Wired for Sound: The Essential Connection Between Music and Development

By Cynthia Ensign Baney

Magazines and network news shows are abuzz reporting the newly discovered links between intellect and music. Dateline NBC entitled their coverage of the new music research "Perfect Pitch." "ZZZt!" "Crackle!" and "Zap!" said Newsweek, in efforts to describe the neural bridges being formed in an infant's brain when stimulated by a parent's voice. "Rat-a-tat-tat" declares Time magazine, describing the prenatal neural wiring crackling in preparation for learning.

These are definitely attention-grabbing headlines and sound effects, but what does the new research mean? Which children are affected? How does this information translate into real-life application in a family or childcare setting?

The Child's Brain

Just as mom used to say, a child's brain functions like a sponge ready to soak up new information. But instead of picturing the brain as a sponge, visualise a sort of cosmic, 3-D dot-to-dot. The dots represent neurons, which are waiting to be connected via new pathways of information called neural bridges. Each time a child is stimulated to think, either new neural bridges are formed or pre-existing ones are strengthened. The more neural bridges that are formed and strengthened, the more the intellect will be developed. By the same token, when neurons are not connected to others, no neural bridges are formed, signifying a weaker area of intellect. Without information for lengths of time, neurons die off. Surely the well-worn phrase "Use it or lose it" takes on new meaning with such information!

The Research

The most widely reported research was conducted by psychologist Fran Rauscher and physicist Gordon Shaw at the University of California-Irvine in 1994. The goal of the research was to discover the connection between music and upper-level math and science skills (Rauscher, 1996a). Test groups of three-year-olds participated in an adult-led daily singing time or weekly keyboard lessons. The third group, known as the control group, did not receive music training of any kind. While the small motor skills of most three-year-olds would make successful keyboard lessons an improbability, the results of incorporating music into the curriculum were very positive. **After eight months, every child who participated in a music-training program increased in his or her spatial intelligence by an average of 46 percent over the control group's six percent increase.** The children that showed the most dramatic improvement were the disadvantaged.

Spatial skills, as defined by Howard Gardner in Frames of Mind: The Theory of Multiple Intelligences (Gardner,1983; Lazear, 1991), pertain to the ability to form mental images, visualise graphic representations, and recognise relationships of various objects to one another. In the simplest of terms, spatial skills are essential building blocks for later success in calculus and physics. The children's spatial skills were measured via a portion of the Weschler Preschool and Primary Scale of Intelligence called the Object Assembly Task.

In addressing a KinderMusik International professional development seminar, Dr. Rauscher (1996b) indicated that the students who played the keyboard had the greatest success because of the opportunity to move spatially. The keyboard, which has both auditory and physical representations of ascending and descending pitches, involved movement and listening—a greater number of music components. These children moved through their space, making their music experience more complete.

Dr. Edwin Gordon, one of the foremost experts in music learning theory, has conducted extensive research on music aptitude in early childhood. Gordon defines music aptitude as a "...measure of a child's innate potential to learn music" (1990). He makes a distinction between music aptitude and music achievement. Music achievement measures the child's learning. Gordon has concluded that music aptitude is a product of both "innate potential and environmental influences," citing his research that no child is without music aptitude, and more than two-thirds of children have average music aptitude (1995).

Gordon's research confirms that the highest level of music aptitude occurs immediately after birth. Infants possess an abundance of genes and synapses that immediately make them ready for learning music. Environment must make use of this specific neural wiring, or it will be lost. Gordon quotes Dr. Robert Post, Chief of the Biological Psychiatry Branch of the National Institute of Mental Health, saying "...Some or most of the unused synapses that might have been used for developing sensitivity to music may move to support another sense or medium, such as the visual or verbal" (p. 15). Thus, the earlier music is introduced, the more potential the child has for learning.

Music aptitude flourishes in a musically enriched environment. In his research, Gordon defines the "window of opportunity" for developmental music aptitude as occurring between birth and age nine. After age nine, the child's music environment no longer determines the level of music aptitude (Gordon 1967).

Child's Play

Dr. Dee Joy Coulter (1995), a nationally recognised neuroscience educator, classifies the songs, movement, and musical games of childhood as "brilliant neurological exercises" that introduce children to speech patterns, sensory motor skills, and vital movement strategies. Sadly, as Coulter observes, the spontaneous transmission of this playful "brain training" is being replaced by TV, business, and even the more academic approach that some early childhood programs are taking. Coulter maintains that music activities combining rhythmic movement with speech and song benefit young children by providing opportunities to develop the mind further. "Inner speech" and "impulse control" are two areas that are cultivated through this type of musical play. According to Coulter, the brain cells that control inner speech also regulate motor impulses. Until strong language skills are developed, the inner speech abilities are not strong enough to override the powerful urges to move impulsively. To control their impulses, children need to be able to "obey their own minds." The language development opportunities provided by songs and fingerplays are vital in the development of self-management.

Additional Benefits

Just as language acquisition and vocabulary skills are enhanced through the use of musical play, so are logic and rhythmic skills. The ability to keep a beat is a vital rhythmic skill, and one that Dr. Coulter links to the world of inner speech. Logic or reasoning also develops as a part of inner speech, as the child becomes able to organise ideas and solve problems. Children with more developed inner speech and impulse control also exhibit greater social skills. In order to help children grow intellectually through use of music, opportunities to experience music through speech, song, and movement must be available and frequent. Since the brain is developing quickly from birth to age three, early childhood music involvement is a vital part of intellectual development.

Newsweek's cover story, "Your Child's Brain: How Kids Are Wired for Music, Math and Emotions," (February 19, 1996), emphasises the new research on the neural connections that are being formed in a child's brain as a result of appropriate stimulation. The article states that if more administrators were tuned into brain research, "...music would be a daily requirement."

"Fertile Minds," the previously referenced article from Time magazine, states that babies are so tuned in to sound that their hearts beat faster when their parents make eye contact and speak in a melodious voice. Both special reports focus on timelines called "windows of opportunity." Time reveals that the experts universally agree that birth to age three is the crucial "window" for maximum neural development.

As research affirms the positive cerebral benefits of music, early childhood experts are asserting the value of music as a source of joy that translates into creative expression. Music educator Lorna Heyge, Ph.D. (1996), states: "While educational leaders turn to early childhood music because it promotes brain development, they will stay with music because of the joy and stimulation experienced in actual music making. Music learning requires total involvement—that is why it appeals so much to young children" (p. 72).

In order for children to benefit from a music program, four essential elements must be present (Heyge, 1996). Children should have opportunities to participate in singing, dancing (creative movement), listening, and playing instruments. In combination, these skills comprise "active music making," the ultimate music experience for children.

Active Music Making

Just as a child learning to talk must first hear a human voice speaking, his or her language acquisition would be incomplete without the opportunity to interact with other people. A child explores his or her potential to communicate through sound and speech patterns. Children must have the opportunity to participate in active music making. To listen to music without the opportunity to engage actively in music production is like hearing the language without the opportunity to communicate with anyone else.

Singing as a Life Skill

Children today need significant adults in their lives to provide them with the opportunities to experience music firsthand. Our society has become so busy and entertainment-driven that many children are deprived of the simple joy of singing. In some homes, videos have replaced the music traditions once central to family life. Musical play and the songs of childhood have been forgotten and replaced with CDs of energetic drumbeats and cutesy kid songs.

Certainly the enjoyment of music is still fairly universal, but the process of disseminating this part of the culture seems more difficult. Although music is a fundamental life skill, quality music interaction with children has become somewhat of a lost art. Singing is an essential component, yet today many adults feel ineffective. For others, the challenge is finding time or remembering the lyrics or melody.

Children need appropriate vocal models. Much of the readily available music is someone's perception of what is childlike. An adult singing in a baby voice is childish, and inappropriate for children. At the other extreme, some children's audiotapes have complicated themes, hard-driving rhythms, and gravely vocals, like scaled-down versions of adult music.

Adults planning music experiences should choose songs that will engage the child. Simple, unaccompanied tunes with singable melodies are useful with children. Dr. John Feierabend (1996) encourages selecting songs related to subjects that are of interest to a child. He recommends folk songs, because of the "marriage of words and music" where the melody "emerges naturally from language." Feierabend also believes the text should relate to the world of the child: imaginative; creative; and full of wonderful, childlike observation.

The voice is the first and most important instrument. Vocal activities in a musical environment enrich and support language development. Oral and receptive language can be practised through the use of call and response songs. Singing also provides an opportunity for self-expression, and helps to develop the sense of self.

Moving

"In this age of high technology, children's motor development may not be keeping pace with their cognitive development and chronological age," says Phyllis Weikert (1995). With babies and young children, Weikert states that "Hearing music, combined with rocking, patting or bouncing to the beat, promotes the hearing-feeling connection so necessary to later steady beat independence" (p. 21).

Weikert (1988) refers to the body as the primary learning centre, distinguishing between nonpurposeful and purposeful movement. Directing actions toward a goal such as hopping, dancing, or specified movements at prescribed moments in a song also aids in the mastery of body movements. She encourages teachers to employ purposeful movement, where action is pre-planned and discussed before movement, as well as to provide opportunities for child-initiated ideas. She cites lack of awareness of body capabilities and poor impulse control as being among the chief consequences of overlooking movement as a vital part of early childhood training.

Listening

Attentive listening is a vital skill in every part of life and learning. The ability to listen affects intellectual, emotional, and social areas either positively or negatively. The child who is not able to listen will struggle in language development. Listening problems have been linked to later difficulty in reading, spelling, and arithmetic; children who are unable to listen have been diagnosed with various learning disabilities.

Every effort should be made to provide the highest quality of listening material for the children, from a wide variety of sources. Differing styles of classical music can affect the behaviour of the child. Music by Mozart, Bach, or Chopin has a therapeutic effect on the listener, while military marches and other classical pieces by Wagner and Paganini have an energising effect (Maudale, 1997). This type of music can heighten hyperactivity in some children. Rock and disco with heavy rhythmic backgrounds can also be overstimulating for some pre-schoolers (Gordon, 1990).

Although listening is a vital component in the process of music learning, teachers and parents should avoid having music become "audible wallpaper." It is not necessary, nor is it healthy, to have music playing all the time. Silence is also an important part of auditory discrimination. When a quiet area is provided, the child can concentrate on focused listening, which is discerning a particular sound and connecting it to its source. An environment in which there is always heavy auditory stimulation teaches the child to shut out sound and detracts from developing listening skills.

Personal listening preferences develop from experiences and exposure to a variety of music styles. Although the market is diverse, most adults gravitate towards music within a few certain styles. Many radio stations play music of one particular genre, such as rock or country. Despite the personal preferences of the adult, every effort should be made to expose children to a varied repertoire, so they can eventually develop their own tastes. Classical music with authentic instrumentation is a good place to begin.

Playing Instruments

When a child has the opportunity to play a simple rhythm instrument, the music experience becomes more vital. The child has, by virtue of creating sound from a source outside of him or herself, joined the music process in an exciting way. Exploring ways of creating sound with uncomplicated instruments allows children to express themselves uniquely. Improvising and experimenting with drums, jingles, rhythm sticks, and rattles allow children the opportunity to explore the connection between varied sound and their ability to produce it.

David Elkind (1984) speaks of the detriment children experience when pressure to perform "weighs on the child, and robs he...activity of its playfulness and pleasure." Elkind insists that adults hurry children, when "...they insist that they [the children] acquire...skills at an early age" (p. 12). When a child is pressured to play a certain instrument (like piano or violin) before he or she is ready, it places undue stress on the child. Children who are allowed the freedom to experiment with instruments will enjoy the experience, with no stress-induced side effects.

Incorporating Music in the Daily Routine

Children benefit when singing occurs as part of their daily life. Singing throughout the day, not just at circle time, follows a child's natural inclinations. Adults need to encourage natural music aptitude in young children. Singing, dancing, creative movement, playing instruments, and listening are all vital components of an appropriate early childhood music experience. In order for children to benefit from music, parents, teachers, and caregivers should plan for daily music opportunities.

Music builds and strengthens bonds of trust and communication between adults and children. Music gives children a reference point, a way to respond appropriately. Simple songs, incorporated into daily activities, communicate without nagging or endlessly repeating directions. Since the children are already "tuned in" musically, singing will capture their attention more easily. Transitions will be smoother and children will be more likely to remember the daily routine. Better yet, the children will begin to help each other by singing the songs together, as they anticipate the planned activity.

Greeting and good-bye songs, and songs for transitions like picking up toys, washing hands, naps, and mealtimes, help establish routine. Repetition of songs promotes learning and success, as children have additional opportunities to master the vocabulary and melody of each song. Adding simple hand movement will aid children in sequencing the material. Children will respond to and love the additional music, regardless of the parent/teacher/caregiver's musical ability.

Music will not only help the teacher connect more with the children, it will also make the day more enjoyable. Including songs at even the most unlikely times such as diaper changing will ease the flow of the day. The children will know what to expect, because the song clues them in to what happens next. The possibilities of adding songs to the day are endless. Consider the list below for starters: morning arrival, breakfast, going outside, walking to the park, playtime, sharing, cleaning up, riding in the car, mealtime prayer, naptime, wake up time, evening departure.

If the perfect song for a specific occasion is lacking, create one. Transitions are a perfect time for piggy-back songs. Putting instructions to music aids in recall. In addition, the parent or teacher who creates songs will encourage and stimulate the children's creativity as well.

Conclusion

A child's initial musical experience is so vital to development that it could be viewed as a "...pre-clinical dose of treatment utilising speech, motor development and sensory integration," says Dr. Lorna Heyge. Although scientists, therapists, parents, teachers, and music experts may have different motivations for opening the world of music experience for each child, the benefits of music development, within the "window of opportunity" are overwhelmingly positive for the child. According to Heyge (1997), music:

- Optimises brain development;
- Enhances multiple intelligences;
- Facilitates genuine bonding between adult and child;
- Builds social/emotional skills;
- Promotes attention to task and inner speech;
- Develops impulse control and motor development; and
- Communicates creativity and joy.

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