

The Impact of Music on Language & Early Literacy

A Research Summary in Support of Kindermusik





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Introduction

Early childhood classroom teachers believe in the power of music to engage children. What scientifically based research supports the use of music and musical instruction to build early literacy skills? This research summary answers that question, providing support to educators who wish to integrate music and musical instruction into their early language and literacy programs in schools.

This research summary reviews high-quality experimental studies conducted in classrooms with young children receiving music education, plus relevant brain research that focuses on the impact of musical instruction on the brain. The impact of music and musical instruction on early language and literacy development for young children is examined in the following areas:

- Reading Comprehension and Verbal memory
- Listening Skills
- Vocabulary, including for English Language Learners
- Phonological and Phonemic Awareness
- Writing and Print Awareness
- Impact on Children with Disabilities
- Family Involvement

The research summarized below provides strong support for including music and musical instruction in the early childhood classroom. Importantly, this recommendation is made not just for the value of the musical experience itself, but also because of the impact music and musical instruction can have on young children's development of language and early literacy.

Music Instruction & Reading Scores Linked

Reading comprehension is seen as "the essence of reading" (Durkin, 1983) and the desired outcome of reading instruction, including the focus of assessment on standardized reading tests starting in third grade. Comprehension is defined as "intentional thinking during which meaning is constructed through interactions between text and reader" (Harris & Hodges, 1995).

A number of research studies have found that children who participate in music instruction tend to score higher on tests of reading comprehension than children who do not participate in musical instruction.

- A meta-analysis of 25 correlational studies, some involving sample sizes of over 500,000 students, found a "strong and reliable association" between music instruction and scores on tests of reading comprehension (Butzlaff, 2000).
- A study of 4, 739 elementary and middle school students in four regions of the United States revealed a strong relationship between elementary (third- or fourth-grade) students' academic achievement as measured by test scores and their participation in high-quality music programs (Johnson & Memmott, 2006).

While these studies are appealing, one cannot conclude from correlational studies alone that the music instruction was the cause of the gains in reading scores. To answer that question, we turn to the experimental studies that involved pre- and post-testing of young children receiving classroom music education.

The authors of a classic study (Hurwitz et al, 1975) asked whether music training improved reading performance in first grade children. The experimental group received musical instruction including listening to folk songs with an emphasis the listening for melodic and rhythmic elements. The control group consisted of children who were matched in age, IQ, and socioeconomic status and who received no special treatment. After training, the music group exhibited significantly higher reading scores than did the control group, scoring in the 88th percentile

versus the 72nd percentile. Moreover, continued musical training was beneficial; after an additional year of musical training, the experimental group's reading comprehension scores were still superior to the control group's scores.

These findings provide initial support for the view that music instruction facilitates the ability to read. More recent research focuses on the specific impact of music instruction on the subprocesses involved in successful reading. Researchers believe that music instruction impacts a student's brain functioning in processing language, which in turn impacts reading subprocesses like phonemic awareness and vocabulary. These subprocesses ultimately impact a student's ability to read with comprehension.

Research Into Practice:

Kindermusik@School Kindermusik's Kindermusik@School helps teachers engage young children in language- and literacy-rich musical activities that include playful instruction in foundational music skills and instrument exploration. Research suggests that engaging young children in these types of musical activities are correlated with later success in reading comprehension.

Music Instruction Improves Verbal Memory

Another way in which music instruction may positively impact reading ability is through increased verbal memory. The findings linking music training to verbal memory are important because verbal memory is essential for reading printed words with comprehension. As reading progresses to sentences and texts of greater lengths, verbal memory allows a child to retain material in memory as it is being read so that syntactic and semantic analyses necessary to comprehension can be performed. Verbal memory is essential for all children learning to read (Brady, 1991; Stone and Brady, 1995), and poor performance in verbal memory has been associated with reading disabilities for young children (Ackerman and Dykman, 1993; Cornwall, 1992; Scarborough, 1998).

Recent brain and psychological research shows that music instruction can have a positive impact on verbal memory.

- A study of ninety 6- to 15-year-old boys found that those with music training had significantly better verbal learning and retention abilities. The longer the duration of the music training, the better the verbal memory (Ho, Cheung, and Chan, 2003). A follow-up study concluded that the effect was casual. The authors suggest that the cause of the increase in verbal memory was neuroanatomical changes in the brains of children who were playing music.
- Another study found that learning to play a musical instrument enhances the brain's ability to remember words. "Adults with music training in their childhood demonstrate better verbal memory," according to study author Chan. This brain research with 60 adults showed that musicians have enlarged left cranial temporal regions of the brain, which is the area involved in processing heard information. As a result, people with music training could remember 17% more verbal information than those without music training (Chan, et al, 1998).

Research Into Practice:

Kindermusik@School engages children in active music-making with a variety of musical instruments both in the classroom and at home. Research suggests that this early experience may improve children's verbal memory, an important factor in successful text comprehension for later stages of reading development.

Music Helps Build Listening Skills

"Learning to listen is a prerequisite to listening to learn," stresses researcher Mayesky (1986). Listening is the first language mode that children acquire, and it provides a foundation for all aspects of language and reading development. Listening is a very large part of school learning, with students spending an estimated 50 to 75 percent of classroom time listening to the teacher, to other students, or to media (Smith, 1992).

Despite the frequency of listening activity in classrooms, listening skills are not frequently taught exp

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Newfon, 1990). "Mosf feafthers feafh, assumfng fhaf befause they are talking, their students are listening" (Swanson, 1996). As a result, many children do not

acquire the listening skills necessary to acquire new knowledge and information.

Too often listening is thought to be a natural skill that develops automatically, but in fact developing good listening skills requires explicit instruction. "If we expect children to become good listeners, ... we need to *teach* them to become *active* listeners" (Jalongo, 1995). Direct instruction in listening skills should include "lessons designed to specifically teach and model the skills necessary for active listening" (Matheson, Noon & Winiecki, 2000). An experimental study with young English language learners showed that focused listening instruction can benefit listening comprehension for children learning a second language (Goh & Tibe, 2006).

Musical activities are cited by researchers as effective experiences for building listening skills in the classroom (Hirt-Mannheimer, 1995; Wolf, 1992), for both mainstream classrooms and classrooms with children who have disabilities. (Humpal and Wolf, 2003).

Recent brain research (Flohr, et al, 1996) shows that music training changes and improves brain functioning related to listening. An experimental study with children ages 4 to 6 provided music training for 25 minutes for 7 weeks, and then measured brain activity. Those children who had received musical training produced EEG frequencies associated with increased cognitive processing and greater relaxation.

Music Can Build Vocabulary, Including for English Language Learners

Many researchers promote music as a way to enhance vocabulary acquisition and comprehension, and emphasize music's ability to engage children in instruction (Fountas & Pinnell, 1999; Miller & Coen, 1994; Page, 1995; Smith, 2000; Wiggins, 2007).

According to educational researchers, there is substantial evidence that children acquire vocabulary incidentally by reading and listening to oral stories (Krashen, 1989). During the preschool years before children can read, children rely exclusively on the oral language they listen to in order to acquire language. Even as children attend elementary school, only a portion of the vocabulary words they learn are the result of explicit instruction (Nagy & Herman, 1987). Research shows that stories read aloud are an effective source of new vocabulary for young children (Bech & McKeown, 2001).

Researchers have suggested that song lyrics could provide a source of new vocabulary. Research support for the hypothesis that songs provide a source of incidental acquisition of vocabulary comes from the field of second language acquisition. Medina (1993) studied the effects of music upon the acquisition of English vocabulary in a group of 48 second-grade children with limited English proficiency. Vocabulary gain scores were consistently higher for the groups in which either music or illustration were used, and the highest for the group in which both were used.

Research also supports the use of direct vocabulary instruction, including the effectiveness of having your children learn academic words that are "robust" (Beck, McKeown & Kucan, 2002). Authors argue that young children develop "word consciousness" and a love of words through being playfully challenged with learning new word meanings.

Research Into Practice:

Kindermusik@School Each unit of Kindermusik@School gives children not only the opportunity to listen actively to music, but also includes focused listening activities using music, non-musical sounds, and language. Classroom routines help teachers focus children's attention on listening to direction. Read-aloud stories and songs give children opportunities to practice listening to extended discourse.

Research Into Practice:

Kindermusik@School In every unit of Kindermusik@School, children hear stories read aloud and sing songs that include new vocabulary words. Stories are accompanied by illustrations. Research supports these practices as effective sources of implicit vocabulary acquisition. Explicit instruction in musical terms is included in each unit of the "Move & Groove" program for older children. Words essential to the unit's theme are included on picture cards along with recommended instruction for English language learners (in the ELL Guides), expanding the possibilities for vocabulary acquisition.

Music Improves Phonological and Phonemic Awareness

Phonological awareness, according to Snow, Burns & Griffin (1998), “refers to a general appreciation of the sounds of speech as distinct from their meaning.” Within phonological awareness but more fine-grained is phonemic awareness, which the same researchers explain as “an understanding that words can be divided into a sequence of phonemes” (individual units of speech sounds).

In her research, Adams (1990) state that “children’s level of phonemic awareness on entering school may be the single most powerful determinant of the success he or she will experience in learning to read.” To become successful readers, young children need to understand that words are made up of discrete sounds, and they can then use that knowledge of sounds to read and build words. Phonological and phonemic awareness receive so much attention because research shows that children with these skills are more successful at learning to read than those without these skills (Bradley & Bryant, 1985; Ehri et al, 2001; Stanovich, 1986; Togese & Mathes, 2000).

Research Into Practice:

Kindermusik@School Within

Kindermusik@School, teachers use songs with rhyming lyrics, which help children build phonological awareness. In the “Laugh & Learn” level for younger children, students are exposed to rhyming songs. In the “Move & Groove” program for older children, students receive explanations of rhyming before or after singing and generate words that rhyme.

To understand the impact of musical experiences on children's development of phonological awareness, it helps to understand the similarities between music and language. Where spoken language is comprised of a stream of connected phonemes, music is comprised of a series of discrete musical notes, or tones. Understanding a spoken sentence requires successful auditory processing of the individual phonemes combined with the intonation communicated by pitch, and hearing music requires listening for the individual notes combined with their rhythmic values. Because of these fundamental similarities, the human brain processes music and language in some similar ways. Researchers have recently verified that musical instruction can have an exciting impact on young children's phonological awareness.

Many top educational researchers recommend integrating music into phonological awareness instruction. These researchers recommend songs, and specifically rhyming songs, as an effective mechanism for building funny make awareness with children in early childhood classrooms (Dams, Foorman, Lundberg & Beeler, 1998; Ericson & Juliebo, 1998; Yopp & Yopp, 1997).

Beyond integrating songs into early literacy instruction, recent brain and educational research suggests that providing young children with music instruction can build essential brain functioning that leads to increased growth in phonemic awareness.

Building an understanding of the sounds within words must begin with an ability to discriminate similarities and differences in sounds. Not surprisingly, then, researchers have found a link between musical pitch discrimination and reading ability in young children.

- First grade children were tested on both phonemic awareness and musical pitch awareness. The researchers found a high degree of correlation between phonemic awareness and pitch discrimination. The ability to perceive slight differences in phonemes appeared to depend on the ability to extract information about the frequencies of the speech sounds. The researchers proposed that “carefully structured musical training should be an essential component of the primary school curriculum” (Lamb & Gregory, 1993).
- Another study examined the relations among phonological awareness, music skills, and early reading skills in 100 preschoolers. The researchers found that music skills correlated significantly with both phonological awareness and reading development (Anvari et al, 2002).
- A third study confirmed the correlation between phonological awareness and musical aptitude as measured by pitch awareness. Preschool children completed both phoneme manipulations and deletion tasks and musical aptitude tests. Those children with higher levels of musical aptitude had greater ability to manipulate speech sounds (Peynirciogul et al, 2002).

This link between music ability and phonemic awareness is supported by recent brain research in both adults and children.

- A study by Stanford researchers (Gaab et al, 2005) found that musical training improves how the brain processes the spoken word. Specifically, the research found that musical instruction and experience helps the brain improve its ability to distinguish between rapidly changing sounds, referred to as auditory processing. This auditory processing is critical to developing phonemic awareness and to learning to read successfully. In a study of adult musicians who began playing an instrument by the age of seven and continued playing into adulthood, it was found through functional magnetic resonance imaging scanners, or fMRIs that musicians had more focused, efficient brain activity than did non-musicians. Researchers stated that this finding may have important implications for improving reading skills for young children.
- Another study (Musacchia et al, 2007) demonstrated that playing musical instruments triggers changes in the brain stem as well as in the brain cortex. Senior study author Nina Kraus explained this finding to mean that music training may enhance reading and speech functions because the brain stem is a pathway for both music and language. Researchers measured the activity of neurons in the brain of the experimental subjects who had been playing musical instruments since the age of five. They found that musicians' brain stems not only showed increased activity, but also quicker response times to both music and speech sounds. The longer a person had been playing an instrument, the sharper the responses. As a Scientific American article (Swaminathan, 2007) summarized in an article reviewing this research study, *Sesame Street* had it right when they paired music with early literacy instruction.
- Based on the success of adult studies researchers (Magne et al, 2006) conducted a study of the impact of musical training on eight-year-old children. Specifically, researchers examined the impact of 3-4 years of musical training on pitch processing in both music and in language. In language pitch is the essential component of prosody, the patterns of speech and intonation in a spoken language. Prosody is often called "the music of speech". Prosody not only conveys emotional messages, but also is essential at the phonological level in helping to understand words. The results of these EEG studies of brain functioning showed that musician children outperformed non-musicians on both music and language tasks. Researchers concluded: "... the present findings highlight the positive effects of music lessons for linguistic abilities in children. Therefore, these findings argue in favor of music classes being an intrinsic and important part of the educational programs in public schools..."

A number of researchers have conducted experimental classroom studies to determine the specific impact of music instruction on phonemic awareness of young children. A recent quasi-experimental study by Gromko (2005) found evidence that school children participating in music instruction showed improved phonemic awareness. The experimental group was comprised of four classrooms of kindergarten children in a Title I school who received four months of music instruction for 30 minutes once per week. The music instruction included active music-making and kinesthetic movements to emphasize steady beat, rhythm and pitch, as well as the association of sounds with developmentally appropriate symbols. Four classrooms at a nearby elementary school received no music instruction and served as a control group.

Research Into Practice:

Kindermusik@School Children participating in Kindermusik@School receive music instruction including active music-making and kinesthetic movements to emphasize steady beat, rhythm and pitch, as well as the associate of sounds with developmentally appropriate symbols. Activities include responding physically and verbally to changes in pitch. Research suggests that this type of musical instruction may produce gains in phonological awareness due to similarities in brain functioning between music and language.

All students in Gromko's study were tested using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) test in the fall, winter, and spring. The winter and spring testing included the phoneme-segmentation fluency (PSF) subtest, an aural test which requires children to hear a

word and respond with its component sounds. All students in both experimental and control groups received approximately the same number of minutes of reading instruction. The data revealed that children who received music instruction showed significantly greater gains in phonemic awareness when compared to the control group.

Gromko explains that the students receiving musical instruction likely benefited from the emphasis on aural-skill development. She writes, "When children learn to discriminate fine differences between tonal and rhythmic patterns and to associate their perceptions with visual symbols, they will benefit not only musically but in skills related to the processing of sound shown to be necessary for reading." She explains that the finding is consistent with the "near-transfer theory," which suggests gains due to similarities in brain functioning between music and phonemic awareness.

Music Enriches Early Writing Instruction & Print Awareness

Young children's early attempts at writing help develop their emerging literacy skills. Starting around 2 years of age, children learn to master the functions and purposes of writing (making grocery lists) and begin to understand the forms and features of written language (alphabet letters). According to Neuman (2007), "writing and reading are related and depend on each other." Between the ages of 4 and 7, children begin to translate the sound they hear in words into letters that represent them. Children's early writing attempts are an important way to express their growing phonemic awareness.

Related to early writing is the development of concepts of print. Concepts of print refers to children's knowledge of the functions of print and how print works (Strickland, Schickedanz, 2005). Young children's understanding of concepts of print has scientifically based research support as a predictor of early literacy success (Snow et al, 1998; National Early Literacy Panel, 2007). Educators can help children build concepts of print by providing experiences with books and written texts, and developing a print-rich classroom environment.

Like language, music is represented by printed notation. Like language, music writing follows a developmental progression from the perception of individual sounds to broader groupings within songs (Gromko, 1998). Calling children's attention to the use of symbols to represent individual music notes and events may help children build the fundamental understanding that language sounds can also be represented by written symbols.

Two experimental studies have shown that music instruction can enhance early writing skills in classroom:

- Standley & Hughes (1997) engaged children ages 4-5 years in 15 lessons that used music to enhance the teaching of writing and pre-reading skills. Children were primarily economically disadvantaged, and included migrant preschoolers and students with disabilities. Instruction included focus on concepts of print, participation in singing activities, and writing response activities. At post-testing, children in the experimental group showed enhanced print concepts and pre-writing skills.
- A subsequent study by Register (2001) replicated the previous study with a larger sample size of 50 children. The results again showed that children who receive the music-enhanced instruction made greater gains in writing skills and print awareness.

Research Into Practice:

Kindermusik@School The materials included with Kindermusik@School help teachers create a print-rich classroom environment. Each unit includes a story and song lyrics that can be used to call children's attention to concepts of print. Writing activities included with each unit engage older children in independent writing, and home-based writing activities for all children encourage children to engage further in developing their awareness of print and early writing skill. In the "Move & Groove" level for older children, the focus on musical notation helps children understand that sound can be represented by printed symbols, and understanding that may transfer to building print awareness for language.

Research Into Practice:

Kindermusik@School incorporates lessons focused on developing rhythm, including copying and producing steady beat, rhythm patterns using instruments, and listening to and copying rhythms. According to research with dyslexic children, these activities should have benefits in brain functioning that leads to improvements in language and literacy skills.

Music Instruction Helps Children With Disabilities

Based on the research summarized above, music instruction may be expected to have an impact on children with **reading disabilities**. Both correlational and experimental research studies identify timing deficits as a key factor for dyslexic children. Researchers have found that temporal connectivity, or the ability of different parts of the brain to “talk” with each other at the same time or in sequence is a key to overcoming dyslexia (Richards & Berninger, 2007).

Recent research has focused on the use of music instruction, specifically rhythm, to improve timing difficulties.

- A research study with seven- and eight-year old students showed a correlation between rhythmic ability and reading skills. The follow-up study, conducted with 12 eight- to ten-year olds, utilized an experimental design including students matched for reading ability. The intervention group received musical training focused on the auditory (rhythm and pitch), visual, and motor skills. As a result, the mean reading comprehension scores of the intervention group increased while the mean scores of the control group showed no increase. The researchers conclude that training in music is an effective additional strategy for helping children with reading difficulties (Douglas & Willatts, 1994).
- Temporal processing has been shown to improve with musical training (Gaab et al, 1996). In the same Stanford study cited previously, researchers suggest that music training will lead to improved non-musical skills, especially for children struggling with language-learning impairments (LLI).
- Overy (2003) conducted an initial study confirming that children with dyslexia have difficulty with rhythmic skills (but not pitch.) A follow-up experimental study utilizing a control group and pre-/post-testing set out to determine the impact of music lessons that focused specifically on rhythm and timing skills for dyslexic children. The study found that classroom music lessons had a positive effect on both phonological and spelling skills in addition to musical abilities. The author concludes: “This research strengthened the argument that music lessons have the potential to provide a valuable multisensory learning environment for dyslexic children.”

Research Into Practice:

Kindermusik@School In addition to the Teacher Guides containing lesson plans for early childhood classrooms, Kindermusik@School includes a special guide specifically addressing children with special needs. This guide includes information about how to use music in an inclusive classroom, and how to adapt the activities for even greater success with children who have special needs.

Additional support for the positive impact of music on children with disabilities comes from the field of music therapy. Music therapy is the clinical and evidence-based use of music interventions that may include music improvisation, receptive music listening, songwriting, lyric discussion, music and imagery, music performance, and learning through music. While the studies listed below are limited by smaller sample sizes, their cumulative effect is to suggest a positive impact of music instruction on children with special needs. Research findings include:

- For children with **developmental delays**, music therapy produced increases in nonverbal communication and motor skills (Aldridge, Gustorff, and Neugebauer, 1995).
- For children with **language deficits**, music therapy resulted in increased communicative responsiveness including natural gestures, manual signs, vocalizations, and spoken words (Braithwaite and Sigafoos, 1998).
- Preschool children with **communication disorders** performed similarly to normal children on basic music skills, suggesting that participation of language-disabled children in music activities with peers is appropriate. Music instruction is an area of effective mainstreaming that results in increased social interaction for children with language problems (Cassidy, 1992).
- For children with **physical disabilities**, music was effective in promoting spontaneous speech (Harding & Ballard, 1982).
- For children on the **autism spectrum**, children in music therapy showed gains on

musical vocal behavior and nonmusical speech production, resulting in increased communicative behaviors (Edgerton, 1994).

In addition, children with a variety of disabilities showed on-task behavior and correct responses to specific tasks while participating in music therapy in public schools in Florida, suggesting that music therapy interventions were **developmentally appropriate** as per the guidelines established by the National Association for the Education of Young Children (Standley and Hughes, 1996; NAEYC, 1996).

Music Recommended to Engage Families in Learning

Decades of research have demonstrated the impact that parent and family involvement can have on improved student outcomes related to learning and school success. Involvement from parents and family members in early childhood programs has been proven to help children succeed in their transition to kindergarten and elementary school (Kreider, 2002; Marcon, 1999) including for children from inner cities (Miedel and Reynolds, 1999). Promising outcomes have been demonstrated in literacy when children's parents and families are involved in the educational process (Faires et al, 2000; Hara & Burke, 1998). The positive impact of parent/family involvement has also been documented in the area of music (Zdzinski, 1996).

Parental involvement does have a positive impact on literacy acquisition, according to a meta-analysis of 14 high-quality experimental studies by Senechal (2006). A separate meta-analysis (Bus et al, 1995) showed that there was a statistically significant link between parent-child book reading at home and reading acquisition for young children ages 3-8. Yet a third meta-analysis (Scarborough et al, 1994) showed correlations between parent-preschooler reading and reading achievement in grade school.

Researchers recommend music as an effective means of engaging families in important home learning to build early literacy and language development (Harvard Family Research Project, 2007; Rathbun & Hausken, 2001; Stone, 1999). Music is cited as particularly effective for engaging families of English language learners (NY State Education Department, 1998) and to enhance children's multicultural development (Swick et al, 1995).

Summary

Scientific research supports the use of music in early literacy instruction and also provides evidence for the positive impact of music instruction on early literacy skills. Specifically, scientists have found evidence that music instruction can improve phonemic awareness, verbal memory, and vocabulary, leading scientists to conjecture that improvements in brain functioning related to these areas are the source of correlations between music ability and reading comprehension test scores. Evidence supports the use of music as music instruction for all children, and suggests that music may have specific positive impact on children who are English language learners and children with reading and other disabilities. As researcher Gromko (2005) concludes, "The implication for schools is that music instruction, while valuable for liberating the artistic and musical potential of every child, may significantly enhance children's language literacy as well."

Research Into Practice:

Kindermusik@School gives families compelling tools to engage parents and caregivers in building children's early language and literacy as recommended by researchers. Resources for each child include a monthly magazine with fun and literacy-based activities and a story for reading aloud at home, an audio CD filled with multicultural songs and listening activities and the story recorded in English, and every other month, an instrument for playing music. Home resources are available in Spanish to engage families who speak Spanish as a home language.

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