concrete concepts and proceeding to abstract concepts, facilitates learning. Equally important is the sequencing of level of operations, starting with motor activities and proceeding to verbal operations. Even after children have moved beyond the sensorimotor stage, many still need kinesthetic experiences, such as using their own bodies and objects to experience concepts, to provide a solid foundation upon which language can be built (Gfeller, 1990).

Purpose of Study

Previous studies support the benefits of integrating music and visual aids into early childhood classrooms in order to promote language development (Mulkey, 1993). Studies have also shown that visual aids and kinesthetic aids coupled with music can complement the educational objectives of students who have limited English proficiency (Medina, 1990; Schunk, 1995). No studies could be found that examined the use of visual and kinesthetic aids coupled with music on the language skills of preschoolers who are deaf and hard-of-hearing. The purpose of the present study was to examine the effect of melodic and rhythmic interventions on typical hearing and deaf/hard-of-hearing preschool children’s acquisition of selected vocabulary words.
CHAPTER II
REVIEW OF LITERATURE

In reviewing the literature related to the present study, five broad areas are outlined for further examination: (a) children who are deaf/hard-of-hearing, (b) language development for children who are deaf/hard-of-hearing, (c) the use of songs in language development for hearing and deaf/hard-of-hearing populations, (d) the use of visual and kinesthetic aids in language development, and (e) the use of visual and kinesthetic aids paired with music in language development.

Children Who Are Deaf of Hard-or-Hearing

The impact of hearing loss on a child’s life is dependent on the degree, cause, and type of hearing loss. The degree of hearing loss can be classified as slight, mild, moderate, severe, or profound (Lewis & Bear, 2002). It is assessed by an audiological evaluation that combines elements of the frequency and the intensity of sound in order to determine the individual’s hearing threshold. A hearing threshold level (HTL) is the softest sound that an individual can hear (Schirmer, 2001). The intensity of sound is measured in decibels (dB). Persons with mild hearing losses (HTL 26-40 dB) will have difficulty following conversation if the speaker is more than six feet away or if there is background noise. They may have speech impairments and limited vocabulary. Persons with moderate hearing losses (HTL 41 to 55dB) may be able to hear if the speaker is speaking loudly and at no more than three to five feet away. They will also have difficulty following group discussions. Persons with severe hearing losses (HTL 71 to 90dB) may be able to hear someone's voice if the speaker is one foot away. However, without the use of hearing aids, this individual will likely not be able to understand speech. Persons with a profound hearing loss (HTL 91dB or greater) may hear loud sounds but cannot hear conversational speech. Individuals with profound hearing loss will rely on visual information as their primary means of communication (Heward, 2000).

In addition to intensity of sound, the frequency of sound is another important factor in measuring the degree of hearing loss. The frequency or pitch of the sound is referred to in Hertz (Hz). While the range that humans can typically hear is from about 20 Hz to 20,000 Hz, the range most important for understanding speech is considered to be between 500 Hz to 2000 Hz. A hearing loss can vary
depending on the frequency of sound. It is possible and common for an individual to have normal hearing in one frequency range and have a significant hearing loss in another frequency range (Schirmer, 2001).

Hearing loss can also be categorized by the type of hearing loss and the age of onset. The two main types of hearing loss are conductive and sensorineural. A conductive hearing loss is due to a condition that interferes with the transmission of sound to the outer or middle ear. In sensorineural loss, the damage lies in the inner ear or along the nerve pathway from the inner ear to the brain stem. An individual with a mixed hearing loss has a combination of both a conductive and a sensorineural loss (Schwartz, 1987). A hearing loss that is present at birth or that occurs before the child has learned language is called a prelingual hearing loss. Educators consider the hearing loss to be classified as prelingual if it occurs earlier than two years of age. A postlingual hearing loss occurs after the child has developed spoken language (Schirmer, 2001).

Another factor that can affect a child’s language development is the cause of a hearing loss. Hearing loss is caused by a wide range of biological and environmental factors. The most common causes of prelingual hearing loss are premature birth, heredity, maternal rubella, and the congenital cytomegalovirus. The most common causes of postlingual hearing loss include meningitis, otitis media, and loud noise. As mentioned before, the etiology, type, and age onset of the hearing loss are important factors in a child’s language development (Schirmer, 2001).

**Language Development in Children with Typical Hearing**

To examine the challenges in language development for children who are deaf/hard-of-hearing, it is important to understand the stages of language development for children who have typical hearing. Even before birth, sounds in a hearing child’s prenatal environment may affect language and cognitive development (Marschark & Clarke, 1993). At 30 to 35 weeks the fetus is hearing maternal sounds and beginning to discriminate among speech sounds. Studies have shown that newborn infants have the ability to discriminate their mother’s voice from that of other females (DeCasper & Fifer, 1980). This auditory feedback and stimulation for infants who are hearing is the foundation for the child’s stages of verbal communication.
At the age of 2 months, the first step in language development is cooing—the production of vowel-like sounds. These sounds develop into babbling around 6 months of age. Babbling is viewed as one of the key mechanisms that permit babies to discover and to produce the patterned structure of natural language (Petito, 1993). For vocal babbling to occur, it is crucial that babies receive auditory stimulation from their environment and auditory feedback from their own vocalizations (Locke, 1990). During the babbling stage, a child typically begins to engage in turn-taking games, which display interactions similar to those found in conversations. Imitation and echoing are also common behaviors during this stage. At 11 to 14 months, a child begins to form recognizable words (Boysson-Bardies, 1999).

A toddler’s first words are typically learned through hearing the words used by the primary caregiver (Harris, Clibbens, Chasin, & Tibbitts, 1989). A child’s initial words typically refer to objects, familiar actions, or outcomes of actions. As two-word phrases begin to develop, a child’s vocabulary grows rapidly and may expand to anywhere from 10 to 20 words a week. By preschool age, most children learn to use hundreds of words by forming them into sentences and by interacting in conversations with others (Berk, 1996). The active role of the caregiver during this time period is crucial to the development of a child’s language skills.

The manner in which a caregiver speaks to an infant during the early stages of life, sometimes known as motherese or parentese, is considered critical in promoting normal language development. Motherese or parentese contains such elements as simplified, shortened sentences, exaggerated expressions, clear pronunciations, questioning, repetition, and directions (Boysson-Bardies, 1999). In the vocal messages of parentese, the baby is oriented toward the mode of oral communication. A baby reacts reciprocally to the caregiver’s patterns of sound and movement. Infants learn to imitate their parent's vocal and facial expressions, and notices when their parents imitate them. The infant also learn to "take turns" in conversation. This parent-infant reciprocity helps a baby learn to be sociable and how to communicate effectively (Boysson-Bardies, 1999). An effective parent-infant reciprocal relationship provides an opportunity for parents to learn how to stimulate their baby's senses and meet their baby’s needs. As a result, an effective parent-infant reciprocal relationship reduces parental anxiety and increases the mother and father’s self-confidence as parents (Harris, 1978).
The amount of maternal verbal stimulation, such as motherese, correlates to measures of the child’s future linguistic development (Harris, Clarke, & Stewart 1973). In a longitudinal study, Hart and Risley (1995) discovered that the more parents talk to their children, the faster their children’s vocabularies increase and the higher the children’s IQ test scores. Furthermore, the size of a child’s vocabulary is strongly associated with the size of the parent’s vocabulary. Hart and Risley’s findings reiterate that the child’s first three years of life are the most important regarding language development, and that it is essential to provide a wide variety of language experiences during that critical period.

**Language Development in Children Who Are Deaf/Hard-of-Hearing**

Due to the importance of the verbal interaction between parents and children in the early stages of life, parents’ hearing status has a significant impact on the language development of children who are deaf/hard-of-hearing. Research indicates that hearing parents and their hearing children tend to interact similarly as deaf mothers to their young deaf children (McAnally, Rose & Quigley, 1987). With regard to the timeline of developmental milestones, sign language acquisition by children who are deaf/hard-of-hearing and born to deaf parents is similar to spoken language acquisition by children with typical hearing (Bonvillian, Orlansky, & Novack, 1983). In observations of six-month-old babies living in a sign only environment, researchers found that the babies used gestures—which were considered equivalent to verbal babbling of hearing babies exposed to a speech environment (Petitto, Holowka, Sergio, Levy, & Ostre, 2004). In this same study, data were also recorded on the babies’ developmental milestones over a sixteen-month period. On average, each subject produced his or her first recognizable sign at 8.5 months, their tenth sign at 13.2 months and the first sign combination at 17 months.

Researchers also found that the kinds of words or signs first produced by children who are deaf/hard-of-hearing are similar to those first produced by hearing children. Like hearing children, children who are deaf/hard-of-hearing sign or speak about people who are important in their lives, familiar objects and actions (McAnally, Rose, & Quigley, 1987). Compared to hearing babies in a speech environment, babies in a sign language environment achieve language milestones at an accelerated pace. Research indicates that this sign language advantage could occur because babies often use gestures to communicate before they use words (Bonvillian, Orlansky & Novack, 1983). However,
by 18 to 23 months, this sign language advantage does not seem to persist through future developmental milestones.

Children who are deaf/hard-of-hearing and born to hearing parents are often significantly linguistically delayed compared to children who have typical hearing. Researchers have found that the quality of mother-child interaction is related to a deaf child’s future communication skills (Meadow, Greenberg, Ertin, & Carmichael, 1981). Studies have shown that hearing mothers of children who are deaf/hard-of-hearing are less likely to respond positively and contingently to their children than mothers who share the same hearing status as their children (MacTurk, Meadow-Orlans, Koester, & Spencer, 1993; Meadow-Orlans, 1997; Meadow-Orlans & Steinberg, 1993). Compared to pairs where parent and child hearing status is matched, interactions between children who are deaf/hard-of-hearing and their hearing parents tend to be more brief, more frequently interrupted due to miscommunication, and more likely to be dominated by the parents. In reaction, these children are typically less responsive and less involved in the use of language than children with a parent of the same hearing status (Pressman, Pipp-Siegel, Yoshinaga-Itano, & Deas, 1999). It has been proposed that a mother’s stress, found to be related to the diagnosis of her child’s deafness, is one reason for the repeated research findings that describe hearing mothers as less sensitive than mothers with hearing children (Schlesinger & Meadow, 1972). One recent study (Lederberg & Everhart, 2000), however, found that hearing mothers of children who are deaf/hard-of-hearing are equally sensitive to their children’s communicative abilities as mother-child dyads who were matched in hearing status; therefore Lederberg and Everhart suggest that intervention efforts should be focused on fostering linguistic development rather sensitivity training.

Research on the language acquisition of children indicates that early identification of a child’s hearing loss has a positive effect on their language development (Yoshinaga-Itano, 2003). Children whose hearing loss is identified by six months and who are fitted with hearing aids by six months demonstrate significant language gains compared to children who are identified and fitted for hearing aids later than six months. These language gains were found across all degrees of hearing loss, genders, communication modes, and socio-economic levels (Yoshinaga-Itano, 2003). Likewise, in current cochlear implant research, implantation in infancy has been found to be beneficial to the development of
language skills compared to implantation after infancy (Miyamoto, Houston, Kirk, Perdew, & Sviersky, 2003).

In addition to early identification and auditory intervention, special educational programs and family involvement have also indicated positive results for children who are deaf/hard-of-hearing. Moeller (2000) found that, regardless of the degree of hearing loss, students who were enrolled in early intervention educational programs before 11-months of age showed greater language outcomes at five years of age than students who were not enrolled in early intervention programs. The results of the same study indicate that strong family support—characterized by the family’s amount of participation in educational sessions and their ability to become effective language models for their child, can also mitigate the negative effects of late identification and intervention (Moeller, 2000).

While research universally supports early identification, early intervention, and parental support, research on the recommended type of language intervention continues to be examined. In the United States, decisions regarding the appropriate language system for children who are deaf/hard-of-hearing often weighs heavily on their parents. The majority of children who are deaf/hard-of-hearing in the United States use an oral approach for communication. However, even with intensive oral training, children who are profoundly deaf are markedly delayed in their acquisition of speech when compared to their hearing peers (Goldin-Meadow & Mayberry, 2001). Therefore, many children who are deaf/hard-of-hearing will ultimately learn to use sign language in a school setting rather than in their home environment. The communication system used in the school is not always consistent with the system used at home, where most children are often communicatively isolated (Lederberg and Everhart, 1998).

The majority of students who are deaf/hard-of-hearing in the United States learn American Sign Language when they enter school at approximately 4 or 5 years of age (Mayberry, 1998). Musselsman, Wilson and Lindsay’s study (1989) illustrates the transient nature of deaf/hard-of-hearing students in programs with different language approaches. The placement and movement among preschool programs of 131 children with severe and profound hearing losses was observed for over four years. In the first year of the study, most of the children were enrolled in auditory/oral programs. By the final year, the majority of the students were moved into total communication programs. Consequently, this group of students entered school linguistically and cognitively behind their hearing peers who benefited from a
home and classroom environment that consistently modeled and used a total communication approach (Musselman, Wilson, & Lindsay, 1989). Other studies have similarly indicated that few children who are deaf/hard-of-hearing are educated under only one placement or communication mode (Spencer & Lederberg, 1997; Stredler-Brown, 1998).

Despite advances in intensive intervention services, improved educational techniques, and hearing aid technology, there has been little improvement in the academic statistics of children who are deaf/hard-of-hearing (Yoshinaga-Itano, Seday, Coulter, & Mehl, 1998). Academic achievement data indicate that regardless of whether their parents are deaf or hearing, students who are deaf/hard-of-hearing perform below grade level on assessments of reading comprehension. These limitations in reading have a negative impact on their overall academic achievement. Data also indicate that the average student who is deaf/hard-of-hearing graduates from high school with language and academic achievement levels below that of the average fourth-grade hearing student (Yoshinaga-Itano, Seday, Coulter, & Mehl, 1998). King and Quigley (1985) report that students who are deaf/hard-of-hearing usually have their lowest performance on vocabulary subtests when compared to their performance on other standardized test domains such as mathematics, spelling and language mechanics—punctuation and capitalization.

In order to improve the academic achievement of students who are deaf/hard-of-hearing, various researchers have looked at specific factors of vocabulary knowledge in relation to language development (LaSasso & Davey, 1987; Letourneau, 1972; McNally, Rose, & Quigley, 1987; Prezbindowski & Lederberg, 2003). Several generalizations can be drawn from this body of research. Students who are deaf/hard-of-hearing are delayed in their level of vocabulary knowledge compared to their hearing peers (McNally, Rose, & Quigley, 1987). Students who are deaf/hard-of-hearing tend to use shorter, simpler sentence structures than that of peers and have a more narrow range of contexts that foster word learning (Prezbindowski & Lederberg, 2003). Vocabulary knowledge of children who are deaf/hard-of-hearing correlates strongly to reading comprehension (LaSasso & Davey, 1987). They often have difficulty with words that have multiple meanings (Letourneau, 1972). Compared to hearing children, children who are deaf/hard-of-hearing are more likely to understand and use concrete nouns
and familiar action verbs over more abstract or general words with which they may have less experience (Marschark, 2007).

Although there is widespread agreement about the difficulties that children who are deaf/hard-of-hearing encounter in learning to read, there is much debate on how to teach literacy to children who are deaf/hard-of-hearing (Musselman, 2000). However, researchers have documented a strong positive correlation between in-depth knowledge of vocabulary and reading comprehension (LaSasso & Davey, 1987; Paul & Gustafson, 1991). In order for any instructional reading program to be effective, researchers emphasize the importance of addressing the development of skills such as word identification, word knowledge, and comprehension. Students who are deaf/hard-of-hearing should be exposed to words and their meanings, nuances, figurative usage in deliberate but natural and meaningful learning situations. While skilled readers develop vocabulary through the reading context rather than direct instruction, many children who are deaf/hard-of-hearing do not comprehend words that they encounter in context during reading (DeVilliers & Pomerantz, 1992; Kelly, 1995, 1996). They have difficulty utilizing the context effectively in order to decode words. Therefore, most children, who are deaf/hard-of-hearing need systematic instruction in vocabulary, especially in multiple dimensions of words, before they can independently decode words in the reading context (Blachowicz & Fisher, 2000; Paul, 1998, 2001). In summary, educators should provide experiences where students who are deaf/hard-of-hearing are actively involved in developing their understanding of vocabulary, become immersed in the vocabulary, and experience vocabulary repeatedly in multiple contexts.

Researchers often compare the language development of students who are deaf/hard-of-hearing to the language development of students who speak English as a second language (ESL) (Singleton, Morgan, Digello, Wiles, & Rivers, 2004). Many children in the Deaf community learn English as a second language through their first language of American Sign Language. As a result, similarities exist in the educational programs of ESL students and students who are deaf/hard-of-hearing. For both populations, the process of reading and writing are often divided into three approaches: bottom-up, top-down and interactive (Stewart & Kluwin, 2001). The bottom-up approach is a reading model that is based on the principle that the written text is hierarchically organized. The comprehension of smaller units of language, such as phonemes, must be comprehended before decoding higher units (i.e. sentence
syntax). The failure to comprehend the lowest levels of the hierarchy results in higher order misunderstandings. According to this model, students who are deaf/hard-of-hearing have difficulty with reading because the inability to hear speech hinders their progression of decoding letters to words to sentences (Stewart & Kluwin, 2001).

The top-down model, also known as the whole language approach, emphasizes the importance of context and what the reader brings to the text. The primary objective of this approach is to read for meaning rather than mastery of the letter sounds. Instead of processing the text letter by letter, readers should use meaning, context, and grammatical cues to identify unrecognized words. When observing students who are deaf/hard-of-hearing using the top-down approach, researchers have found that the greatest challenge is the student’s lack of context and prior knowledge due to the communication limitations of being deaf in a hearing society (Stewart & Kluwin, 2001).

Some theorists believe that the majority of readers use the bottom-up and top-down processes simultaneously throughout the reading process (Dechant, 1991). Researchers have observed that students who are deaf/hard-of-hearing utilize both methodologies when reading as well (Kelly, 1995; LaSasso & Metzger, 1998). The interactive model of language development combines valid strategies from both methodologies. Researchers hypothesize that an interactive system may be the best reading model for students who are deaf/hard-of-hearing (Stewart & Kluwing, 2001). Stewart and Kluwing (2001) reiterate that whichever literacy model is chosen, authentic activities that provide students who are deaf/hard-of-hearing with opportunities to talk about what they are reading and writing should be incorporated. In addition, modeling and guidance are essential in helping students who are deaf/hard-of-hearing overcome their lack of proficiency in English.

The Use of Music in Language Development

Some linguists theorize that singing develops in humans before speaking. Livingstone (1973) provided anthropological theories that homo sapians sang long before speaking. Typical language development is first evident in an infant’s song-like vocalizations. As early as five months, infants may recognize changes in melodic contour and rhythm patterns (Chang & Trehub, 1971). By six months, infants can learn to echo pitches that are sung to them (Kessen, Levine & Wendrich, 1979). In response to infant vocalizations, adults speak with sing-song tones that contain musical characteristics known as
parentese (Boysson-Bardies, 1999). In the early stages, these musical exchanges primarily function to teach social regulation (Boysson-Bardies, 1999; Trehub, 2003); however, as children grow, the songs, which are embedded with academic, social and cultural content, become carriers of information.

A substantial amount of research shows that songs can effectively facilitate and improve language skill acquisition in several different ways. These include the use of music to aid memory and attention (Gfeller, 1983; Isern, 1960; Jellison & Day, 1973; Jellison & Miller, 1982; Lathom, 1971; Renner, Wolfe & Hom, 1993), the use of music to provide motivation and reinforcement (Harding & Ballard, 1982), as well as the use of music to increase language discrimination, verbal response and reading accuracy (Colwell, 1994; Hoskins, 1988; Madsen, Madsen, & Michel, 1975). Many studies support the reinforcement value of music and the application of music as an antecedent to desired behavior (Eisenstein, 1974; Hanser, 1974; Jorgenson, 1974; Larson & Allyn, 1990; Madsen & Forsythe, 1973). Research has indicated that music can be used as a tool to motivate students in language development (Harding & Ballard, 1982; Seybold, 1971; Steele, 1971). Harding and Ballard (1982) investigated the effectiveness of using music as a stimulus and a reward for spontaneous speech in preschoolers with physical disabilities. They observed verbal behaviors of three preschoolers in the regular classroom environment and in a structured music environment. The major finding of this study indicated that music can be used as stimulus to increase appropriate verbalizations for students who have language delays due to physical disabilities (Harding & Ballard, 1982). These findings were corroborated by Seybold (1971), who found that preschoolers with speech delays showed greater increases in the use of spontaneous speech after participating in a music therapy program. In another study, also involving preschoolers, reading behaviors increased when music was used as a contingency for reading during preschool “free play” (Steele, 1971). The results of these three studies all suggest that songs can effectively establish a positive learning environment and provide motivation for participation.

In addition to eliciting motivation and attention, several studies provide evidence that music can also enhance a child’s ability to retain information (Gfeller, 1983; Lathom, 1970; Jellison & Miller 1982; Nicholson, 1972; Wolfe & Hom, 1993). It is a common practice for some classroom teachers, music educators and music therapists to use music as a mnemonic device to teach academic, social and motor skills to young children (Jellison & Miller, 1982). Music is often used as a vehicle for teaching
tasks in a sequence from beginning to end. These tasks may include motor or verbal behaviors such as reciting the letters of the alphabet, dialing a phone number correctly, or making a sandwich (Jellison & Miller, 1982). Ashcraft (1989) describes three principles of successful mnemonic devices: (1) they create a structure for learning, (2) they provide a distinctive memory record so that the material is not easily forgotten, and (3) they guide the learner in the retrieval process. The rhythm and melody of a familiar song provides a structure for learning, a distinctive memory record, and provides retrieval cues to facilitate recall. The requirements of a good mnemonic device seem to be inherent in the nature of music (Rainey & Larsen, 2002).

Researchers have looked at how music functions as a mnemonic device. In an early investigation, Jellison (1976) contended that the recall of information in a written format was increased when participants were presented digits through a song presentation compared to spoken presentation. In a later study, Jellison and Miller (1982) looked at the effects of sung or spoken input on the recall of sequential information. While songs did not facilitate participants’ recall in this study, the ability to recall a sequence of words was equivalent regardless of whether the words were sung or spoken to subjects, and most preferred rehearsal under the singing condition. In a similar study, Wolfe and Hom (1993) taught phone numbers to a preschool class in three different conditions: with a familiar melody, an unfamiliar melody, and with speech. They found the number of trials it took students to learn telephone numbers embedded within familiar melodies was significantly less than the number of trials in the unfamiliar and spoken conditions.

An additional study conducted by Gfeller (1983) showed that musical rehearsal paired with modeling and cuing significantly aided recall and retention of multiplication tables for typical students and students with learning disabilities. Throughout the research project, participants commented that the familiar melody opposed to the unfamiliar melody facilitated the recall of information most effectively. Gfeller (1983) also noted that if the musical rehearsal of the mnemonic was not modeled, then recall was not significantly facilitated. Other researchers have supported the premise that when using mnemonic strategies with younger students, more modeling of how to use the strategy is needed to facilitate effective recall of information (Pressley, Samuel, Hershey, Bishop, & Dickinson, 1980; Pressly & Dennis-Rounds, 1980).
From the literature it appears that the characteristics of a song can hinder or aid recall (Boltz & Wallace 1994; Wallace, 1994; Wallace & Rubin, 1988). Researchers have examined components of songs that were optimal for aiding recall. The following generalizations can be made from the research: a song can aid recall if the melody is repetitive, familiar or easy to learn, and the lyrics and melody should be sufficiently simple not to distract from the lyrics (Wallace, 1994). The target content to be learned must also be placed in lyrics that make use of rhyme, repetition and phrasing. Lyrics that use imagery and poetics also facilitate recall (Wallace & Rubin, 1988). Some researchers suggest that sung lyrics are better remembered than spoken lyrics (Boltz & Wallace, 1994). Research indicates that element of rhythm alone can be an effective tool for recalling information (Shepard & Asscher, 1972; Staples, 1968; Ryan, 1969; Weener, 1971). The impact of rhythm is greater when the verbal information carries meaning compared to meaningless information (i.e., nonsense syllables) (Glazner, 1976; Shepard & Ashcher, 1971; Wiener, 1971).

In addition to the use of music as reinforcement for reading behaviors and as a memory aid, music provides a distinct tool for processing information. Campbell (2000) stated that “the systems the brain uses to process music are either identical to or fundamentally entwined with the systems used in perception, memory, and language” (pg. 22). Madsen, Madsen and Michel (1975) examined the effect of music on children’s ability to discriminate words that had similar phonemes. Results indicated that participants’ auditory discrimination significantly increased in the conditions that paired words with musical tones and paired stories with melodies compared to the conditions without music. The researchers postulated that by assisting auditory discrimination, music may also improve efficiency for both language discrimination and reading skills.

Colwell (1994) explored the notion that music can improve reading skills by examining the effect of a reading program paired with music. In comparing the participants who practiced reading by using either sung or spoken rehearsal, she found that participants who used song rehearsal to practice a reading selection had greater reading accuracy. The results suggest that song rehearsal facilitated reading accuracy by serving as a structural prompt for the students (Colwell, 1994). In a later study, Colwell (2002) again studied the effect of music on the reading accuracy of children who had learning disabilities. Targeted words were taught under three conditions: reading rehearsal paired with singing,
reading rehearsal paired with chanting, and reading rehearsal through the typical reading program which did not include music. Results indicated that reading accuracy improved regardless of condition; however, more on-task behavior occurred during the music conditions (Colwell, 2002).

The use of music to help develop language skills in children with developmental delays has also proven to be effective. Hoskins (1988) investigated the relationship between music and the expressive language abilities of preschool children who had language delays. The Peabody Picture Vocabulary Test (PPVT), which was given in the usual spoken format and a format where the words were paired with melodies and the Expressive One-Word Picture Vocabulary test were all administered to participants as pre- and posttests. The group participated in music activities where a music therapist showed a picture of an object and taught the participants a melodic phrase that incorporated the targeted vocabulary words. Participants’ significant improvement with the melodic versions of the PPVT may suggest that antiphonal singing with picture cards may be a beneficial technique for language development. In summary, research on the controlled use of songs to improve language development presents a strong rationale for the use of music in educational settings.

Another use of music has been to enhance students who are in English as a Second Language (ESL) programs. An overview of research on foreign language learning suggests that music in the foreign language classroom can: increase motivation while decreasing anxiety (Jolly, 1975), improve speaking pronunciation (Wilcox, 1995; Purcell 1992), and enhance cultural awareness and aid in language retention (Salcedo, 2002; Purcell, 1992; Medina, 1990). One particular study of interest reported on the effectiveness of music and story illustrations in the English vocabulary acquisition of students who were limited English proficient students. The students were assigned to four groups: (a) story spoken with illustrations, (b) story spoken without illustrations, (c) story sung with illustrations, and (d) story sung with illustrations. Results indicate that the largest vocabulary acquisition gains were made in the music and illustration condition (Medina, 1990).

When studying ESL learners and the use of music to facilitate language acquisition, Wilcox (1995) discovered that music has positive effects on participants’ vocabulary learning. Wilcox claimed that the parallel structure of the songs and lyrics assisted in cueing the students’ recall of words. The songs also helped to establish the prosody of language. Wilcox noticed that the students’ enjoyment of
singing increased as well the students desire to practice and rehearse the target language. In another study on the effects of music on second language learning, Kennedy and Scott (2005) found that activities such as active music listening, group chanting, rhythmic training, music and sing language, and lyric analysis improved the story retelling skills of middle school students in ESL programs.

The Use of Songs in Language Development for Children who are Deaf/Hard-of-Hearing

In order to understand how music is utilized to teach language skills to students with limited hearing, it is important to be familiar with the research on the musical strengths and preferences of students who are deaf/hard-of-hearing. When examining rhythmic elements of music such as beat identification, tempo change, accent as a factor in meter discrimination and rhythm pattern maintenance, results indicated that participants who were deaf/hard of hearing performed as well or better than hearing participants (Darrow, 1984). The results from the study also suggest that the rhythmic abilities of individuals who are deaf/hard-of-hearing tend to be stronger than pitch-related abilities. The melodic rhythm duplication of students who were deaf/hard-of-hearing were significantly lower compared to hearing participants, which Darrow suggests might be attributed to the lack of musical experience of students who are deaf/hard-of-hearing. Several other generalizations can be made from Darrow’s research on music and children who are deaf/hard-of-hearing. Music stimuli are most effective when presented with the appropriate use of amplification (Darrow, 2005). The vocal range of an individual who is deaf/hard-of-hearing tends to be lower and smaller when compared to hearing students (Darrow & Starmer, 1986). Sustaining instruments give more aural feedback to students who are deaf/hard-of-hearing than do percussive instruments (Darrow, 1991). Students who are deaf/hard-of-hearing require more exposure, both in duration and intensity, when presented with music stimuli compared to hearing students (Darrow, 2005).

A number of researchers have looked at the effect of music on the expressive and receptive language skills of children who are deaf/hard-of-hearing (Galloway & Bean, 1974; Darrow & Starmer, 1986; Staum, 1987). Because students who are deaf/hard-of-hearing often lack the internal feedback mechanisms necessary to self-monitor elements of speech such as voice inflection, speech rhythm and pronunciation of words, speech improvement is commonly cited as an objective for students who are deaf/hard-of-hearing that can be included as a part of music therapy or music instruction (Berkenshaw,
Darrow and Starmer (1986) examined the effect of vocal training on the speech of children who are deaf/hard-of-hearing. The study focused on components of speech such as fundamental frequency, frequency range and speech rate. The results of the study suggested that individualized vocal training and the singing of songs in lower keys appropriate to the student’s vocal range may have helped to modify the students’ fundamental frequency and frequency range of speech. In another study, Amir and Schuchman (1985) investigated the effect of music on auditory training for preschool children who were deaf/hard-of-hearing. The results of their study indicated that the residual hearing of a child who is deaf/hard-of-hearing may be improved through a systematic program of auditory training in a musical context; however, the auditory training did not transfer over into other environments outside of the musical setting (Amir & Schuchmann, 1985). The use of a music notation system was also found to be successful in improving the speech prosody in individuals who were deaf/hard-of-hearing (Staum, 1987). She used music notation to assist clients in rhythmic and intonational accuracy related to their speech (Staum, 1987). During the intervention, rhythm notation was matched to familiar and unfamiliar. The rhythms were also presented on two staves to symbolize changes in pitch. Staum noted that the older children in the study had success with transferring the technique from novel to complex verbal phrases. In another study on speech rhythm, Birkenshaw (1965) also reported that Orff-Schulwerk techniques were successful in improving the speech rhythm of students who were deaf/hard-of-hearing.

Beyond the enhancement of speech, other investigations have also found the integration of music into language arts programs to be beneficial (Darrow, 1989; Gfeller & Darrow, 1987). In addition to increasing motivation, music establishes a multisensory approach to learning that can help the child who is deaf/hard-of-hearing internalize the meaning of new vocabulary (Gfeller & Darrow 1987). Darrow (1987) reported that singing may provide an opportunity for children who are deaf/hard-of-hearing to engage in intensive listening and vocal activity. The process of learning songs can reinforce auditory discrimination, integrating letter sounds, syllabication and pronunciation. Learning songs may also serve as a teaching tool to aid in the development of vocabulary and to provide a context for the study of the sentence structure and semantics of lyrics (Gfeller & Darrow, 1987). Galloway and Bean (1974) also used songs as well visual aids and movement to teach body parts to children who were
deaf/hard-of-hearing. Although the lack of a control group and the minimal number of participants limited their statistical analyses, Galloway and Bean found songs to be a useful method for teaching selected language concepts to children who are deaf/hard-of-hearing.

Song writing may also provide a medium for students who are deaf/hard-of-hearing to enhance vocabulary development and to reinforce syntax and semantic practice (Gfeller 1987). Gfeller (1987)) recommended the incorporation of song writing with the Language Experience Approach to improve the language skills of students who are deaf/hard-of-hearing. In research on children’s description of music, Swedberg (2007) found that the students who were deaf/hard-of-hearing used more analytical language than figurative language to describe music. Her results suggest that the listening and describing of musical excerpts might be used as an educational tool to reinforce analytical and figurative language by students who are deaf/hard-of-hearing (Swedberg, 2007).

The Use of Songs and Visual Aids in Promoting Language

Children’s ability to learn increases when they are taught through their strongest learning modalities. Educators often advocate the use of visual aids as part of a multi-sensory approach to learning, particularly as a way of accommodating the diversity of learning styles among individual learners (Mard, 1986, Nocera, 1979). When teaching language, visual aids give educators the ability to “create a situation or context which is outside the classroom walls” (Kreidler, 1971, p.22). In research on vocabulary acquisition of ESOL students, words that are associated with actual objects or imagery techniques are learned more easily than words without (Kellogg & Howe, 1971; Omaggio, 1979; Snyder & Colon, 1988). When using mnemonic strategies for remembering new words, children experience increased success if the words are presented pictorially, with the greatest advantage being when an interactive image is provided (Miler, Leven, & Pressly, 1980; Pressley and Levin, 1978; Pressley, Samuel, Hershey, Bishop, & Dickinson, 1980; Pressley, Levin, & Delaney, 1982).

Zarra (1999) compared the effectiveness of visual aids on the ability of preschoolers with language delays to retell a story. Participants were exposed to stories in three conditions: (a) oral story-telling using only auditory cues, (b) story-telling using illustrations, (c) story-telling using illustrations and puppets. Participants were asked to retell the stories either orally, using illustrations, or through role-play with the use of puppets and illustrations. While no significant difference was found between
the use of illustrations alone and the use of illustrations and puppets, the results indicated a significant
difference in participants’ recall when visual aids were used.

The use of visual aids and music to enhance children’s enjoyment in language development is
apparent in the popularity of children’s illustrated songbooks. Picture songbooks have frequently been
examined by researchers to investigate the effect of music on such skills as memory, reading, and
language in young children (Barcley & Walwer, 1992; Davis, 1994; Jalango & Bromely, 1984; Lamme
1990). Jalango and Bromley (1984) found picture books based on song lyrics can help children with
delayed language increase their phonological, syntactic and semantic competence. In a similar study,
Gray-Thompson (1988) studied the use of music and picture books to promote the language
development of children who are deaf/hard-of-hearing. The study included children who primarily used
American Sign Language as their primary mode of communication. Compared to the control group, the
children in the picture songbook condition showed a significantly greater increase in word recognition.

In examining the effect of music and visual aids on language in early education, Mulkey (1998)
pretested participants and divided target vocabulary words into three conditions: (a) target words were
sung and paired with visual aids, (b) target words were sung but not accompanied by visual aids, (c)
control condition—neither sung nor seen during any of the songs. After three 15-minute group sessions,
participants were posttested. Data revealed that music paired with visual aids was the only condition
that yielded significant gains from pre- to posttest. Results of this study reinforce the benefits of pairing
visual and music aids when teaching language in the early childhood classroom (Mulkey, 1998).

The Use of Kinesthetic Aids to Promote Language

Although the instructional aids utilized by educators are typically pictures and three-dimensional
objects, classroom aids for language acquisition are not limited to tangible objects. Kinesthetic aids
such as gesture, mime and physical actions provide live modeling to connect the spoken word to an
image. Even in infancy, the use of gesture as a kinesthetic aid can have an impact on language
development. Goodwyn, Acredolo, & Brown (2000) discovered that the infants of parents who taught
language paired with symbolic gesture increased in their verbal development when compared to infants
who were not exposed to the gestures. Boyatsiz and Watson (1983) examined the symbolic gestures
used by infants and toddlers, and found that the age of the child correlates to the symbolic mode of
gesture. For example, three-year-old participants were successful in imitating gestures that represented concrete objects, but could not imitate gestures that represented imaginary objects or ideas. Their study suggests that a child’s ability to utilize gestures follows a developmental progression from concrete to more abstract object gestural representations during the preschool years (Goodwyn, Acredolo & Brown, 2000). In an educational setting, gestures may be used by teachers to evaluate student progress. Gestures are considered a window into a student’s mind and may reveal what a child is thinking or if learning is taking place. Researchers have determined that a child displays a “mismatch”—gestures that conflict with what is verbally being said—when experiencing cognitive instability or variability (Pine, Lufkin, & Messer, 2004). Cognitive variability has been shown to be a reliable indicator that the child’s knowledge system is in a state of transition, which predicts the understanding a new concept. As the children move through the transitional stages of learning and arrive at the state of understanding, a concordance or “match” of gesture and speech is observed (Pine, Lufkin, & Messer, 2004).

In addition to processing receptive information, gestures have been shown to assist in expressive communication (Pine, Lufkin, Kirk & Messer, 2007). Researchers have also observed children expressing ideas in gesture before they express ideas verbally. These data suggest that gestures are integrally connected to the child's thinking and expressive communication. In a picture-vocabulary test, Pine and Kirk (2006) found that the use of gestures facilitated a child’s vocabulary retrieval process. In another study on the effect of gesture on expressive language, researchers found that children who are told to gesture while re-telling a story tend to use more details than children who do not gesture (Stevanoni & Salmon, 2005).

Researchers have also studied the effects of a teacher’s use of gestures on how children learn (Church & Goldin-Meadow, 1986). Researchers have determined that when teachers use gesture in instruction, children learn, often better than when taught with speech alone (Singer & Goldin-Meadow, 2005). Children who are taught to gesture with their hands as an aid to learning new concepts have been shown to have better retention than children who do not gesture (Cook, 2007). In response to students’ use of gestures, teachers often adjust their instruction, including their own gestures (Goldin-Meadow, Kim & Singer, 1999; Goldin-Meadow & Singer, 2003). Goldin-Meadow and Singer (2003) looked at the effect of a teacher’s use of gestural mismatch on elementary students’ learning of math. The
researchers observed that when children heard a problem-solving strategy but saw another gesture that conveyed different information, more learning occurred compared to matched gestures. The researchers propose that children are able to glean more information when gestures differ from speech (Goldin-Meadow & Singer, 2003).

In addition to gesture, researchers have also looked at the effects of other types of kinesthetic movement to increase children’s learning (Cammisa, 1994; Witcher, 2001). Educational kinesiology is based on the principle that specific movement can improve memory, reading, concentration and communication. An educational program called Brain Gym, which is based on the educational kinesiology, has become popular in educational settings (Diamond, 1999). One particular study examined the effect of the Brain Gym program on the academic and perceptual motor skills of 25 students who had learning disabilities (Cammisa, 1994). Analysis of data indicated significant improvement in the perceptual motor skills of students participating; however, the changes in academic skills were not significant. Research has indicated that educational kinesiology seems to be more effective with improving perceptual motor skills than with academic achievement (Cammisa, 1994; Witcher, 2001).

American Sign Language (ASL), a visual/manual language, embodies a visual and kinesthetic modality for vocabulary acquisition. While many children who are deaf/hard-of-hearing learn English through the visual language of American Sign Language, sign language has been also used to enhance the language of hearing children as well. A recent trend in early education is the use of teaching sign language to communicate with hearing infants and toddlers. Popular publications and videos such as “Baby Sign” encourage parents to sign with their babies before they speak (Goodwyn, Acredolo, & Brown, 2000). Researchers support the idea that signing to hearing infants and toddlers has positive effects on language development (Goodwyn, Acredolo, & Brown, 2000). Daniels (1996) concluded that preschool hearing students who received instruction in English and ASL scored significantly higher on the Peabody Picture Vocabulary Test compared to students in classes with no sign instructions. In a larger study, Daniels (1997) found similar results that supports the use of sign language and provides evidence that a multi-sensory experience, where words are presented visually, kinesthetically and orally, is advantageous for young learners.
When using signs to teach reading to hearing kindergartens, Cooper (2000) also found that sign language can be used as a tool to enhance learning. She noticed that the implementation of fingerspelling during reading activities assisted the students by emphasizing phonemic awareness. She also contended that including sign language into a reading curriculum expedited the rate of children’s learning, enhanced their motivation for reading and enabled students to be more successful with kinesthetic approaches to learning. In a pilot study, Wilson, Teague and Teague (1984) had similar findings in their study on the use of sign language to improve the spelling performance of first grade students. The researchers implemented a program that paired instructional activities with signing and fingerspelling as learning aids for spelling. The data analysis revealed that sign language and fingerspelling improved the students’ spelling performance significantly over both short and long-term periods of time.

The Use of Music Paired with Kinesthetic Aids to Promote Language

Music education approaches have often incorporated kinesthetic movement and visual aids to enhance the learning of musical concepts. The Kodaly approach utilizes Curwen hands signs as visual and kinesthetic aids to reinforce pitch and ear-training. Cousins and Persellin (1999) investigated the use of Curwen hand signs on pitch accuracy of elementary school students. The researchers discovered that the use of Curwen hand signs promoted greater pitch accuracy compared to singing without hand signs (Cousins & Persellin, 1999). The Orff-Schulwerk approach also encompasses kinesthetic aids by incorporating body percussion to help students internalize rhythm concepts (Orff & Walter, 1963).

While various researchers have examined the use of kinesthetic aids and visual aids paired with music to teach musical concepts (Cousins & Persellin, 1999; Campbell & Scott-Kassner, 2002), few researchers have looked at the pairing of movement, visual aids and music to teach language. Madsen (1982) examined the use of gestures and music to facilitate children’s vocabulary development. Students who were pretested on a group of nonsense words were assigned to three groups: (a) a music-gesture treatment group, (b) a gesture only treatment group, and (c) a no contact control group. Her results indicate that the participants in the music-gesture treatment group scored the highest on the posttest. Music also seemed to increase participants’ ability to transfer newly learned words to other contexts (Madsen, 1982).
In another study, Buday (1995) explored the use of music as a strategy to enhance the recall of signs by children who have autism. Children with autism were taught spoken and signed vocabulary under two conditions. In one condition, the students listened and observed as seven words were signed and spoken in conjunction with music from an audio cassette. In a second condition, the students listened and observed as another set of vocabulary words were spoken and signed with rhythmic speaking on a cassette tape. All of the conditions were videotaped and viewed by an objective scorer who tallied the number of signs and spoken words accurately copied by the participant. The results indicated that correct imitation was significantly greater in the melodic condition than in the rhythmic condition (Buday, 1995).

Rationale and Purpose Statement

Research has indicated that students who are deaf/hard-of-hearing are delayed in their level of vocabulary knowledge compared to their hearing peers (McNally, Rose, & Quigley, 1987). King and Quigley (1985) report that students who are deaf/hard-of-hearing usually have their lowest performance on vocabulary subtests when compared to their performance on other standardized test domains such as mathematics, spelling and language mechanics—punctuation and capitalization. Researchers have documented a strong positive correlation between in-depth knowledge of vocabulary and reading comprehension (LaSasso & Davey, 1987; Paul & Gustafson, 1991.) Moeller (2000) found that, regardless of the degree of hearing loss, students who were enrolled in early intervention educational programs before 11-months of age showed greater language outcomes at five years of age than students who were not enrolled in early intervention programs. The present study examines whether music can be an effective tool for aiding the vocabulary development of preschooler’s who are deaf/hard-of-hearing.

Research indicates that music paired with sign language has been an effective tool in teaching language to various diverse populations such as children with autism and second language learners (Buday, 1995; Schunk, 1999). Additionally, a study by Schunk (1999) examined the effects of sign language paired with music on the receptive vocabulary of students in an ESL program. All of the participants were asked to identify 20 vocabulary words in a pretest and posttest. The vocabulary words were embedded in the lyrics of children’s songs and Broadway show tunes. The students practiced the
words in one of the five conditions: sung text paired with signs, spoken text paired with signs, sung text, and a control group of spoken text only. The most effective conditions were those which integrated sign language. The condition yielding the greatest gains was that in which the vocabulary words were taught with sign language and song. Additional research indicates that the use of songs and visual aids are effective in promoting language development in preschoolers (Mulkey, 1998). No studies could be found that examined the effect of the pairing of sign language, visual aids and song on the language acquisition of children who are deaf/hard-of-hearing.

The present study addresses a gap that exists in the research on children who are deaf/hard-of-hearing. Research has indicated that students who are deaf/hard-of-hearing benefit from the use of song to promote language development (Galloway & Bean, 1974; Darrow & Starmer, 1986; Staum, 1987). Researchers has also found that using the combination of sign language and visual aids paired with music has been an effective tool to teach vocabulary (Buday, 1995; Schunk, 1999), but whether the results are consistent when working with children who are deaf/hard-of-hearing remains to be seen. The purpose of the present study was to examine the effect of melodic and rhythmic interventions on typical hearing and deaf/hard-of-hearing preschool children’s acquisition of selected vocabulary words.

**Research Questions**

The research questions were:

1. Is there a significant difference between hearing and deaf/hard-of-hearing participants’ overall abilities to identify selected vocabulary words?
2. Is there a significant difference among the four conditions (melodic, rhythmic, contact control and no contact control) on typical hearing and deaf/hard-of-hearing participants’ acquisition of the selected vocabulary words?
3. What is the order of effectiveness for the intervention conditions (contact control/conversation, melodic, and rhythmic) for typical hearing and deaf/hard-of-hearing participants?
CHAPTER III

METHOD

Pilot Study

A pilot study was conducted to help select words that would be unfamiliar to most preschool students, and to evaluate the procedures. Thirty hearing preschoolers between three and four years old were selected to participate. Each preschooler attended a local preschool located in Tallahassee, Florida. The preschoolers completed a pretest and posttest of targeted vocabulary words by touching or pointing to the correct picture from a set of four pictures. Each child participated in three 20-minute music sessions, during which they heard songs containing the target words. Results of the pilot study indicated that additional words, as well as more difficult words, would be more appropriate for the main study. Based on the results of this pilot study, revisions in the method included the addition of six words.

Participants

Participants (N = 30) were preschoolers with typical hearing (n = 15) and varying levels of hearing loss (n = 15). Students at a state school for the deaf and neighboring schools located in Colorado Springs, Colorado served as participants. Participants ranged from three- to four-years of age. Eighteen males and twelve females participated in the study. All of the students who were deaf/hard-of-hearing participated in educational programs that provided instruction verbally and through sign language. Of those participants who were deaf/hard-of-hearing, four had cochlear implants, three had mild hearing losses, five had moderate hearing losses and three had severe hearing losses. Hearing losses refer to students’ hearing threshold levels (HTL) after amplification with a hearing aid if applicable. Participants who were deaf/hard-of-hearing included students from a state school for the deaf and blind, a resource room in a public school for preschoolers with hearing loss, and a mainstream preschool classroom that includes students who are deaf/hard-of-hearing. The hearing participants were from a local private school.
Design

Participants were pretested on 24 targeted vocabulary words from four conditions. After the pretest, the students participated in three sessions in which six words were taught under the rhythm, melodic and contact control/conversation condition. To avoid order effect, the treatment conditions were counterbalanced across the three sessions. See Table 1. After the three sessions, the participants were posttested.

Table 1

*Counterbalance of Treatment Conditions*

<table>
<thead>
<tr>
<th>Session</th>
<th>Treatment Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Melodic, Rhythmic, Conversational</td>
</tr>
<tr>
<td>2</td>
<td>Rhythmic, Conversational, Melodic</td>
</tr>
<tr>
<td>3</td>
<td>Conversational, Melodic, Rhythmic</td>
</tr>
</tbody>
</table>

Setting and Schedule of Sessions

All of the participants were pretested and posttested individually in the music room or in their classroom by the researcher. The group music sessions took place in the participants’ classroom. The participants were given a 10-minute pretest and posttest and received three 25-minute sessions for one week during the intervention period. The study was conducted in a setting that was familiar to the participants in attempt to make them comfortable during testing procedures.

Materials and Equipment

The vocabulary words were selected from the Peabody Picture Vocabulary Test and from an early educational curriculum designed by an early education specialist (see Appendix A). Enlarged pictures of the target words were used in each session. Pictures were taken from the
Peabody Picture Vocabulary Test Teachers at the school confirmed the age appropriateness and equivalency of the vocabulary words assigned to the various conditions (see Appendix B). Popular children’s songs were selected and the words were revised to incorporate a targeted vocabulary word in each song (see Appendix C and D).

Procedure

After obtaining formal consent from parents, the students were pre- and posttested. Participants served as their own control and were given an identical pre- and posttest before and after each intervention. Participant demographic data (gender and age) are reported in Appendix F. Participants were pre- and posttested individually. During pre- and posttests, participants were asked to touch the target word from a set of four pictures. This procedure was repeated for a total of 24 trials over the four conditions. The targeted vocabulary words were divided into 6 categories: plants, birds, animals, woodwind/string instruments, percussion instruments and vegetables. From each of the categories, 6 words were randomly assigned to each condition. The two treatment and two control conditions were: (1) contact control/conversation (CC)—teaching the selected vocabulary words using verbal instruction alone, (2) no contact control (NCC)—no purposeful teaching of the selected vocabulary words, (3) rhythmic conditions—the selected vocabulary words were taught through rhythmic chant and (4) melodic condition—the selected vocabulary words were taught through song. All of the treatment conditions were paired with sign language and pictures of the selected vocabulary words.

Description of Control Conditions

Contact Control/Conversational Condition (CC). Target words assigned to this condition were taught using verbal instruction paired with pictures and sign language. Each word was said three times during the teaching procedure. The teaching text is found in Appendix E. Participants were encouraged to sign with the researcher.

No Contact Control Condition (NCC). Selected target words assigned to this condition were not purposefully taught to participants through any specific intervention.
Description of Treatment Conditions

_Melodic Condition (MC)._ Target words assigned to this condition were embedded in six children’s songs. Each word was assigned to one song sung a capella. During each song, the target vocabulary word was sung three times. Songs used in the study are found in Appendix C. These songs were also paired with pictures and sign language. Participants were encouraged to sing and sign with the researcher.

_Rhythmic Condition (RC)._ Target words assigned to this condition were embedded in six rhythmic chants. Each word was assigned to one rhythmic chant. During each rhythmic chant, the selected target word was chanted three times. The rhythmic chants are found in Appendix D. The rhythmic chants were also paired with pictures and sign language. The participants were encouraged to sign and sing with the researcher.
CHAPTER IV
RESULTS

Data Analyses for Research Question One

1. Is there a significant difference between hearing and deaf/hard-of-hearing participants’ overall abilities to identify selected vocabulary words?

A Test of Between Subjects ANOVA was used to determine the effects of the four conditions (no contact control, contact control, melodic intervention, and rhythmic intervention) on the two groups’ (hearing and deaf/hard-of-hearing) overall abilities to identify selected vocabulary words. Results of the ANOVA determined that there was no significant difference between the two groups on their overall abilities to identify the selected words ($df = 1, f = 3.24, p = .08$).

Pre- and posttest means, standard deviations and mean gains scores by the four conditions are presented in Table 2 for typical hearing participants and in Table 3 for deaf/hard-of-hearing participants. Descriptive data in Tables 2 and 3 indicate that all conditions resulted in gains from pre- to posttest. During testing, participants viewed four words per test page—three words assigned to the three instructional conditions and one word assigned to the no contact control condition. Through the process of elimination, participants were able to decode the “unknown” word assigned to the no contact control condition; therefore, explaining why even this condition was effective.
Table 2

*Pre- to Posttest Total Gain Scores by Conditions and Subtests for Hearing Participants*

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Gain Scores</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melodic Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td></td>
<td>2.60</td>
<td>1.30</td>
</tr>
<tr>
<td>Posttest</td>
<td></td>
<td>3.73</td>
<td>1.03</td>
</tr>
<tr>
<td>Rhythmic Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td></td>
<td>2.80</td>
<td>0.86</td>
</tr>
<tr>
<td>Posttest</td>
<td></td>
<td>4.13</td>
<td>1.51</td>
</tr>
<tr>
<td>Conversational Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td></td>
<td>2.33</td>
<td>1.29</td>
</tr>
<tr>
<td>Posttest</td>
<td></td>
<td>4.60</td>
<td>1.50</td>
</tr>
<tr>
<td>No Contact Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td></td>
<td>2.83</td>
<td>1.27</td>
</tr>
<tr>
<td>Posttest</td>
<td></td>
<td>3.92</td>
<td>1.68</td>
</tr>
</tbody>
</table>
Table 3

Pre- to Posttest Total Gain Scores by Conditions and Subtests for Deaf/Hard-of-Hearing Participants

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Gain Scores</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melodic Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>2.33</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>.67</td>
<td>3.00</td>
<td>1.85</td>
</tr>
<tr>
<td>Rhythmic Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>2.67</td>
<td>1.29</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>1.27</td>
<td>3.93</td>
<td>1.10</td>
</tr>
<tr>
<td>Conversational Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>2.13</td>
<td>1.41</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>1.00</td>
<td>3.13</td>
<td>1.36</td>
</tr>
<tr>
<td>No Contact Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>2.27</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>0.20</td>
<td>2.47</td>
<td>1.13</td>
</tr>
</tbody>
</table>
Data Analyses for Research Question Two

2. Is there a significant difference among the four conditions (melodic, rhythmic, contact control and no contact control) on typical hearing and deaf/hard-of-hearing participants’ acquisition of the selected vocabulary words?

Raw data for all of the participants consisting of pre- and posttest scores by the four conditions are reported in Appendix G. Paired $t$-tests were used to determine if pre- to posttest gains were significant for each of the four conditions. Results of the paired $t$-tests are shown in Table 4 and in Table 5. For typical hearing participants, results of the paired $t$-tests revealed that the three treatment conditions—melodic, rhythmic, and contact control/conversational conditions yielded significant gains from pre- to posttest. No significant gains pre- to posttest were found for typical hearing participants under the control condition. For deaf/hard-of-hearing participants, results of the paired $t$-test revealed that two of the three treatment conditions—the rhythmic and contact control/conversational conditions yielded significant gains from pre- to posttest. No significant gains pre- to posttest were found for deaf/hard-of-hearing participants under the melodic or control conditions.

Table 4
$t$-tests on Pre- to Posttest Scores for Hearing Participants

<table>
<thead>
<tr>
<th>Conditions</th>
<th>$t$</th>
<th>$df$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melodic</td>
<td>4.43</td>
<td>14</td>
<td>.00*</td>
</tr>
<tr>
<td>Rhythmic</td>
<td>2.80</td>
<td>14</td>
<td>.01*</td>
</tr>
<tr>
<td>Contact Control/Conversational</td>
<td>5.90</td>
<td>14</td>
<td>.00*</td>
</tr>
<tr>
<td>No Contact Control</td>
<td>1.74</td>
<td>14</td>
<td>.10</td>
</tr>
</tbody>
</table>

*Indicates a significant difference, $p \leq .05$. 

---

35
Table 5

*t-tests on Pre- to Posttest Scores for Deaf/Hard-of-Hearing Participants*

<table>
<thead>
<tr>
<th>Conditions</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melodic</td>
<td>1.91</td>
<td>14</td>
<td>.07</td>
</tr>
<tr>
<td>Rhythmic</td>
<td>2.94</td>
<td>14</td>
<td>.01*</td>
</tr>
<tr>
<td>Contact Control/Conversational</td>
<td>2.74</td>
<td>14</td>
<td>.01*</td>
</tr>
<tr>
<td>No Contact Control</td>
<td>0.51</td>
<td>14</td>
<td>.62</td>
</tr>
</tbody>
</table>

*Indicates a significant difference, *p* ≤ .05.

Because repeated measures were made on all participants representing two groups, a Double Repeated-Measures Univariate ANOVA was used to determine the individual effects of the four conditions and any interactions between conditions, groups or tests. This analysis determined that there was a significant difference between conditions (*df* = 3, *f* = 3.40, *p* = .02), between tests (pre and posttests) (*df* = 1, *f* = 56.04, *p* = .000), significant interactions between groups and tests (*df* = 1, *f* = 4.30, *p* = .04), and significant interactions between conditions and tests (*df* = 3, *f* = 3.18, *p* = .03). See Table 6.
Table 6
Double Repeated Univariate Analysis of Variance

<table>
<thead>
<tr>
<th>Source</th>
<th>$F$</th>
<th>$df$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>3.24</td>
<td>1</td>
<td>.08</td>
</tr>
<tr>
<td>Conditions</td>
<td>3.40</td>
<td>3</td>
<td>.02*</td>
</tr>
<tr>
<td>Tests</td>
<td>56.04</td>
<td>1</td>
<td>.00</td>
</tr>
<tr>
<td>Tests × Groups</td>
<td>4.30</td>
<td>1</td>
<td>.47</td>
</tr>
<tr>
<td>Conditions × Tests</td>
<td>3.18</td>
<td>3</td>
<td>.03*</td>
</tr>
</tbody>
</table>

Indicates significant difference, $p \leq .05$

Tests of Within-Conditions Contrasts for participants with typical hearing revealed significant differences between conditions 3 and 1 (contact control/conversation and melodic) ($df = 1, f = 6.46, p = .02$), with the control/conversation condition significantly more effective than the melodic condition. Significant differences were also found between condition 3 and 4 (contact control/conversation and no contact control) ($df = 1, f = 4.71, p = .04$), with the contact control/conversation condition significantly more effective than the no contact control condition. See Table 7.
Table 7
*Tests of Within-Conditions Contrasts for Participants with Typical Hearing*

<table>
<thead>
<tr>
<th>Source</th>
<th>$F$</th>
<th>$df$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhythmic × Melodic</td>
<td>1.02</td>
<td>1</td>
<td>.33</td>
</tr>
<tr>
<td>CC/Conversation** × NCC</td>
<td>4.71</td>
<td>1</td>
<td>.04*</td>
</tr>
<tr>
<td>Melodic × NCC</td>
<td>2.44</td>
<td>1</td>
<td>.14</td>
</tr>
<tr>
<td>Rhythmic × NCC</td>
<td>.00</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>Rhythmic × C.C./Conversation</td>
<td>.20</td>
<td>1</td>
<td>.66</td>
</tr>
<tr>
<td>CC/Conversation** × Melodic</td>
<td>6.46</td>
<td>1</td>
<td>.02*</td>
</tr>
</tbody>
</table>

*Indicates significant difference, $p \leq .05$

** Indicates that the condition was significantly more effective

CC/Conversation=Contact Control/Conversation
NCC=No Contact Control

Tests of Within-Conditions Contrasts for participants who were deaf/hard-of-hearing revealed significant differences between conditions 2 and 1 (rhythmic and melodic) ($df=1$, $f=4.89$, $p=.04$), conditions 2 and 4 (rhythmic and no contact control) ($df=1$, $f=13.62$, $p=.00$), and conditions 2 and 3 (rhythmic and contact control/conversation) ($df=1$, $f=7.00$, $p=.02$), with the rhythmic condition significantly more effective than the other conditions. See Table 8.
Table 8

*Tests of Within-Conditions Contrasts for Participants who were Deaf/Hard-of-Hearing*

<table>
<thead>
<tr>
<th>Source</th>
<th>$F$</th>
<th>$df$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhythmic** × Melodic</td>
<td>4.89</td>
<td>1</td>
<td>.04*</td>
</tr>
<tr>
<td>CC/Conversation × NCC</td>
<td>.83</td>
<td>1</td>
<td>.37</td>
</tr>
<tr>
<td>Rhythmic** × NCC</td>
<td>13.62</td>
<td>1</td>
<td>.00*</td>
</tr>
<tr>
<td>Rhythmic** × C.C./Conversation</td>
<td>7.00</td>
<td>1</td>
<td>.02*</td>
</tr>
<tr>
<td>Melodic × NCC</td>
<td>.53</td>
<td>1</td>
<td>.47</td>
</tr>
<tr>
<td>CC/Conversation × Melodic</td>
<td>.01</td>
<td>1</td>
<td>.92</td>
</tr>
</tbody>
</table>

*Indicates significant difference, $p \leq .05$

** Indicates that the condition was significantly more effective

CC/Conversation=Contact Control/Conversation
NCC=No Contact Control

These analyses revealed that for the hearing participants, the contact control/conversational condition was significantly more effective than the melodic and no contact control conditions, though not significantly more effective than the rhythmic condition. For deaf/hard-of-hearing participants, the rhythmic condition was significantly more effective than the melodic, contact control/conversational and no contact control conditions.
Data Analyses for Research Question Three

3. What is the order of effectiveness for the intervention conditions (contact control/conversational, melodic, and rhythmic) for typical hearing and deaf/hard-of-hearing participants?

Figure 1 reveals that for typical hearing participants, the most effective condition was contact control conversation, followed by rhythmic, melodic and no contact control conditions. For deaf/hard-of-hearing participants, Figure 2 indicates the most effective condition was the rhythmic condition, followed by the contact control/conversation, melodic and no contact control conditions. These figures, along with Figure 3 showing the gain scores for both groups, reveal that the three instructional conditions were all more effective for both groups than the no contact control condition.

![Figure 1](image_url)

*Figure 1.* Total score of pre- to posttests for hearing participants.
Figure 2. Total score of pre- to posttests for deaf/hard-of-hearing participants.

Figure 3. Total gain scores for both populations (deaf/hard-of-hearing and hearing).
Summary

Results of the analyses indicate that:

1) There was no significant difference between the two groups (deaf/hard-of-hearing and hearing) on their overall abilities to identify the selected words.

2) The three instructional conditions were all more effective for both groups than the no contact control condition.

3) For hearing participants, the melodic, rhythmic and contact control/conversational condition resulted in significant gains from pretest to posttest; however, the contact control/conversational condition was significantly more effective than the melodic and no contact control conditions, though not significantly more effective than the rhythmic condition.

4) For participants who were deaf/hard-of-hearing, the rhythmic and the contact control/conversational condition resulted in significant gains from pretest to posttest; however, the rhythmic condition was significantly more effective than the melodic, contact control/conversational condition, and the no contact control conditions.
CHAPTER V
DISCUSSION

The purpose of this study was to examine the effect of melodic and rhythmic interventions on the vocabulary acquisition of typical hearing and deaf/hard-of-hearing preschoolers. For deaf/hard-of-hearing participants, the rhythmic condition was significantly more effective than the other three conditions. For hearing participants, the contact control/conversational condition was more effective than the rhythmic condition, and was significantly more effective than the no contact control condition and the melodic condition. The results also determined that there was no significant difference between the hearing participants and the participants who were deaf/hard-of-hearing on their overall abilities to identify the selected vocabulary words.

Relationship to Extant Literature

Results of the present study indicate that the music interventions (the melodic and rhythmic conditions) were effective in improving the preschoolers’ ability to identify vocabulary words from pretest to posttest. These finding corroborate past studies that used gesture paired with music to teach vocabulary (Buday, 1995; Schunk, 1999). However, Schunk (199) and Buday (1995) found the most effective condition for vocabulary acquisition to be melodic condition paired with sign language. The findings of the present study differ from their studies as the melodic condition was less effective than the rhythmic and contact control/conversational conditions for both groups (hearing and deaf/hard-of-hearing). While Schunk (1999) found the most effective condition to be melodic, she did not include a rhythmic condition to compare to the melodic condition. Buday (1995) did include a rhythmic condition, though differences in her findings may be due to her population, which was children with autism as compared to the population of the present study—hearing and deaf/hard-of-hearing.

The findings of the present study corroborate the results of previous research indicating that rhythm can be an effective mnemonic device for recalling information (Hicks, 1974; Prickett, 1974; Ryan, 1969; Shepard & Asscher, 1972; Staples, 1968; Weener, 1971). Prickett
(1974) investigated the effect of rhythmic patterns on digit recall and found that grouping of pulses in a rhythmic pattern has a greater influence on recall than evenly spaced pulses. In looking at rhythm’s effect on language acquisition, Hicks (1987) investigated the teaching of vocabulary through the use of rap music. She found that preschool children who received instruction through rap music made significant gains in vocabulary compared to the use of conversational speech. The present study’s findings corroborate those of Prickett’s (1974) and Hick’s (1987) who found that rhythmic chant can be an effective teaching tool for vocabulary acquisition.

Participants with hearing loss were more responsive to the rhythmic condition than to any of the other three conditions. This finding supports those of Darrow (1987) who found that children with hearing loss scored higher on rhythm tests than on tonal tests; and therefore suggested that deaf/hard-of-hearing children may be more responsive to the rhythmic aspects of music than to the melodic features. In a study on media images of individuals who are deaf/hard-of-hearing, Darrow (1999) noted that nearly half of the deaf subjects stated their reason for liking the excerpt in which the deaf characters signs a rap was because they could “see the rhythm of the words” (pg. 107). Therefore, the participants in the present study might have responded to the rhythmic condition because of the visual display of the rhythm through the signed chants. These findings in relation to deaf/hard-of-hearing children’s responsiveness to rhythm also parallel current research on children with cochlear implants (Takauki, Trehub, Kanda, Takahashi, 2006). The results of a study by Takauki, Trehub, Kanda and Takahashi (2006) indicated that rhythm is the most salient element of music for children with cochlear implants. In the present study, five of the fifteen participants who were deaf/hard-of-hearing had cochlear implants.

Hearing participants had the most success with the conversation condition, which like all conditions, was paired with sign language and visual aids. These findings corroborate Daniels’ (1996) findings which demonstrate how simultaneously presenting words in visual, kinesthetic, and oral modalities can be used to enhance a child’s vocabulary development. In a previous study looking at different modalities of teaching, Persellin (1987) noted that when presented
with visual aids and singing, children were distracted by the visual aids and needed to be cued to sing. The students in her study also had a difficult time multi-tasking when presented with kinesthetic aids and singing. In the current study, perhaps the novelty of sign language, singing and pictures over-stimulated the hearing students and had a “flooding” effect which resulted in the most effective educational condition to be the least stimulating condition.

In comparing the vocabulary of hearing children and children who are deaf/hard-of-hearing, previous research has found that the children with hearing loss have a significantly decreased vocabulary level (King & Quigley, 1985). However, the present study found that there were no significant differences between groups (hearing and deaf/hard-of-hearing) on their overall abilities to identify the selected vocabulary words. Due to the fact that all of the participants were enrolled in an early intervention programs, this finding of equivalency between the two groups seems to corroborate earlier research that suggests that early interventions bridges the language gaps between the two populations—deaf and hearing (Yoshinaga-Itano, 2003). However, while not significant, descriptive data did indicate that students who were deaf/hard-of-hearing made smaller gains than typical hearing participants from pre- to posttest in all the conditions.

Researchers have noted that children who are deaf/hard-of-hearing lack the vicarious learning that a hearing child receives auditorily from their environment (Harris & Chasin, 2005). In order for a child who is deaf/hard-of-hearing to learn about his or her environment, implicit and deliberate instruction must take place, which requires visual attention from the child (Harris & Chasin, 2005). In the present study, the no contact control condition served as method to monitor a participants’ natural learning during the treatment period, and as a comparison condition to the treatment interventions. In comparing the two groups (hearing and deaf/hard-of-hearing), participants who were deaf/hard-of-hearing made the smallest gains from pretest to posttest in the no-contact control condition. This finding reinforces the importance of the deliberate and structured teaching of vocabulary to students who are deaf/hard-of-hearing.

Limitations to Present Study
There were several factors that may have influenced the results of this study. Due to the fact that deafness is a low-incidence disability, the sample size is small, which may have affected the results. The 15 participants who were deaf/hard-of-hearing were selected from four different educational programs. While all of the educational programs utilized sign language, their communication philosophies differed. One school followed a bi-cultural/bi-lingual model while another educational setting used simultaneous communication—a pairing of oral communication and manual communication. The schools also contrasted in the different musical experiences provided for the students. While students from one school went to music class twice a week, another school provided no music program for their students. These educational differences among the groups might have also had an impact on the results.

In this investigation, treatment conditions took place over a 5-day period. According to Gfeller’s study (1983), the amount of exposure to teaching material is directly related to the child’s ability to retain the information. Interventions may have been more effective if the material had been presented over a longer period of time. Another variable that may have influenced the results was the characteristics of the stimulus vocabulary used. Since real words, as opposed to nonsense words, were chosen for the study, students may have been more familiar with one category of words than others. For example, in examining posttest scores of words from the various categories (animals, plants, instruments, birds, vegetables, percussion instruments), words taken from the category of animals had the highest scores, regardless of the condition. Preschoolers’ affinity for or familiarity with words representing animals may have increased their learning of these target words.

Another limitation of the study was the variability in pretest scores. Through pilot procedures, the researcher attempted to pick words that were most likely to be unfamiliar to a preschool-aged child. However, the participants’ scores on the pretest varied, which may have affected posttest results. For example, on the pretest, few participants knew the word “clarinet;” therefore, increasing the likelihood of greater gain scores for this word and thus, the condition to which the word clarinet was assigned.
The melodies and lyrics chosen for the study may have been a limitation for the melodic condition. The melodies used in the melodic condition were based on familiar children’s songs, which one would think should facilitate word recall; however, in the present study the melodic condition was not as effective as the other conditions. Perhaps in future research, the pairing of lyrics and melody might be piloted to examine their appropriateness and singability.

**Suggestions for Future Research**

Several ideas related to the hypotheses and experimental design deserves further study. While rhythmic chants were the most effective to teach children who are deaf/hard-of-hearing the targeted vocabulary, there are no other studies to support this finding. Further research is needed to demonstrate whether the results of the present study can be replicated. Replications of this study might also include a larger sample size, a longer intervention period, and a more homogenous sample in relation to the type of hearing losses represented among participants. In addition, researchers may wish to investigate the retention of vocabulary words learned through rhythmic chants.

Further research is needed to examine what characteristics of rhythmic chants appeal to students who are deaf/hard-of-hearing. Researchers may examine elements of rhythmic chants such as their meter, tempo, and various note values as well as the choice of signs used to perform the chant. Additionally, researchers might wish to investigate the use of the rhythmic chants paired with low-pitch instruments which would provide tactile and perhaps vibratory feedback to the children as well. On the basis of this study, rhythmic chant, which was incorporated into the presentation of vocabulary words, facilitates recall for students who are deaf/hard-of-hearing. Additional research is warranted to determine possible additional applications of this finding to other types of learning beyond vocabulary.

**Implications for Practice**

Some people believe that for music to be an effective intervention, one must be able to hear well; however, the current study supports previous research that suggests children who are deaf/hard-of-hearing do respond to music. Participants who were deaf/hard-of-hearing were the most responsive to the rhythmic condition, even more so than typical hearing participants.
Darrow and Loomis (1999) stated that “making rhythm visual greatly adds to the deaf students’ perception of music” (pg 102). Signed chants are an effective way to make rhythm visual, and in the current study, signed chants were shown to be a successful aid when teaching non-musical information.

Students who are deaf/hard-of-hearing are delayed in their level of vocabulary knowledge compared to their hearing peers (McNally, Rose, & Quigley, 1987). Vocabulary knowledge of children who are deaf/hard-of-hearing correlates strongly to reading comprehension (LaSasso & Davey, 1987). Research indicates that the more exposure to vocabulary words during the critical period of learning, the more success a child who is deaf/hard of hearing will have with expressive and receptive language (Hart & Risley, 1995; Moeller, 2000). It must be concluded that a focus on vocabulary instruction is essential for music therapists who work with students who are deaf/hard-of-hearing. The therapist’s choice of target words should be in collaboration with early education specialists for children who are deaf/hard-of-hearing. In corroboration with past research on vocabulary acquisition in early education, the words should be concrete and paired with visual aids such as objects or pictures (Gfeller, 1990). A music therapist must be creative with the use of learning aids in order to adapt music to visual and tactile senses as well as to the auditory sense (Darrow & Grohe, 2002).

Previous research has indicated that a child who is deaf/hard-of-hearing is primarily a visual learner, therefore gaining the child’s visual attention is imperative to language acquisition (Harris & Chasin, 2005). Signing rhythmic chants may provide an effective tool for engaging a child’s visual attention. In a preschool music therapy setting, the structure of rhythmic chants may: provide predictability and a motivating context for repetition of language or text, promote the use of kinesthetic movement, reinforce the learning of vocabulary words, provide exposure to rhyming words, and facilitate the participation of young children—regardless of language.

Research has indicated that early intervention results in significantly better language, speech, and social emotional development (Yoshinaga-Itano, 2003). The current study may provide additional support for music therapists’ role in early intervention programs. Gfeller and Baumann (1988) stated that “the language specialist certainly has the greatest professional
knowledge concerning language development and remediation; however, a multidisciplinary approach offers valuable opportunity for generalization of language goals in a variety of social settings” (p.204). In the educational environment, music may serve as reinforcing medium for teaching children who are deaf/hard-of-hearing. The current study gives support for the notion that music therapy is an important component of the multidisciplinary approach in early educational and therapeutic interventions for children who are deaf/hard-of-hearing.

Conclusions

While hearing participants made the greatest gains in the contact control/conversational condition, participants who were deaf/hard-of-hearing made the greatest gains in the rhythmic condition. These findings support past research which indicates that children who are deaf/hard-of-hearing are most responsive to the rhythmic aspect of music. The findings of the present study also indicate that music therapists can utilize rhythm as an effective tool in reinforcing language goals. Previous research indicates that emphasis on vocabulary development in the early education of children who are deaf/hard-of-hearing predicts their later academic achievement. Therefore, it is essential for music therapists who work with children who are deaf/hard-of-hearing to know techniques and strategies for teaching language concepts that have been shown to be effective through research. By using evidence-based practices, music therapists can help enhance the language development of students who are deaf/hard-of-hearing.
Appendix A1
Target Vocabulary Words

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<td>Xylophone</td>
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APPENDIX B
PICTURES OF THE VOCABULARY WORDS
Appendix B2

Birds
Appendix B3

Plants/Trees
Appendix B4

Animals
Appendix B5

Vegetables
Appendix B6

Percussion Instruments
APPENDIX C
SONGS USED FOR THE MELODIC CONDITION
Appendix C1
Melodic Condition: Palm Tree

I am hot so what do I do? I see a palm tree to sit next to.

sitting near a palm tree a coconut fell, I drink milk from the coconut shell of the palm tree.
Appendix C2
Melodic Condition: Llama

Have you ever seen a llama? Their necks are nice and long.

Llama has great big eyes this is the llama song!
Appendix C3

Melodic Condition: Clarinet

The clarinet, the clarinet goes du ah du ah du ah du ah det. The

clarinet, the clarinet goes do ah do ah do ah det!
Appendix C4
Melodic Condition: Peacock

Old MacDonald had a farm, yes he did! And on his farm he had a peacock, yes he did, the peacock would spread his wings here and spread his wings there, Old MacDonald had a peacock, yes he did!
Appendix C5
Melodic Condition: Xylophone

We love to play the xylophone! (clap) (clap) We love to play the xylophone!
Appendix C6
Melodic Condition: Lettuce

I like to eat, eat, eat, le truce in my sa-lad!
I like to eat, eat, eat, le truce in my sa-lad!
Le truce in my sa-lad!
APPENDIX D
RHYTHMIC CHANTS USED FOR THE RHYTHMIC CONDITION
Appendix D1
Rhythmic Condition: Cactus

A cactus sits in the dry desert ground. I don't see any water around.

reach out and touch the cactus with my hand. Ouch! Don't touch a cactus刺ring in the sand.
Appendix D2
Rhythmic Condition: Chimpanzee

See the chimpanzee in the tree, looking down at you and me.

Funny little chimpanzee, we laugh tee hee hee!
Appendix D3
Rhythmic Condition: Piccolo

The picc-o-lo, the picc-o-lo goes tu tu tu tu tu tu tu. The

picc-o-lo, the picc-o-lo goes tu tu tu tu tu tu tu tu tu tu tu tu tu tu.
Appendix D4
Rhythmic Condition: Eagle

Old Mac Don ald had a farm, yes he did! And on his farm he had an eagle,

yes he did! The eagle would soar here and soar there, Old Mac Don ald had an eagle, yes he did!
Appendix D5
Rhythmic Condition: Cymbals

We love to play two cymbals! (clap) (clap) We love to play two cymbals!

We love the cymbals!
Appendix D6

Rhythmic Condition: Celery

I like to eat, eat, eat, celery in my salad!

I like to eat, eat, eat, celery in my salad!

ceph-er-y in my sa-lad!
APPENDIX E
CONVERSATIONAL EXCERPTS
Appendix E1
Conversational Condition Script

Target Word: Harp
This is a picture of a **harp**. A **harp** has many strings. Have you seen a **harp** before?

Target Word: Ivy
This is a picture of **ivy**. **Ivy** loves to climb up walls. Certain types of **ivy** can be itchy when touched.

Target Word: Wheat
This is a picture of **wheat**. **Wheat** is used to make bread. **Wheat** has tiny seeds inside.

Target Word: Pelican
This is a picture of a **pelican**. **Pelicans** have large beak. **Pelicans** love to eat fish.

Target Word: Gorilla
This is a picture of **gorilla**. **Gorillas** beat their chest sometimes to show-off. Can you beat your chest like a **gorilla**?

Target Word: Cowbell
This is a picture of a **cowbell**. Sometimes cows wear a **cowbell** around their neck. Farmers use the **cowbell** to hear where cows have gone.
APPENDIX F

PARTICIPANTS’ DEMOGRAPHIC DATA
Appendix F1
Participants Demographic Data

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APPENDIX G
RAW DATA
Appendix G1
Raw Data for Hearing Participants-Melodic, Rhythmic, Contact Control/Conversation, and No Contact Control Condition

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Appendix G2
Raw Data for Deaf/Hard-of-Hearing Participants-Melodic, Rhythmic, Contact Control/Conversation, and No Contact Control Conditions

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APPENDIX H

VOCABULARY SCORING SHEET
Appendix H1

Vocabulary Scoring Sheet

1. FREEBEE
2. clarinet, piccolo, harp, saxophone
3. llama, opossum, gorilla, chimpanzee
4. palm tree, cactus, ivy, fern
5. lettuce, celery wheat, peas
6. eagle, peacock, pelican, dove
7. cymbals, xylophone, cowbell, tambourine
8. clarinet, piccolo, harp, saxophone
9. llama, opossum, gorilla, chimpanzee
10. palm tree, cactus, ivy, fern
11. lettuce, celery, wheat, peas
12. eagle, peacock, pelican, dove
13. cymbals, xylophone, cowbell, tambourine
14. clarinet, piccolo, harp, saxophone
15. llama, opossum, gorilla, chimpanzee
16. palm tree, cactus, ivy, fern
17. lettuce, celery, wheat, peas
18. eagle, peacock, pelican, dove
19. cymbals, xylophone, cowbell, tambourine
20. clarinet, piccolo, harp, saxophone
21. llama, opossum, gorilla, chimpanzee
22. palm tree, cactus, ivy, fern
23. lettuce, celery, wheat, peas
24. eagle, peacock, pelican, dove
25. cymbals, xylophone, cowbell, tambourine
APPENDIX I

INSTITUTIONAL REVIEW BOARD APPROVAL AND CONSENT FORMS
Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8633 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 12/4/2006

To: Julie Novak
401 West Park Ave #208
Tallahassee FL 32301

Dept: MUSIC THERAPY

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
The effect of music on the ability of pre-school hearing children and children who are deaf/hard-of-hearing to identify pictures representing selected vocabulary words.

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Human Subjects Committee at its meeting on 8/9/2006. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If the project has not been completed by 8/8/2007 you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. The principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

cc: Alice-Ann Darrow
HSC No. 2006.0569
Dear Parent:

I am a graduate student under the direction of Professor Dr. Alice-Ann Darrow in the College of Music at Florida State University. I am conducting a research study to see if music can be used to enhance language development for pre-school students who are deaf and hard-of-hearing.

Your child's participation will involve a short vocabulary pre-test, three 30 minute music sessions, and a short vocabulary post-test. Your participation, as well as that of your child, in this study is voluntary. If you or your child choose not to participate or to withdraw from the study at any time, there will be no penalty, (It will not affect your child's treatment in class). The results of the research study may be published, but your child's name will not be used.

Although there may be no direct benefit to your child, the possible benefit of your child's participation is increased language and musical development.

If you have any questions concerning this research study or your child's participation in the study, please call me at (719) 473-0952.

Sincerely,

Iulia Novak

* * * * * *

I give consent for my child ____________________ to participate in the above study. (Release statement for audiotaping/ videotaping or relinquishing confidentiality must be inserted here, if applicable).

Parent's Name: ________________________________

Parent's Signature ____________________________ (Date) ____________________

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at (850) 644-8633.
REFERENCES


BIOGRAPHICAL SKETCH
Julie Novak

Education
9/95-12/99 Bachelor of Music in Music Education, Magna Cum Laude, Florida State University, Tallahassee, Florida

Professional Experience
12/99-6/00 Deaf/Hard-of-Hearing Itinerant Teacher
Broward County, Florida
6/00-8/00 Educational Interpreter, Pasadena Lakes Elementary
Pembroke Pines, Florida
9/00-6/03 Music Educator, Mirror Lake Elementary
Plantation, Florida
9/05-12/05 Music Therapist, Florida State University, Counseling Services, Tallahassee, Florida

Certifications and Training
1999 Music and Special Education Certificate, Florida State University
1999 Orff Schulwerk Teacher Education Course: Level 1
2000 Florida Educational Interpreter Certification
2000 Orff Schulwerk Teacher Education Course: Level 2
2002 Orff Schulwerk Teacher Education Course: Level