

## Music Lessons Boost Verbal Memory

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July 28, 2003 -- The benefits of music lessons may turn up in more areas than just the recital hall. A new study shows children who take music lessons have better verbal memory skills than others and may find it easier to learn in school.

Researchers say the findings suggest that experiences that activate and alter a region of the brain may improve performance in other tasks supported by that area, much in the same way cross training boosts athletic performance.

### **More Music, More Memory?**

In the study, psychologists in Hong Kong studied 90 boys between the ages of 6 and 15. Half of the boys had received music training as members of their school's string orchestra, plus music lessons on Western instruments, for up to five years. The others had no musical training. Researchers gave the children verbal memory tests to see how many words they could learn and recall from a list and a similar test to measure their visual memory skills.

The study showed that the students with music training learned, recalled, and retained more words than the other boys. And verbal memory skills rose in proportion to how long they had taken music lessons. No such differences were found for visual memory skills.

"The more music training during childhood, the better the verbal memory," says researcher Agnes S. Chan, PhD, a psychologist at the Chinese University of Hong Kong, and colleagues. "This strongly implies that the better verbal memory in children with music training is not simply a matter of differences in age, education level, or their family's socioeconomic characteristics."

### **Lasting Benefits of Music Lessons**

In a second experiment, researchers followed up a year later with the 45 orchestra students. Nine had dropped out less than three months after the initial study, and 17 new students had begun music training.

This beginner's group had originally shown lower verbal memory skills than the musically trained students, but one year later these new students showed significant improvement in verbal skills. Although the verbal memory skills of the nine children that stopped taking music lessons did not continue to improve after the training ended, their memory skills remained stable and they did not lose the advantage they had gained previously.

Researchers say this group of children had already had almost three years of musical training before they discontinued their music lessons, which means their training may have had a long-lasting effect.

But as shown by the new music students, as little as a year of music lessons was enough to provide noticeable benefits in verbal memory skills.

Researchers say more studies are needed, but learning more about how musical training boosts memory performance may one day help in rehabilitating people with memory loss.

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In the January 1997 article, "The Musical Mind," Gardner was quoted as saying that music might be a special intelligence which should be viewed differently from other intelligences. He stated that musical intelligence probably carries more emotional, spiritual, and cultural weight than the other intelligences. But perhaps most important, Gardner says, is that music helps some people organize the way they think and work by helping them develop in other areas, such as math, language, and spatial reasoning. In a January 1997 publication, Gardner states that school districts that "lop off" music in a child's education are simply "arrogant" and unmindful of how humans have evolved with music brains and intelligences. Students are entitled to all the artistic and cultural riches the human species has created.

While it is understood that music education can have an important impact on musical intelligence, there is accumulating a significant amount of research supporting the impact of music education on all seven intelligences. This article will provide a few recent selected examples for the purpose of illustration. An important recent 1995 publication, *Spin-Offs: The Extra-Musical Advantages of a Musical Education*, reviews the research literature from 1970 to 1992 and should be consulted for additional research.

#### *Linguistic*

A study by Hall in 1952, reported that when examining 278 eighth and ninth graders, the use of background music in study halls resulted in substantially more improvement of reading comprehension than those that studied without music.

In a study by Ramey and Frances Campbell of the University of North Carolina (as reported in "You Can Raise Your Child's IQ" in *Reader's Digest* October 1996), preschool children taught with games and songs showed an IQ advantage for 10 to 20 points over those without the songs, and at age 15 had higher reading and math scores.

#### *Logical-Mathematical*

The Council on Basic Education conducted a study comparing the amount of time spent on the arts by schools in Germany, Japan, England, and the United States, and found that not only did the U.S. trail the other countries in time devoted and percentage of time devoted to arts instruction, but that the U.S. trailed countries in math and science scores.

A study in Rhode Island published in the May 23, 1996 issue of *Nature* reported that first-graders who participated in special music classes as part of an arts study saw their reading skills and math proficiency increase dramatically. Students who studied music appreciation scored 46 points higher on the math portion of the SAT in 1995, and 39 points higher if they had music performance experiences, than those without music education.

#### *Spatial*

In a study by Frances Rauscher and Gordon Shaw at the University of California, Irvine, that was presented in 1994 at the American Psychological Association, they reported that pre-schoolers who took daily 30 minute group singing lessons and a weekly 10-15 minute private keyboard lesson scored 80 percent higher in object-assembly skills than students who did not have the music lessons.

#### *Bodily-Kinesthetic*

In a report of the significance of singing in *MUSICA Research Notes* in Fall 1996, Weinberger cites research of Kalmar dealing with the positive effects of singing in normal children in a long-

term study, as she studied the effects of the Kodály method of instruction, and found significant effects on motor development and cognitive development of those participating in the music program.

### *Musical*

A report in *The New York Times International* in May 1996 indicated that in Japan, Korea, Taiwan, and China music is a more significant part of education for children than in the U.S.A., and the children in those countries are far more likely to have what some regard as one of the most striking signals of a musical mind, absolute pitch. As reported in "The Musical Mind," by Susan Black, neuromusical investigations are producing evidence that infants are born with neural mechanisms devoted exclusively to music. And perhaps, even more important, studies show that early and ongoing musical training helps organize and develop children's brains.

A report by John Langstaff and Elizabeth Mayer in *Learning*, March/April 1996, presented a rationale for the importance of music education in early childhood. By approximately age 11, neuron circuits that permit all kinds of perceptual and sensory discrimination, such as identifying pitch and rhythm, become closed off. Not using them dooms the child to be forever tone deaf and offbeat.

### *Interpersonal*

A study done in 1978 by McCarty, McElfresh, Risce, and Wilson, reported that a pattern of inappropriate student behavior on a school bus was changed by playing music. Research at the Harvard Project Zero as reported by Colwell and Davidson, suggests that arts activities for all students on Fridays and Mondays reduces the absentee rate on those days.

### *Intrapersonal*

Martha Mead Giles found in a study reported in the *Journal of Music Therapy* that music and art instruction may be an important link to children's emotional well-being. In an *Update: Applications of Research in Music Education* report, Fall/Winter 1994, research was cited that in addition to an enhancement of self-concept as an outcome of music education, trust and cooperation, empathy, and social skills were also shown to be benefits of a music education.

Historically, music education and music therapy researchers have provided a clear evidence that music and music education does have a measurable impact on individuals. However, it was the research efforts of Frances Rauscher (now at the University of Wisconsin, Oshkosh), Gordon Shaw and colleagues, at the Center for the Neurobiology of Learning and Memory at the University of California at Irvine, dealing with the causal relationship between music and spatial task performance that resulted in the creation of the term "The Mozart Effect" and the proclamation that music can and does indeed make you smarter. A new book, *The Mozart Effect*, by Don Campbell, is to be released later this year.

The October 1993 issue of *Nature* included the report of a study done by Rauscher, Shaw, and Ky that found that listening to 10 minutes of Mozart's piano Sonata K.448 over a period of time increased spatial IQ scores in college students. A further study on spatial performance and music found that the spatial reasoning skills of 19 preschool children who were given 8 months of music lessons far exceeded the spatial reasoning performance of 15 children who had no musical training. Whereas the effect of listening to Mozart lasted only a short time (about 15 minutes), the results of the study with preschool children suggested to the researchers that music can improve intelligence for long periods of time, maybe even permanently.

In 1995, Rauscher and other researchers replicated and extended their findings concerning the Mozart effect and reported the results in *Neuroscience Letters*. In the most recent study, they used the same task as in their first experiment but extended the types of listening experienced. Seventy-nine college students were divided into three groups: silence, the same Mozart as used in the 1993 study, and a work by Philip Glass. Only the Mozart group showed a significant increase in spatial IQ score.

Rauscher and Shaw developed their research based on a neurobiological model that posits that music will enhance higher brain functions. There are certain synaptic connections being made through music training that are similar to those required for abstract and spatial reasoning.

What we as musicians knew experientially and intuitively, scientific studies on the brain, intelligence and music are confirming that we hold in our hands as music educators a powerful tool, a key that may unlock the door to developing the great potential residing in the human brain. May this sampler whet your appetite to taste more from this table of knowledge.

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#### **Does Music Instruction Affect Reading Development?** **by Glenn E. Nierman**

Few of us as music educators would deny the importance of music in the lives of individuals "for its own sake." Yet perhaps in the current political arena in which the arts find themselves, it would be useful to continue to highlight the connections between music and nonmusical learnings that can be supported by research, i.e., by systematic investigation. The focus of this column for

the next several issues will, therefore, be on research studies that have investigated the relationship between the study of music and other nonmusical learnings: reading and language development, math, social skills, motor skills, psychological well-being, etc. The first relationship to be explored will be that of music study and reading development.

Pick up any report card from school districts across the state and you will quickly discover what subjects are most important to the administrators of the district. What subject appears first on the report card? What area of study often includes extra graphs to help the parents understand the achievement record of their child? The answer, at the elementary level, is probably reading or math. The purpose of this article is to cite several studies that explore the relationship between music instruction and reading skills. The studies reviewed here are only several from among twelve different studies cited by Cutietta, Hamann, and Walker in the publication *Spin-Offs* (1995), published by United Musical Instruments.

#### *Studies Involving Primary Children*

Several studies have compared the effects of music activities on the reading ability of primary children. In a 1975 study by Hurwitz, Wolff, Bortnick, and Kokas, two matched groups of first grade children, one which had received music training via a Kodály-based curriculum and one which had no musical training, were tested in terms of their reading ability. The results indicated that the children receiving the music instruction performed more effectively on reading tests than students not receiving the instruction. Furthermore, this enhanced reading ability was found beyond the first grade level when the music program continued.

In a study by Kelley (1981), 62 first graders were divided into one of three groups receiving: (1) Orff Schulwerk-based instruction, (2) visual art instruction, and (3) no music or visual art instruction. At the conclusion of the instruction, which was received three times per week for thirty minutes for a six-month period, the researcher found a significant positive correlation between the Orff treatment group and the oral reading sections of the *Botel Reading Milestones Test*. It should be noted, however, that a positive correlation does not establish causation. Further research is needed in this area.

There are other studies that have examined the relationship between music instruction and the reading ability of primary children, but what about the effect of music instruction on the reading ability of older individuals?

#### *A Study Involving College Students*

Wood (1990) examined the scores on the Nelson Denny Reading Test of approximately 7,500 students who were enrolled in a medium-sized university between 1983 and 1988. He found that music and music education majors had the highest reading scores of any major on campus, including students majoring in such areas as biology, chemistry, mathematics, and even English. This descriptive information opens the door for further investigation into the question of whether years of processing musical notation transfers to enhanced verbal reading skills.

#### *For Further Study*

To find out more about the relationship between music study and reading skills, consult any of the following journals which report such research in music education: *Journal of Research in Music Education*, *Bulletin of the Council for Research in Music Education*, *Journal of Music Therapy*, *Dialogue in Instrumental Music Education*, *Contributions to Music Education*, *Psychology of Music*, or *Update: Applications of Research in the Music Classroom*.

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## **Music Instruction and Language Skill Development by Glenn E. Nierman**

This article is part of a series of articles reviewing research that has investigated the relationship between music study and other nonmusical learnings. The purpose of this series of articles is to provide music educators with factual information to show that not only is music important for its own sake, but it also supports learning in other areas of the curriculum. The focus of this article is on the relationship between the development of language skills and music study. The studies reviewed here are only several from among others cited by Cutietta, Hamann, and Walker in the publication *Spin-Offs* (1995), published by United Musical Instruments.

### *Studies Involving K-12 Students*

In a study involving first grade students, Turnipseed (1976) studied the effects of receiving explicit instruction in listening skills using classical music on students' achievement in reading and language arts. She found that students who participated in the listening program scored significantly higher in the discrimination sections of reading and language arts tests. Furthermore, these students also received higher grades in reading from their classroom teachers.

Not only does music seem to make a difference in language achievement for elementary students, but for high school students as well. The verbal scores of about three million students who took the SAT during 1987 through 1993 were stratified according to various kinds of arts instruction taken in high school (music appreciation, music performance, and no instruction in the arts) and compared not only among these stratifications, but with the average verbal SAT scores of all students. Results indicated that students who took music appreciation or participated in music performance groups had verbal scores which were consistently 19 to 31 points above the national average and 35 to 44 points above students with no arts instruction. Furthermore, this study seemed to show a positive correlation between the number of years of music study and verbal SAT scores, i.e., the more years of music study, the higher the SAT scores.

### *Music Instruction, Language Development & Exceptional Children*

In addition to studies cited above, there have also been studies that have examined the concomitant effect of music instruction on the language development of exceptional students. Blanton (1961), for example, studied the effects of participating in applied vocal music instruction, passive music instruction (listening), or a combination of both treatments on first and second grade students' speech articulation problems and "personality adjustment." He found that students who received the music instruction (vocal, listening, or vocal/instrumental in combination) had significantly higher speech articulation and "personality adjustment" scores than those who did not have such instruction. Blanton concluded that children exposed to music instruction modified their speech behavior and showed substantial improvement in their emotional adjustment skills.

Sixteen language delayed preschoolers, ages two to five, were included in a 1988 study by Hoskins. These students were given singing instruction which emphasized antiphonal expressive

singing. At the end of the study the students were tested utilizing measures of word expression, melodic imitation, and rhythmic imitation. Hoskins found that as the students' melodic development increased, so did their spoken expression. In other words, vocal music instruction may lead to more expressive spoken language on the part of children.

### *Conclusions*

What conclusions can be drawn from the above studies? First, there appears to be a relationship between musical development and language skills development. Further, this connection seems to exist regardless of age or the presence or absence of language disabilities. Secondly, students who have studied music seem to have both better discrimination skills for perceiving language as well as better articulation skills for speaking language. In brief, music study appears to aid language development.

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