

Research in Early Childhood Music: 1929-1999

by

Chet-Yeng Loong
Baldwin-Wallace College

Nancy E. Lineburgh
Nordonia Hills City Schools

Overall, music educators realize that the preschool years are the most important time of learning in a child's life. Music approaches such as Dalcroze, Kodály, and Orff-Schulwerk have been used by music educators in elementary schools and preschools since the mid-20th century. A limited amount of research has been conducted to show how these methodologies are appropriate for young children.

The amount of early childhood research in music education, in general, is quite small, even though the information provided by researchers is essential to music educators. Thus, it was not surprising that Alvarez (1981) mentioned in her dissertation that, "although researchers in the 30s and in the 70s have investigated rhythmic development, the sequences have not yet been fully researched." In addition, McDowell (1974) stated that teachers in preschools or nursery schools often guess which tempi are best for use with children under the age of four. Even twenty and thirty years later, these statements still hold true.

The review of literature in this article was formulated through examination of music education research covering the period from 1929 to 1999. The references found in this review are organized under five major headings: physical development, rhythmic responses, playing instruments, singing, and infants. This review does not pretend to be exhaustive, but hopes to give an overview of the existing literature and provide a starting place for further research.

Physical Development of Young Children

In order to work with young children, it is important to know what they are physically capable of doing at each age and stage, especially in the development of motor skills. The literature supports the theory that basic motor development is established before the age of 5, and motor skills stabilize thereafter (Gilbert, 1981; Rarick,

1961). For this reason, much attention must be paid to the physical development of children under the age of 5.

Moog (1976) noted that by the age of 6 months, when infants are typically able to coordinate the actions of their sense organs, children move their whole bodies in a generalized manner. The movements are organized and repetitive. For example, some sway to and from, or from side to side, while others bounce up and down. By age 2, toddling children are seen rocking from side to side, bouncing up and down, and waving their arms. They are able to clap their hands, tap on their knees, and move objects they are holding.

At the age of 3 to 4, the variety of movements declines and children enter into a period of practicing the movements they already know. According to Moog (1976), 4-year-olds' movements tend to be repetitious and more complex and dance-like. These movements are rarely coordinated with the beat although children of this age are capable of responding to tempo changes in the music.

Children's physical coordination improves as they enter kindergarten, when, more often than not, 4- to 6-year-olds are able to move to the pulse of music. According to Scott-Kassner (1993), the following movements normally are represented by 4-year-old children: hopping, galloping, jumping (forward, as well as up and down), sliding, whirling, and skipping. Four-year-olds also demonstrate better eye-hand coordination than 2- and 3-year-old children.

Rhythmic Responses

Rhythmic Performance. Children from 3 to 5 years of age express rhythm by chanting to the steady beat, using speech patterns, clapping hands, and playing instruments using large muscle movements (Frega, 1979). Kindergarten children are most

accurate when chanting, while first- and second-grade children can also perform well rhythmically when clapping (Schleuter and Schleuter, 1985). Rainbow, Edward, and Owen (1979) observed that 3- and 4-year-old children play simple rhythm instruments and use speech patterns and chants. Many researchers have found that the rhythmic performances of young children increase in complexity with their chronological age (Frega, 1979; Klanderaman, 1979; Rainbow, Edward, and Owen, 1979; Schehing, 1952; and Schleuter and Schleuter, 1985). Also, large muscle performances of rhythm—such as in stepping—are easier than small muscle performances—as in clapping—and large muscle movements become easier with age (Schleuter and Schleuter, 1985).

Schehing (1952), Simmons (1964), Fifield (1980), Flohr (1985), and Loong (1999) all found that young children under the age of 5 tend to improvise in steady beats. Schehing found that 67% of 3- and 4-year-olds played rhythms that could be notated in note values of equal duration. In the Fifield study, 95% of the subjects (aged 3, 4, and 5 years) played bells using durations of equal value. Flohr's 2-year-old subjects tended to strike the xylophone using equal length, accented note values. Loong's subjects, age 1-5 years, played instruments following their personal tempi steadily for several beats, drifted distractedly for a couple of beats, then resumed playing at the original tempi.

Jersild and Bienstock (1935) found that there was a high degree of correspondence between the young child's ability to beat time with his/her hands and to keep accurate time when walking. Loong's (1999) study supported this finding; marching and instrument playing activities were not found to be too difficult for 1- to 5-year-old children, and children did equally well when stepping/walking and playing instruments.

Personal Tempi. Another element that strongly relates to the physical, rhythmic performance of young children is their personal tempi. Many researchers have assessed the natural tempi of young children. In Hulson's (1929) study, the range of tempi 4-year-old subjects ($n = 21$) were able to match when walking was from M.M. = 84 to M.M. = 200, while the best tempo found for walking was M.M. = 132. In Frego's study (in press) the average walking tempo of kindergarten subjects was M.M. = 139. Vaughan's (1981) assessment of the walking tempo for children, age 41 through 190 months, from Canada, England, Denmark, Columbia, and Argentina was from M.M. = 104 to M.M. = 118. Vaughan found that the metronome mean for a walking tempo was M.M. = 118.6 for kindergarten, dropping gradually to M.M. = 104.5 for grade three, then rising gradually back to M.M. = 118.6 at grade seven. Vaughan suggested that if a music educator "starts with a tempo dictated by the children's own behavior then their ability to respond will increase dramatically" (p. 100).

Regarding the tempi children were able to match when running, Hulson (1929) found that the range was from M.M. = 88 to M.M. = 144, while the best tempo found for running was M.M. = 112. In the same study, the range of tempi matched when skipping was from M.M. = 100 to M.M. = 160, while the best tempi found for skipping were M.M. = 116 and M.M. = 132-136.

Simons (1964) observed twins and paired singletons from 9 to 36 months of age as they played bells and a tom-tom. The mean of the median tempo for the paired singletons for tapping the beat on the instruments was M.M. = 164; for the twins, the mean of the median tempo was M.M. = 173.

Frego (in press), on the other hand, found that there was a significant change in tempo preference from kindergarten through grade six in both walking and marching tempi. Marching tempi were found to be significantly slower than walking. In addition, there was a significant difference between the walking and marching tempi of the group. Frego also found that the rate of tempo preference decreased as the subjects' chronological age increased.

Walters (1983) found that there was no significant difference between subject variability of personal tempo in primary-aged children (kindergarten through third grade, $n = 96$). The range of the tapping tempo was M.M. = 40 to M.M. = 210. The mean of personal tapping tempo for all subjects was M.M. = 106.8.

As for the tempo choices of children between the ages of 6 and 36 months, Lineburgh, Loong, and Wolf (1998) found that there was a significant difference in tempi between the 6-12 month group and the 25-36 month group, and between the 13-24 month group and the 25-36 month group when children were playing unpitched instruments and a bass drum, with older children tapping faster than younger children. These researchers suggested that the tempo choices for children under the age of 3 years be focused within the range of M.M. 133-168 for tapping unpitched instruments and the drum.

Loong (1999) found that once young children created their own tempi, they did not change their tempi while playing instruments in different settings. In addition, age was not a factor for 1-to-5-year-olds in determining the tempi established by the children when playing instruments. However, the tempi of young children playing scraping/rubbing, striking, and shaking instruments were significantly different. Children under the age of 5 tended to play shaking instruments faster (M.M. = 162.90 to 167.93) than scraping/rubbing (M.M. = 140.18 to 142.39) or striking instruments (M.M. = 111.09 to 113.52).

Matching or Synchronizing Steady Beats. The ability of children to match steady beats at a given tempo has been studied since 1932. It has been found that the ability to match/synchronize steady beats of young children increased with age (Buchanon, 1988; Christianson, 1938; Groves, 1969; Jersild & Bienstock, 1935; Loong, 1999; Sims, 1985; Walters, 1983; and Williams, 1932). In addition, young children were found to be able to match the tempi of the musical beats that were played close to their own heart rates (Buchanon, 1988; Loong, 1999; Vaughan, 1981; and Walters, 1983). Young children were also more successful when matching beats which were played in faster rather than slower tempi, either by walking,

tapping, or playing an instrument (Jersild & Bienstock, 1935; Walters, 1983; and Williams, 1932).

Buchanon (1988) found that 4-year-old subjects had the highest synchronization scores for matching beats, followed by 5-year-olds and then 3-year-olds. Subjects' ($n = 30$) synchronization scores were better when the music rate was 15% faster than the heart rate and worse when the music rate tempi was 15% slower than the heart rate tempi.

Walters (1983) reported that a child will "experience greater difficulty synchronizing movement with music as that music diverges in tempo from his/her personal tempo" (p. 82). In addition, Loong (1999) found that the mean personal walking tempi of all subjects in the study was M.M. = 133.74. Thus, Loong's study supports the findings of Hulson (1929), Frego (in press), and Lineburgh, Loong, and Wolf (1998).

Playing Instruments

Playing instruments is an important activity in an early childhood music setting. Andress (1988) found that 4-year-olds explore sounds of musical instruments with great detail. They can identify the shape, size, and sound of classroom and some orchestral instruments, and they begin to play simple accompaniments on instruments that have controlled pitches. Researchers, when observing the instrument playing behavior of young children, have found that preschool children spontaneously explore instruments and are capable of making music freely and spontaneously in a natural setting (Loong, 1998 and Miller, 1983). Older subjects tend to choose a wider variety of instruments (Loong, 1998 and Miller, 1983). Loucks (1974) found that, by age 4, children are able to categorize instruments based on a variety of qualities.

In Gilbault's (1999) study it was found that 72% of the subjects, ages 3 to 5, preferred to play on struck unpitched instruments (drums), 19% preferred to play on pitched instruments, and only 6% preferred to play on shaken unpitched instruments. Thus, it can be concluded that children at different ages prefer different types of instruments. Loong's (1999) research confirmed this finding. In addition, both Loong (1999) and Scott-Kassner (1993) found that children prefer playing percussion instruments with a mallet or some type of stick.

Singing Research

Helping elementary age children find their singing voices has long been a topic of discussion among music educators (Cooper, 1990; and Goetze, Cooper, and Brown, 1989). Much of the research aimed at the elementary years has included kindergarten and first and second grades which are the years that fall under the umbrella of early childhood. As a result, the bulk of early childhood research in singing covers K-2, with some 3- to 5-year-old studies, and topically, follows the lead of the elementary research. For this reason, a review of the singing literature for early childhood looks very similar to a review for elementary, lacking a true character of its own.

Individual vs. Group Singing. As far back as 1938, Updegraff, Heiliger, and Learned noted that a 5-year-old child, who could sing perfectly in tune alone, was unable to match pitch in a group. More recent studies have supported this finding (Goetze, 1985; Goetze & Horii, 1989; Rutkowski, 1990; and Smale, 1988). Green (1994), in a study with grades one, two, three and five, found the opposite to be true, whereas, Cooper (1995) found no significant difference. Rutkowski (1990) carried the idea further by providing kindergarten children either a combination of group and individual instruction or group instruction alone, and found that the children with both individual and group instruction became the more accurate singers.

Words or Neutral Syllables/With or Without Accompaniment. Singing using words or neutral syllables and singing with or without accompaniment are other factors affecting accurate singing. Goetze (1985) found "loo" to be the facilitator of more accurate singing for kindergarten, first grade, and third grade. A replication of that study, conducted with preschool children, found no significant differences (Smale, 1987), as did two other studies conducted with subjects in K-1 and 4-year-olds (Jocobi-Karna, 1996; Levinowitz, 1989). When adding an accompaniment, Atterbury and Silcox (1993) found kindergartners to be unaffected. Petzold (1969) and Stauffer (1985) also found that simple accompaniments did not hinder accurate singing for early elementary-aged children.

Best Models. Various models have been tested to determine the type of voice that

provides the best model for the young child. In general, it has been found that accurate singers respond well to any kind of model. Uncertain singers, on the other hand, find some models easier to imitate than others. Uncertain singers in grades K-3 respond to a voice without vibrato over a voice with vibrato (Yarbrough, Bowers, & Benson, 1992); K-8 girls match more accurately with higher voices and boys match more accurately with lower voices (Price, Yarbrough, Jones, Moore, 1994); between male and female models, first-graders found the female model to be superior (Small & McCachern, 1983); 5- and 6-year-old children echo better when the model's voice is female (Sims, Moore, & Kuhn, 1982).

Pitch Discrimination. Pitch discrimination is yet another topic for discussion. Scott (1979) found that 3- to 5-year-old children could accomplish pitch discrimination tasks on three levels; in order from easiest to most difficult: pitch register, melodic contour, and interval size. Other studies set out to find the relationship between pitch discrimination and vocal accuracy (Apfelstadt, 1984; Davies and Roberts, 1975; Feierabend, 1984 & 1998; Levinowitz, 1989; Robert and Davies, 1975; Rutkowski, 1986; and Zwissler, 1972). The results are mixed.

Range. Range studies have found the first-grade range to span the interval of a ninth (Wassum, 1979); and an infant vocalization to span two octaves (Fox, 1982). Researchers looking at pitch pattern accuracy and vocal range found that children modulate when a song leaves their vocal range and preschoolers demonstrate a larger range when singing patterns than when singing whole songs (Flowers & Dunne-Sousa, 1990). Veldhuis (1992) observed the responses of 4-year-old children in a naturalistic setting as opposed to a research setting. The spontaneous songs of the children were pitched higher than the songs the children sang individually for the researcher.

Vocal Training. Specific vocal training in the form of vocalises and singing songs in a wide range (E2-G1), as opposed to no training and singing in a low range (C1-G/A1), made a significant difference in the singing accuracy of second graders in the McGraw (1996) study. Another type of vocal training, dealing with the breath, made a difference for children in grades two

through four (Phillips, 1983). Among other factors, range was expanded as a result of this training.

Age and Gender. Many studies agree that children sing better with age (Cooper, 1995; Flowers & Dunne-Sousa, 1990; Green, 1994; Moore, Brontons, Fyk & Castillo, 1997; and Petzold, 1963). Some dissention is found regarding differences based on gender. In some studies there appeared to be no difference in accuracy between genders (Apfelstadt, 1984; Petzold, 1963; Rutkowski, 1986; and Smale, 1988). In others, girls seem to sing more accurately than boys (Cooper, 1995; Goetze, 1985; Jordan-DeCarbo, 1982; Goetze & Horii, 1989; Green, 1994; Moore, Brontons, Fyk, & Castillo, 1997; and Stauffer, 1985).

Assessment for Pitch Matching. A five-point assessment tool for evaluating the child singing voice has been developed by Rutkowski (1986, 1990) and was tested and found to be valid for kindergarten children. Levinowitz (1998) replicated the study with elementary-aged children and found validity there as well.

Miscellaneous Factors. Many factors contribute to accurate singing including: stepwise passages over leaps (Sinor, 1984; and Moore, Brontons, Fyk & Castillo, 1997), descending patterns in general (Jersild & Bienstock, 1935; Moog, 1976; Moorehead and Pond, 1941; and Sinor, 1985), brief patterns rather than whole songs (Flowers & Dunne-Sousa, 1990), and whole songs rather than phrases (Klinger, Campbell & Goolsby, 1998). Jarjisian (1981) found a combination of diatonic and pentatonic to be most effective, diatonic providing more of a sense of tonal center and pentatonic providing more of a sense of melodic contour.

Extensive reviews of literature regarding singing can be found in several resources. Many of the points in this review of singing can be confirmed and expanded by reading Goetze, Cooper & Brown (1989), Colwell (1992), and Phillips (1996).

Infants

Topics in infant research include how infants respond to music, what they do, and a look at the singing repertoire that is specifically for babies. Various researchers have found that infants respond to musical stimuli from the first months of life

(Fredrickson, 1994; Michel, 1973; Moog, 1976; Schellenberg & Trehub, 1996 & 1999; Trehub, Schellenberg & Hill, 1997; Trehub, Schellenberg & Kamenetsky, 1999; and Zetner & Kagan, 1998). The effects of singing and music on infants have also been explored (Cassidy & Standley, 1995; Coleman, Pratt, Stoddard, Gerstmann & Abel, 1997; Komara, Heiser, Shawler & Branson, 1995; and Malone, 1996). Fox (1982) and Papousek & Papousek (1981) studied infant vocalization range and contour. Lullabies and play songs have been the focus of other research (Trehub & Schellenberg, 1995; and Rock, Trainor & Addison, 1999).

Conclusion

Music undoubtedly has an influence on young children. Forrai (1977 & 1997) compared children who had been involved in a developmentally appropriate music program with children who had not. The children who had formal musical experiences were more developed in terms of their movements to music, their frequency of vocalization, their social interactions, and their emotional state.

As music educators, we want to provide the best possible musical environment for our young students; we want to feel confident that we are providing developmentally appropriate programs (McDonald & Simons, 1989). Research provides important information about the tempi that are best for our students; when to expect children to synchronize with the steady beat; what instruments suit the various age groups; the best environment for the development of pitch matching and singing; what children do naturally; and how children respond to music.

To complete the research picture and provide more reliable data for teachers, more information is needed about rhythmic accuracy, children's personal tempi, the age at which children can synchronize with the beat, and the age at which performing rhythm becomes a natural response. Regarding singing accuracy, research is needed to more conclusively determine the range expectations for very young children. Replication studies are needed to determine whether or not neutral syllables or words are best and the effects of adding accompaniments. For children under 5 years, more information is needed about how the singing voice changes and develops and the

steps that lead to the acquisition of whole songs.

Research conducted for kindergarten through second grade needs to be reconstructed and replicated for children under the age of 5. In conducting this research, reliable and consistent instruments should be developed so the results can be compared and used with confidence by teachers in the field.

Finally, the early childhood research literature has been reviewed by Simons (1978) for the years 1960-1975, by Alvarez (1981) for the years 1900-1980, and by Scott-Kassner (in Colwell, 1992) for non-specified years through 1991. There is a need for a review of the literature that spans the entire century.

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