

A Collection of Research on the Value of Music Education

Music and music-making enrich the human experience. At MakeMusic, our goal is to provide solutions to help enhance and expand how music is taught, learned, and prepared for performance. We share the belief that music is an essential part of human development.

We applaud your passion and all the work you do to help your students acquire the knowledge and develop the skills for a lifelong love of music.

We've collected this research for you to share with your colleagues, your students, your parents, and your administrators.

Compliments of MakeMusic, Inc.



First of all, check out these links, which will lead you to even more data advocating for music education:

<http://www.menc.org/resources/view/music-education-advocacy-central>

<http://www.childrensmusicworkshop.com/advocacy/topten.html>

<http://www.schoolmusicmatters.com/>

<http://www.tmea.org/resources/advocacy/materials>

<http://www.nyssma.org/parents.cfm>

Americans overwhelmingly want music education in schools

Source: “Americans Overwhelmingly Want Music Education in Schools.” American Music Conference, Valerie Salvestrini, April 21, 2003.

According to a 2003 nationwide survey conducted by the Gallup organization, “95 % of Americans believe that music is a key component in a child’s well-rounded education. In fact, more than 75% of those surveyed feel schools should mandate music education...”

In a question asked for the first time this year, 80 % of respondents agreed that **making music makes participants smarter**. This finding comes on the heels of a decade of scientific research linking active participation in music with improved mental capacity in young children, students and the elderly.

According to a 2003 Gallup nationwide survey, 96 % of Americans believe participation in a school band is a good way for children **to develop teamwork skills**.

According to a 2003 Gallup nationwide survey, 78 % of Americans feel learning a musical instrument helps students **perform better in other subjects**.

www.amc-music.org

Children who take music lessons show brain development and improved memory

Dr. Laurel Trainor, Prof. of Psychology, Neuroscience, and Behaviour at McMaster University, Director of the McMaster Institute for Music and the Mind; Canada; published 9/20/06

Young children who take music lessons show different brain development and improved memory over the course of a year, compared to children who do not receive musical training. The brains of musically trained children respond to music in a different way to those of untrained children, and that the musical training improves their memory. After one year the musically trained children performed better in a memory test that is correlated with general intelligence skills such as literacy, verbal memory, visio-spatial processing, mathematics and IQ.

www.sciencedaily.com/releases/2006/09/060920093024.htm

Music study linked to higher educational and financial attainment

Source: Harris Interactive survey release, November 12, 2007

Research confirms that music education at an early age greatly increases the likelihood that a child will grow up to seek higher education and ultimately earn a higher salary. If you want to be a CEO, college president, or even a rock star, the message from this survey is: take music. As with reading, writing, and arithmetic, music should be a core academic focus because it is so vital to a well-rounded education and will pay dividends later in life, no matter the career path taken.

Respondents of the Harris Poll cite skills they learned in music as helping them in their careers today. **72% of adults with music education agree that it equips people to be better team players in their career**, and **60% agree that music education has influenced their creative problem-solving skills.** Many also agree music education provides a disciplined approach to problem solving and a sense of organization and prepares someone to manage the tasks of their job more successfully.

<http://www.harrisinteractive.com/>

Mastery of the arts and humanities closely correlated with high earnings

Tough Choices or Tough Times: The report of the new commission on the skills of the American workforce, 2007, page 29

Data show that high earnings are not just associated with people who have high technical skills. In fact, mastery of the arts and humanities is just as closely correlated with high earnings, and, according to our analysis, that will continue to be true. History, music, drawing and painting, and economics will give our students an edge just as surely as math and science will.

www.skillscommission.org

Countries who require arts ed outperform U.S. in math and reading

Source: "Why Art Makes Kids Smarter." Nancy Kalish, *Parenting Magazine*, January 2010

"Hong Kong as well as Japan, Canada, Finland, and five other countries that consistently outperform us in math and reading all require extensive education in the arts without narrowing their curriculum, according to a new report from Common Core, a Washington, D.C., educational research and advocacy organization.

For example, national guidelines in Hong Kong recommend that fourth-graders visit artists' studios and study great works of sculpture and painting; in Ontario, Canada, learning musical composition and conducting are standard for eighth-graders."

www.parenting.com

Music students score high on standardized tests

Source: *MENC Journal of Research in Music Education*, Winter 2006, Vol. 54, No. 4, pgs. 293-307; "Examination of Relationship between Participation in School Music Programs of Differing Quality and Standardized Test Results" by Christopher M. Johnson and Jenny E. Memmott, University of Kansas

Students in high-quality school music programs score higher on standardized tests compared to students in schools with deficient music education programs, regardless of the socioeconomic level of the school or school district. Students in top-quality music programs scored 22% better in English and 20% better in math than students in deficient music programs. Students in top-quality instrumental programs scored 19% higher in English than students in schools without a music program. Students in top-quality instrumental programs scored 17% higher in math than children in schools without a music program. Students at schools with excellent music programs had higher English and math test scores across the country than students in schools with low-quality music programs. Students in all regions with lower-quality instrumental programs scored higher in English and math than students who had no music at all.

Arts students outperform non-arts peers on SAT

The Student Descriptive Questionnaire, a self-reported component of the SAT that gathers information about students' academic preparation, gathered data for these reports. Source: The College Board, Profile of College-Bound Seniors National Report for 2006

Students of the arts continue to outperform their non-arts peers on the SAT, according to reports by the College Entrance Examination Board. In 2006, SAT takers with coursework/experience in music performance scored 57 points higher on the verbal portion of the test and 43 points higher on the math portion than students with no coursework or experience in the arts. Scores for those with coursework in music appreciation were 62 points higher on the verbal and 41 points higher on the math portion.

www.collegeboard.com

Music education programs linked to high graduation and attendance rates

Source: "Music Makes the Grade," Harris Survey of American High School Principals and Assistant Principals, April - May 2006

In a survey of American high school principals, 96 % agree that participating in music education encourages and motivates students to stay in school. Further, 89 % of principals feel that a high-quality music education program contributes to their school achieving higher graduation rates.

That agreement is backed up by statistical data:

- Schools that have music programs have significantly higher graduation rates than do those without music programs. In addition, those that rate their programs as "excellent or very good" have an even higher graduation rate.
- Schools that have music programs have significantly higher attendance rates than do those without programs.

Additional findings:

- As the percentage of students enrolled in a music class increases, so does the graduation rate of the school.
- Graduation rates are better at those schools with a music program that's stable or growing.
- Those schools that receive awards for their music classes and/or performing groups have higher overall graduation rates.
- Those schools that have credentialed music teachers have much higher graduation rates.

“How about the kid I grabbed in the hallway when he was in the fifth grade, who was about to get into a fight? I made a deal with him that I would not tell on him if he joined band... Turned out he was on his last chance with the juvenile parole board and one more infraction and he was going to a home. I just got an invitation to his wedding ...I will be sending Dr. Smith and his future wife a lovely gift” .—music teacher anecdote, August 2006

This study was released by MENC: The National Association for Music Education and NAMM: International Music Products Association and conducted by Harris Interactive.

<http://www.menc.org/documents/legislative/harrispoll.pdf>

Teens view music as central to their lives

Source: “FOCUS ON STUDENTS: Research Study Indicates Teenagers’ Strong Commitment to Music & Music Making,” NAMM (*the National Association of Music Merchants*) Foundation, November 1, 2008.

Throughout their essays, students expressed their thoughts toward learning and playing music and revealed that they value music making as a central aspect of their identities.

Teenagers see music as their ‘social glue,’ as a bridge for building acceptance and tolerance for people of different ages and cultural circumstances. Music provides teens’ opportunities in school for engagement as performers, composers and intelligent listeners, activities and qualities that appear to be deeply meaningful to them.

And, for teens desperately seeking relevance, music education may give them the balanced experience they require.

[in reference to the study “Adolescents’ Expressed Meanings of Music in and out of School” by Patricia Shehan Campbell, Ph.D., University of Washington; Claire Connell, University of Washington; and Amy Beegle of Pacific Lutheran University]

NAMM, the National Association of Music Merchants, is the not-for-profit association that unifies, leads and strengthens the \$17 billion global music products industry.

www.namm.org www.nammfoundation.org

Music as a part of a well-rounded education

Source: Barry N., Taylor, K and Walls K., Critical Links: Learning in the Arts and Student Academic and Social Development, AEP (Arts Education Partnership), 2002

The U.S. Department of Education agrees, identifying arts education as core curriculum in the federal No Child Left Behind Act. And a **2006 Gallup Poll revealed that 94 % of Americans consider music to be part of a well-rounded education.**

Students indicate that arts participation motivates them to stay in school, and that the arts create a supportive environment that promotes constructive acceptance of criticism and one in which it is safe to take risks.

<http://www.aep-arts.org/files/publications/CriticalLinks.pdf>

The impact of music education on academic achievement (2005)

Donald A. Hodges and Debra S. O'Connell, The University of North Carolina at Greensboro
www.uncg.edu/mus/SoundsOfLearning/AcdemicAchievement.pdf

What is the impact of participation in music education on academic achievement?

A number of studies support the contention that **students who participate in formal music education have higher academic achievement scores than students who do not participate in formal music education** (Babo, 2001; Cardarelli, 2003; Cox, 2001; Huang, 2004; Miranda, 2001; Schneider & Klotz, 2000; Underwood, 2000). Furthermore, **being excused from nonmusic classes to attend instrumental lessons does not adversely affect academic performance** (Cox, 2001).

Cardarelli (2003) investigated the effects of instrumental music instruction on standardized test performance of third-grade students. Students were divided into two groups: those participating in an instrumental music training program and those not participating. **The music training activity was designed for inner city students who could not financially afford to take music lessons.** She found statistically significant differences between the mean scores of the two groups, with a **positive effect of the music program on the students' achievement levels.**

Schneider and Klotz (2000) examined the relationship between enrollment in music performance classes and athletic extracurricular activities on academic achievement. Three hundred forty six subjects were divided into three groups: musicians (band or choir), athletes, or non-participants. All three groups were statistically equivalent in fifth and sixth grade. **During seventh, eighth, and ninth grades the musicians achieved significantly higher academic achievement scores than the athletes** but did not score higher than the non-participants. The authors noted that the **musicians showed a tendency to maintain stabilized scores while the athletes and non-participants groups' scores dropped.**

Those who participate in music have higher academic achievement than those who do not (Shobo, 2001; Yoon, 2000).

Klupball (2000) **found that the study of instrumental music was significantly related to mathematics and science tests** but not to language arts, social studies, writing, and the SAT verbal and mathematics tests.

Barr, Dittmar, Roberts, & Sheraden (2002) provided elementary students with 16 weeks of instruction for **the improvement of listening skills** in addition to music instruction. **Results indicated improved academic performance.**

Music aptitude was also highly related with academic achievement in 8- to 12-year-old students (Johnson, D., 2000). Palos-Tuley (2003) found **positive significant effects for academic achievement and the degree of involvement in the fine arts of Hispanic students** in grades three, four, and five, involved in either: an intensive fine arts academy, a rotational fine arts program, or a minimal fine arts program. **A positive relationship was found for those high schools whose band participated in concert festival and SAT scores** (Johnson, P., 2000).

Reading is a key to successful academic achievement. Yet, according to the most recent national assessment, only 32% of the nation's fourth-grade children are reading at or above grade level (NAEP, 2000).

Music perception utilized auditory mechanisms related to reading as musical skills correlated significantly with phonological awareness and early reading skills in a group of four- and five-year-old children (Anvari, Trainor, Woodside, & Levy, 2002).

Researchers had previously shown that **adult musicians who received musical training before the age of 12 had a better memory for spoken words than those without musical training** (Chan, Ho, & Cheung, 1998). Subsequently the same group **tested this hypothesis in children ages six to 15** (Ho, Cheung, & Chan, 2003). **Results confirmed the previous findings as those with musical training improved verbal memory (but not visual memory) more so than those who discontinued or never received such training.**

According to the U.S. Department of Education, schools in the United States “are not producing the math excellence required for global economic leadership.” The average math scores of fourth- and eighth-graders have improved slightly; however, 12th-grade math scores have not improved since 1996 (NAEP, 2000). Beginning in 2005, No Child Left Behind requires all states to measure students' progress in mathematics annually in third- through eighth-grade. The subject of mathematics is generally taught in isolation from other subjects and often lacks any creative or artistic flair. Students often become bored and do not pay attention in class, resulting in lower test scores. However, **there is a connection between music and mathematics, both subject areas use numbers, repeating patterns, and ratios** (Vaughn, 2000). Because of this connection it is possible that **participating in music education can improve students' understanding of mathematics, thereby resulting in improved mathematics achievement scores. A large majority of research studies on music and mathematics show that there is some positive effect of music on mathematical achievement.**

Haley (2001) investigated the effects of participating in an instrumental music program (band or orchestra) on the academic achievement of fourth-grade children. The children were placed into three groups: Group A consisted of children who had studied an instrument prior to the introduction of band and orchestra in fourth grade; Group B consisted of children just beginning to study an instrument; and Group C consisted of children with no experience in instrumental

instruction. Data indicated that **students who had studied an instrument prior to fourth grade had higher scores in mathematics achievement than did students in the other groups.**

Whitehead (2001) examined the effect of music instruction (Orff-Schulwerk) on math scores of middle and high school students. Subjects were randomly placed into three groups: full treatment (which received music instruction for 50 minutes five times per week), limited treatment (which received 50 minutes of instruction once a week), and no treatment (which received no music instruction). After twenty weeks, the full treatment group showed a higher level of significant gain in mathematics than the other two groups. The limited treatment group showed limited mathematics improvement and the no treatment group had the lowest gain in mathematics improvement.

A study by Rauscher and Zupan (2000) investigated the effects of classroom music instruction on spatial-temporal reasoning of kindergarten students. Students were assigned to one of two groups: keyboard instruction or no music. After four months of treatment, the **keyboard group scored significantly higher on the spatial-temporal tasks than the no music group. The researchers found that after eight months of treatment, the keyboard group still scored significantly higher than the no music group and the difference between groups was much greater.**

Carlson et al. (2004) examined the effects of background music and relaxation on the reading performance of third-grade students. Students, who participated in this study, sat in a vibroacoustic music chair, which allowed students to feel the vibrations of the music, while completing the reading-based tasks. The results of the study showed a **statistically significant positive impact for both sight-word recognition and reading comprehension.** There was no significant increase for oral reading accuracy. Furthermore, the researchers stated that **all students who were reading below grade level at the beginning of the study improved their performance to grade level or higher.**

Researchers investigated the effects of background music on spelling word retention of elementary school students (Anderson et al., 2000). They found that **spelling test scores and report card grades improved after listening to background music.** The researchers concluded that the **music enabled the students to relax, concentrate, and visualize the spelling words.**

Dawson (2003) examined the effects of four different auditory background conditions on the reading achievement of seventh-grade students. The four auditory conditions included instrumental music of Mozart, instrumental music of Yanni, instrumental music of Pink Floyd, and silence. The researcher found **a significant effect for vocabulary, comprehension, and total reading ability when the auditory background condition consisted of listening to the instrumental music of Mozart** or the auditory condition of silence.

Bibliography:

Anderson, S., Henke, J., McLaughlin, M., Ripp, M., & Tuffs, P. (2000). Using Background Music To Enhance Memory and Improve Learning. (ERIC Document Reproduction Service No. ED437663)

Anvari, S. H., Trainor, L. J., Woodside, J., & Levy, B. A. (2002). Relations among musical skills, phonological processing, and early reading ability in preschool children. *Journal of Experimental Child Psychology*, 83(2), 111-130.

Babo, G. D. (2001). The impact of a formal public school instrumental music instruction program on an eighth grade middle school student's reading and mathematics achievement. (Doctoral Dissertation, Seton Hall University). *Dissertation Abstracts International*, 62 (04), 1277A.

Cardarelli, D. M. (2003). The effects of music instrumental training on performance on the reading and mathematics portions of the Florida Comprehensive Achievement Test for third-grade students. (Doctoral dissertation, University of Central Florida). Dissertation Abstracts International, 64 (10), 3624A.

Carlson, J., Hoffman, J, Gray, D., & Thompson, A. (2004). A musical interlude: Using music and relaxation to improve reading performance. *Intervention in school and clinic*, 39(4), 246-250.

Chan, A.S., Ho, Y.C., & Cheung, M.C. (1998). Music training improves verbal memory. *Nature*, 396, 128-129.

Cox, R. W. (2001). Effects on academic achievement for fifth-grade students in a band pull-out program. (Masters thesis, California State University, Fresno). *Masters Abstracts International*, 40 (01), 26. Mixed results from research. Identified alternative explanations for superiority such as students were intelligent before starting music.

Dawson, D. (2003). Listening to music and increasing reading achievement scores in vocabulary and comprehension and total reading ability. (Doctoral dissertation, Widener University). *Dissertation Abstracts International*, 64 (12), 4407A.

Haley, J. A. (2001). The relationship between instrumental music instruction and academic achievement in fourth grade students. (Doctoral dissertation, Pace University). *Dissertation Abstracts International*, 62 (09), 2969A.

Ho, Y.C., Cheung, M.C., & Chan, A.S. (2003). Music training improves verbal but not visual memory cross-sectional and longitudinal explorations in children. *Neuropsychology*, 17 (3), 439-450.

Huang, H.-C. J. (2004). A study of the relationship between music learning and school achievement of sixth-grade students. (Doctoral dissertation, University of Idaho). *Dissertation Abstracts International*, 65 (02), 0338.

Johnson, D. A. (2000). The development of music aptitude and effects on scholastic achievement of 8 to 12 year olds. (Doctoral dissertation, University of Louisville). *Dissertation Abstracts International*, 61 (08), 3098A.

Johnson, P. B. (2004). The relationship between average SAT scores (total, verbal, and math) and concert festival participation in South Carolina public high schools. (Doctoral dissertation, Georgia Southern University). *Dissertation Abstracts International*, 65 (08), 2851A.

Kluball, J. L. (2000). The relationship of instrumental music instruction and academic achievement for the senior class of 2000 at Lee County High School, Leesburg, Georgia. (Doctoral dissertation, University of Sarasota). *Dissertation Abstracts International*, 61 (11), 4320A. Conclusion: Music helped reading but not math scores.

Miranda, J. Y. (2001). A study of the effect of school-sponsored, extra-curricular activities on high school students' cumulative grade point average, SAT score, ACT score, and core curriculum subject grade point average. (Doctoral dissertation, University of North Texas). *Dissertation Abstracts International*, 63 (11), 3843A.

NAEP 2000 The Nations Report Card: Mathematics. Retrieved August 17, 2005, from <http://nces.ed.gov/nationsreportcard/pubs/main2000/2001517.asp>

National Institute of Child Health and Human Development. (2000). Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.

Neuharth, R. H. (2000). A comparison of achievement test scores of band and non-band students in a rural public school. (Doctoral dissertation, University of South Dakota). *Dissertation Abstracts International*, 61 (07), 2513A. Conclusion: Music helped reading but not math scores

Palos-Tuley, B. (2003). An examination of the relationship between fine arts experiences and creative thinking, academic self-concept, and academic achievement of Hispanic students in grades 3, 4, and 5 in selected south Texas schools. (Doctoral dissertation, Texas A & M University). *Dissertation Abstracts International*, 65 (01), 008A.

Rauscher, F.H., & Zupan, M.A. (2000). Classroom keyboard instruction improves kindergarten children's spatial-temporal performance: A field experiment. *Early Childhood Research Quarterly*, 15 (2), 215-228.

Schneider, T. W., & Klotz, J. (2000). The Impact of music education and athletic participation on academic achievement. (ERIC Document Reproduction Service No. ED448186) Identified alternative explanations for music students having superiority.

Shadd, T. L. (2002). The inclusion of arts in the general curriculum. (Doctoral dissertation, The University of Southern Mississippi). Dissertation Abstracts International, 63(11), 3845A. Identified alternative explanations for superiority such as students were intelligent before starting music.

Shobo, Y. A. (2001). Arts, Recreation & Children in Arkansas, 2001. (ERIC Document Reproduction Service No. ED463076)

Underwood, E. B. (2000). An analysis of the achievement patterns of high school students who participate in instrumental music and those who do not participate in instrumental music. (Doctoral dissertation, University of Illinois at Urbana-Champaign). Dissertation Abstracts International, 61 (05), 1735A.

Vaughn, K. (2000). Music and mathematics: Modest support for the oft-claimed relationship. Journal of Aesthetic Education, 34 (3-4), 149-166.

Whitehead, B.J. (2001). The effect of music-intensive intervention on mathematics scores of middle and high school students. Unpublished doctoral dissertation, Capella University. (Doctoral dissertation, Capella University). Dissertation Abstracts International, 62 (08), 2710A.

Yoon, J. N. (2000). Music in the classroom: its influence on children's brain development, academic performance, and practical life skills. (ERIC Document Reproduction Service No. ED442707)

<http://www.ed.gov/programs/readingfirst/nclb-reading-first.html>

<http://aplus-schools.uncg.edu/>

<http://www.ed.gov/nclb/methods/math/math.html>

Children who take music lessons show brain development and improved memory

Dr. Laurel Trainor, Prof. of Psychology, Neuroscience, and Behaviour at McMaster University, Director of the McMaster Institute for Music and the Mind; Canada; published 9/20/06

Young children who take music lessons show different brain development and improved memory over the course of a year, compared to children who do not receive musical training. The brains of musically trained children respond to music in a different way to those of untrained children, and that the musical training improves their memory. After one year the musically trained children performed better in a memory test that is correlated with general intelligence skills such as literacy, verbal memory, visio-spatial processing, mathematics and IQ.

www.sciencedaily.com/releases/2006/09/060920093024.htm

“Living the Arts through Language + Learning: A Report on Community-based Youth Organizations,” Shirley Brice Heath, Stanford University and Carnegie Foundation for the Advancement of Teaching, Americans for the Arts Monograph, November 1998:

Young people who consistently participate in comprehensive, sequential, and rigorous arts programs are:

- Four times more likely to be recognized for academic achievement.

- Three times more likely to be elected to class office within their schools.
- Four times more likely to participate in a math and science fair.
- Three times more likely to win an award for school attendance.
- Four times more likely to win an award for writing an essay or poem.

Grant Venerable, “The Paradox of the Silicon Savior,” as reported in “The Case for Sequential Music Education in the Core Curriculum of the Public Schools,” The Center for the Arts in the Basic Curriculum, New York, 1989:

The very best engineers and technical designers in the Silicon Valley industry are, nearly without exception, practicing musicians.

Shaw, Rauscher, Levine, Wright, Dennis, and Newcomb, “Music training causes long-term enhancement of preschool children’s spatial-temporal reasoning,” *Neurological Research*, Vol. 19, February 1997:

A research team exploring the link between music and intelligence reported that music training is far superior to computer instruction in dramatically enhancing children’s abstract reasoning skills, the skills necessary for learning math and science.

Academic Preparation for College: What Students Need to Know and be Able to Do, 1983 (still in use), The College Board, New York:

The College Board identifies the arts as one of the six basic academic subject areas students should study in order to succeed in college.

“Music Education – Just What the Doctor Ordered” by Les Susi from *Instrumentalist* July 1990. Used by permission of Coyle Music, Columbus, Ohio. Article originally appeared in Adlib newsletter published by Coyle Music:

A high percentage of participants in instrumental music programs go on to pursue professional careers other than music and later credit disciplines learned in instrumental music with giving them the impetus for their achievement.

As reported in “The Case for Music in the Schools,” *Phi Delta Kappan*, February 1994:

Physician and biologist Lewis Thomas studied the undergraduate majors of medical school applicants. He found that 66% of music majors who applied to medical school were admitted, the highest percentage of any group. 44% of biochemistry majors were admitted.

Texas Commission on Drug and Alcohol Abuse Report. Reported in the *Houston Chronicle*, January 1998:

Secondary students who participated in band or orchestra reported the lowest lifetime and current use of all substances (alcohol, tobacco, illicit drugs).

Siemens Westinghouse competition in math, science, and technology

Source: *The Midland Chemist* (American Chemical Society) Vol. 42, No.1, Feb. 2005
Nearly 100% of past winners in the prestigious Siemens Westinghouse Competition in math, science, and technology (for high school students) play one or more musical instruments. This led the Siemens Foundation to host a recital at Carnegie Hall in 2004, featuring some of these young people, after which a panel of experts debated the nature of the apparent science/music link.

Music education can improve auditory skills in children with disabilities

Source: "Music Training Enhances Brain Stem Sensitivity to Speech Sounds, Neuroscientist Says." *Science Daily*, February 22, 2010.

"Researchers in the Kraus lab [at Northwestern University] provided the first concrete evidence that playing a musical instrument significantly enhances the brain stem's sensitivity to speech sounds. The findings are consistent with other studies they have conducted revealing that anomalies in brain stem sound encoding in some learning-disabled children can be improved with auditory training.

Playing an instrument may help youngsters better process speech in noisy classrooms and more accurately interpret the nuances of language that are conveyed by subtle changes in the human voice...Cash-strapped school districts are making a mistake when they cut music from the K-12 curriculum."

-Nina Kraus, Hugh Knowles Professor of Neurobiology, Physiology and Communication Sciences at Northwestern University and director of the Auditory Neuroscience Laboratory in Northwestern's School of Communication

www.sciencedaily.com

Music study and respect, cooperation, and life skills for the 21st century

by Debra S. O'Connell (2005), "The Impact of Music Education on Aspects of the Child's Self," *Sounds of Learning*, The **University of North Carolina** at Greensboro (p. 4.7).

A study by the Florida Department of Education (1990) reported that students who participated in arts activities, "learned how to deal with and have respect for others" (p. 25). Adderley, Kennedy, and Berz (2003) reported that students who participated in music education stated they felt that they were "part of something much greater than what the individual could produce alone" (p. 203).

www.uncg.edu/mus/SoundsOfLearning/soundsoflearning.html

Students in music appreciation score higher on SATs

Source: "College-Bound Seniors National Report: Profile of SAT Program Test Takers," Princeton, NJ: The College Entrance Examination Board, 2001

The College Entrance Examination Board found that students in music appreciation scored 63 points higher on verbal and 44 points higher on math than students with no arts participation.

http://www.collegeboard.com/prod_downloads/about/news_info/cbsenior/yr2001/NJ.pdf

Cartography of a musician's brain

Source: "Notes on the Brain," Philip Ball, *Financial Times*, June 4, 2010.

One remarkable recent discovery is that musicians literally have a 'map of musical space' imprinted on their brains. Many people liken music listening to being taken on a journey, but for musicians that trip has a particular cartography. They recognise that certain chords are closely related to others, for example a major key and its so-called relative minor, an association exploited in the Beatles' *All My Loving*.

Music theorists have proposed maps of this 'harmonic space' in which related keys lie relatively close together. In 2002, US-based neuroscientist Petr Janata used MRI scanning to show that different areas of the prefrontal cortex of a musician's brain light up when they hear different chords, in basically the same spatial arrangement as the theoretical maps. This part of the brain adjoins areas that deal with purely cognitive processing (such as pitch recognition), emotions and memory, suggesting that the harmonic map is used to integrate all these functions.

www.ft.com

Music education, the brain, and language

Laura-Ann Petitto, University of Toronto, in *Learning, Arts, and the Brain* (Dana Press, 2008)

....There may be an enduring cognitive advantage afforded by early and extensive music education on adult learning of a new language in an instructional setting. Specifically, **musicians showed greater improvement in expressive fluency and competence in their new language than non-musicians.**

www.dana.org

Music improves the way the human brain processes parts of spoken language

Prof. John Gabrieli, former Stanford psychology professor, now associate director of MIT's Athinoula A. Martinos Center for Biomedical Imaging. (Nov. 2005)

A 2004 Stanford University study showed that mastering a musical instrument improves the way the human brain processes parts of spoken language. In two studies, researchers demonstrated that people with musical experience found it easier than non-musicians to detect small differences in word syllables. They also discovered that musical training helps the brain work more efficiently in distinguishing split-second differences between rapidly changing sounds that are essential to processing language. About 40 adults, divided into groups of musicians and non-musicians, matched by age, sex, general language ability, and intelligence, were tested. To qualify, the musicians need to have started playing instruments before age 7 and never stopped,

practicing several hours a week. Functional magnetic resonance imaging showed the musicians had more focused, efficient brain activity. “This is the first example showing how musical training alters how your brain processes language components.”

<http://news-service.stanford.edu>

Music training linked to better understanding of speech

Source: “Music Training Linked to Better Understanding of Speech.” The Dana Foundation, Kayt Sukel, October 30, 2009.

A new study suggests that musical skills can also help people understand spoken words buried in a noisy cacophony. This ability may help explain why music training seems to help some people with other forms of learning and could eventually lead to new therapies for children with autism and older people with hearing difficulty...

[Nina] Kraus and colleagues Alexandra Parbery-Clark, Carrie Lam and Erika Skoe [of Northwestern University] evaluated participants as they listened to and then repeated back sentences presented in varying amounts of background noise. Those who had musical training, defined as ten or more years of musical study, were much better able to repeat the sentences than those without it. Kraus says the finding supports the argument that musical training may harness areas of the brain that improve executive functioning.

www.dana.org

Middle school music may help close the achievement gap between students of different races

“Middle School Music Lessons Enhance Algebra Skills,” Tom Jacobs, Miller-McCune, June 14, 2010.

Researcher Barbara Helmrich of Baltimore’s College of Notre Dame examined a sample of 6,026 ninth-graders enrolled in six Maryland school districts. All had completed an introductory algebra course in either eighth or ninth grade and taken the HSA, a test that assesses how well they learned the subject.

Helmrich divided the students into three groups: Those who had received formal instruction on a musical instrument during the sixth, seventh and eighth grades; those who received choral instruction during those same years; and those who received no formal musical training.

Helmrich reports, “**The students who studied music significantly outperformed their peers. Formal instrumental instruction impacted algebra scores the most.**” While Helmrich notes the link between music instruction and algebra achievement most likely lies in a combination of factors, she argues the primary effect is a matter of enhanced brain development. Middle-school music instruction “takes place during a time (age 10-12) in which a proliferation of new synapses occurs in the developing brain,” she writes.

“This study corroborates the opinion that these new synapses are formed and strengthened, at

least in part, by activities — music in this case — that are undertaken during early adolescence,” she adds.

“For African-Americans, the means of all three groups represented failing scores on the fifth-grade MSA,” she said, referring to a standard assessment of math knowledge and ability. “However, after the middle-school years, the means of both the instrumental and vocal groups represented passing HSA scores, whereas the mean of the group receiving neither instruction did not.”

“The particularly robust results for African-American students suggests ‘offering music education in middle school might present an alternative strategy for narrowing the achievement gap’ between students of different races,” Helmrich writes in the *Journal of Adolescent Research*.

www.miller-mccune.com

Students involved in music show high level of math proficiency

Source: "Involvement in the Arts and Human Development." James Catterall, Richard Chapleau, and John Iwanaga. The Imagination Project at UCLA Graduate School of Education & Information Studies, University of California at Los Angeles, July 1999

Students who report consistent high levels of involvement in instrumental music over the middle and high school years show significantly higher levels of mathematical proficiency by grade 12. This observation holds both generally and for low socioeconomic status students as a subgroup. In addition, absolute differences in measured mathematics proficiency between students consistently involved versus not involved in instrumental music grew significantly over time.

<http://www.gseis.ucla.edu/faculty/files/catterall/catterall.involvement.pdf>

Research education shaped by musical sensibilities

Source: Liora Bresler (2009). Research education shaped by musical sensibilities. *British Journal of Music Education*, 26, pp 7-25

Based on Bresler’s own research education courses for doctoral students, Bresler examined the ways in which music provides powerful and rich models for perception, conceptualization, and engagement for both listeners and performers, to cultivate the processes and products of qualitative research in the social science in general, and in music education in particular. Bresler discussed temporality and fluidity, listening and improvisation, originally terms associated with music, and their ramifications for qualitative inquiry. Bresler then presented some concrete examples from her research course, not as prescriptions to follow but as invitations for readers to generate their own activities and experiences.

<http://journals.cambridge.org/action/displayFulltext?type=6&fid=4012220&jid=&volumeId=&issueId=&aid=4012216>

Music study keeps students away from harmful activities

Patricia Shehan Campbell, Claire Connell, and Amy Beegle (2007), "Adolescents' Expressed Meanings of Music in and out of School," *Journal of Research in Music Education*, 55(3), p. 228-9.

Students spoke of music's social benefits in relation to its function as a distraction from involvement in spurious activity such as drugs, alcohol, smoking (cigarettes), gang life, and promiscuous sex--in their own lives or in the lives of adolescents in general. Some reference was also made to music's capacity to dissuade individuals from suicidal behaviors, if only by giving singers and players purpose in their young lives. Even young teens offered some details about their experimentation with illegal substances and with gang activity, along with a description of music's role in helping them to draw away from these distractions and to set them on course.

There were many references made to music's role in saving teenagers from depression and suicidal behavior, as in this statement by a 13-year-old girl: "Many of my friends have dabbled with suicide, and none of them ever had any involvement with music. Just think, if at least one of these friends was involved with music, then the education department could potentially save a life."

<http://www.menc.org/resources/view/menc-journals>

What makes music work for public education?

Music in Education National Consortium, Journal for Learning through Music, Second Issue, Summer 2003, "What Makes Music Work for Public Education?" - pg. 87 Dr. Martin F. Gardiner, Brown University

Music is an extremely rich kind of experience in the sense that it requires cognition, it requires emotion, it requires aesthetics, and it develops performance skills, individual capabilities. These things have to be developed and all have to be synchronized and integrated so that, as a person learns music, they stretch themselves mentally in a variety of ways. What we are finding is that the kind of mental stretching that takes place can be of value more generally, that is, to help children in learning other things. And these other things, in turn, can help them in the learning of music, so that there is a dialogue between the different kinds of learning.

www.music-in-education.org

School music boosts students' social life, friendships, commitments

"Anything Goes: A Case Study of Extra-Curricular Musical Participation in an English Secondary School," Stephanie E. Pitts, *Music Education Research* (9), 2007.

Music participation at school has been shown to bolster not only individual benefits such as friendships with like-minded individuals and modeling commitment through rehearsals, but school music productions are perceived as making a valuable contribution to social life through a widespread awareness of the show by nonparticipants.

www.sciencedirect.com

Social benefits of music study

“Linking Extracurricular Programming to Academic Achievement: Who Benefits and Why?” Beckett A. Broh, *Sociology of Education* (75), 2002.

Also cited in “Unattended musical beats enhance visual processing,” Nicolas Escoffier, Darren Yeo Jian Sheng, and Annett Schirmer, *Acta Psychologica*, April 2010.

Specifically, students who participate [in music] have more academically oriented peer groups, talk more with parents and teachers, and their parents are more likely to talk with friends’ parents. These benefits are more purely social in nature and may be important in countering lower self-esteem and locus of control.

Life skills learned and social benefits of music study

Patricia Shehan Campbell, Claire Connell, and Amy Beegle (2007), "Adolescents' Expressed Meanings of Music in and out of School," *Journal of Research in Music Education*, 55(3), p. 228-229.

Adolescents also reported that being involved with music provided them with a sense of belonging, or as one 13-year-old girl put it, "Music gives you a place to belong inside and outside the walls of your school." Quite often imagery of the family was chosen to illustrate the feelings of belonging and security they had experienced as a result of participating in musical groups at their school such as band, choir, or orchestra. There was acknowledgment that music diminishes boundaries between people of different ethnic backgrounds, of different age-groups, and of different social interests.

In discussing life benefits of music study, the authors report, "The most heavily reported life preparation skill was self-discipline, with respondents acknowledging that the hard work and dedication that are integral to participation in school music groups teach the valuable lesson that if 'you stick with something and practice,' the rewards will be bountiful. Other students conceded that the concentration required for learning music and the process of memorizing music pieces had honed those skills in other areas of their schoolwork.

Music was frequently described as a force for building one's character, and many students expressed their belief that music was capable of directing them in shaping their broader sense of self, who they were becoming, and how they might succeed in the world. The respondents highlighted confidence, responsibility, compassion, pride, patience, and respect as aspects of their character they feel they owe, at least in part, to music.

www.menc.org/resources/view/menc-journals

Music study and self-esteem

Debra S. O'Connell (2005), "The Impact of Music Education on Aspects of the Child's Self," *Sounds of Learning*, The University of North Carolina at Greensboro (p. 4.6).

Costa-Giomi (2004) investigated the effects of three years of piano instruction on children’s self-esteem. Children in the study were divided into two groups: piano instruction weekly for three

years, and no music instruction. Both groups had similar levels of self-esteem at the beginning of the study. The researcher found that the children who completed three years of piano instruction had a significant increase in self-esteem while the children who did not participate in piano instruction or dropped out of piano instruction did not.

Austin (1990) investigated the relationship of music self-esteem to music activity participation among fifth- and sixth-grade students. Results of the study indicated a significant difference in self-esteem for gender, with a higher mean score for female students. Additionally, the level of musical self-esteem was found to be a significant predictor of participation in music activities.

www.uncg.edu/mus/SoundsOfLearning/soundsoflearning.html

Music and math—academic success

Maureen Harris (2009). *Music and the Young Mind: Enhancing Brain Development and Engaging Learning*, MENC/Rowman & Littlefield Education (p. 9).

Case studies have assessed the academic success of school music students (Milley, Buchen, Oderlund, & Mortatotti, 1983). Rhythm students learned the concept of fractions more easily, and those students who learned rhythm notation scored 100 % higher on fractions tests. The sixty-seven individual case studies showed that students' achievement in mathematics improved when arts were included in the curriculum. Michela (as cited in Kelstrom, 1998) also believed that studying music enabled students to learn multiplication tables and mathematics formulas more easily. These findings indicated that music uniquely enhanced higher brain functions required for mathematics, chess, science, and engineering. Because neural connections were responsible for all types of intelligence, a child's brain developed to its full potential only with exposure to the necessary enriching experiences in early childhood (Hargreaves & Davis, 2000).

www.rowmaneducation.com

J. Milley, I. Buchen, A. Oderlund, & J. Mortatotti (1983). *The arts: An essential ingredient in education*, California Council of Fine Arts Deans.

D. J. Hargreaves & M. A. Davis (2000). Learning . . . the beat goes on. *Childhood Education*, 76(3), 148-54.

J. M. Kelstrom (1998). The untapped power of music: Its role in the curriculum and its effect on academic achievement. *NASSP Bulletin*, 82, 34-43.

Students involved in instrumental music show higher levels of math proficiency

James S. Catterall, Richard Chapleau, and John Iwanga (1999), "Involvement in the Arts and Human Development: General Involvement and Intensive Involvement in Music and Theater Arts," *Champions of Change: The Impact of the Arts on Learning*, Arts Education Partnership

Enlisting the National Educational Longitudinal Survey (NELS:88) (a panel study that followed more than 25,000 students in American secondary schools for 10 years), these researchers found: Students who report consistent high levels of involvement in instrumental music over the middle and high school years show significantly higher levels of mathematics proficiency by grade 12. This observation holds both generally and for low socioeconomic status (SES) students as a subgroup. In addition, absolute differences in measured mathematics proficiency between

students consistently involved v. not involved in instrumental music grow significantly over time.

Researchers examined the probability that students involved in instrumental music would attain the highest levels of mathematics proficiency on the 12th grade tests used in the NELS:88 study. Analyses were differentiated by family income and education levels (SES):

1. All high SES students do better in mathematics than the average student, regardless of their music involvement.
2. Students concentrating in instrumental music do substantially better in mathematics than those with no involvement in music.
3. Low SES students with high involvement in music do better than the average student at attaining high levels of math proficiency.
4. Twice as many low SES 8th graders in band and/or orchestra scored at high levels in math as did low SES 8th graders with no reported involvement in instrumental music. By 12th grade, the differentials increasingly favored students heavily involved in instrumental music, especially the percentages of students performing at the highest levels.
5. By 12th grade, the high performing gap between low SES, high-music students and the average student had grown to about 33% v. 21%.

www.aep-arts.org (under Publications)

Choral participation and quality of life

2009 Chorus Impact Study

A 2009 Chorus America study found that singing in one of the 270,000 choruses in the U.S. (community, school, or church), **is strongly correlated with qualities that are associated with success throughout life.** Greater civic involvement, discipline, and teamwork are just a few of the attributes fostered by singing with a choral ensemble. According to the study, an estimated 32.5 million adults regularly sing in choruses today, up from 23.5 million estimated in 2003. When children are included, there are 42.6 million Americans singing in choruses in 2009. More than 1 in 5 households have at least one singing family member, making choral singing the most popular form of participation in the performing arts for both adults and children.

The 2009 study included a component that explicitly examined the effects of choral singing on childhood development. The results show children who sing in choirs display many of the enhanced social skills found in adult singers, substantiating earlier conclusions that singing in childhood is likely to have an enormous influence on the choices individuals make later in life. Additionally, both parents and educators attribute a significant proportion of a child's academic success to singing in a choir.

www.chorusamerica.org