



# Use of Technology and Music to Improve Learning

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**DISCLAIMER:** *This chapter can in no way replicate the original presentation with slide custom animation, transitions, and forty-five music clips in a PowerPoint production. Instead, the content will be covered and expanded tenfold, with a research review and the music recommendations cited, where appropriate. Your reading will be more informative but considerably less entertaining than if you were experiencing the presentation. Enjoy!*

This chapter examines what we know and don't know about music and learning. Specific outcomes and techniques to integrate music into teaching are proffered. Like ancient Gaul, the chapter is divided into five sections:\*

1. Why use music in teaching?
2. Technology tools in the classroom
3. Selecting appropriate music
4. Ten generic techniques for using music in teaching
5. Finale

See you at the finale.

## Why Use Music in Teaching?

When you watch a TV program or movie, your feelings and emotions—such as excitement, anger, laughter, relaxation, love, whimsy, or even boredom—are often triggered or heightened by the music playing behind the action. You are responding to the mood created by the music and the scene. The soundtrack is so powerful that you may download it off the Internet or order the CD from Amazon so that you can listen to it

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\**Sidebar:* Gaul was divided into three parts, you knucklehead! *Oops.*



again and relive the experience. This attraction to soundtracks extends to Broadway musicals and classical, jazz, rhythm and blues, rock, pop, and new-age music concerts as well. So how can teachers use music as an instructional tool in ways that students will want a CD soundtrack of their classes?

## Instructional Outcomes

The entertainment value of music has been demonstrated. The key question here is: Why isn't there a soundtrack to accompany this chapter? That's actually still in production, but that's not the question I was referring to. Instead, What is the learning value of music in the classroom? Here are twenty potential outcomes to ponder:

1. Grab students' attention
2. Focus students' concentration
3. Generate interest in class
4. Create a sense of anticipation
5. Establish a positive atmosphere/environment
6. Energize or relax students for learning exercise
7. Draw on students' imagination
8. Build rapport among students
9. Improve attitudes toward content and learning
10. Build a connection with other students and teacher
11. Increase memory of content/concepts
12. Facilitate the completion of monotonous, repetitive tasks
13. Increase understanding
14. Foster creativity
15. Improve performance on tests and other measures
16. Inspire and motivate students
17. Make learning fun
18. Augment celebration of successes
19. Set an appropriate mood or tone
20. Decrease anxiety and tension on scary topics

After you have finished pondering, consider the theoretical and research evidence related to these outcomes, which is reviewed and critiqued in the following two sections: (a) music and the brain, and (b) the effects of music on learning. This evidence furnishes the foundation not only for



how music can be used as an effective teaching tool but, more important, for music's potential as a legitimate, systematic teaching method for all K–12 teachers.

## Music and the Brain

There are a quadrillion volumes on the topic of the brain, especially the ones that begin with *This Is Your Brain on...* Specifically, the primary interest here is on how music is processed in students' brains to facilitate learning. This review covers: (1) core intelligences of musical/rhythmic and emotional, (2) left and right hemispheres, (3) triune brain, (4) brain-wave frequencies, and (5) music-brain conclusions.

**Core intelligences.** Among Gardner's (Gardner 1983, 1993, 1999, 2005; Gardner and Hatch 1989; Marks-Tarlow 1995; Williams, Blythe, White, Li, Sternberg, and Gardner 1996) 8.5 multiple intelligences, musical/rhythmic is one of the core intelligences in every student's brain. It involves appreciating and recognizing music, composing, keeping time, performing, recognizing rhythm, and singing. Despite the bevy of talentless contestants auditioning on *American Idol* year after year, which seems to seriously challenge Gardner's theory, he is pretty sure that everyone has that intelligence to some extent, it being part of the unique profile of strong and weak intelligences that every student possesses. Neuroscientific research has confirmed the physical difference in the neuronal networks of each student's brain (Zull 2002). Teachers can only work with what each student brings to the classroom.

This "pluralistic view of the mind" permits teachers to think of exposing their students to a wide range of learning strategies. Drawing on from four to six intelligences allows virtually every student to use their strong intelligences as well as to strengthen their weaker ones. Music should be one of those six.

Goleman's (1998) emotional intelligence is also tied to music. (Note: Gardner's intrapersonal and interpersonal intelligences are similar to Goleman's emotional intelligence.) Music elicits emotional reactions of liking or disliking and excitement or arousal (North and Hargreaves 1997; Robazza, Macaluso, and D'Urso 1994). It can be used to communicate with learners at a deeper level of understanding by touching their emotions.

**Left and right hemispheres.** There are separate hemispheres of the brain related to two ways of thinking: verbal and nonverbal (Gazzaniga 1992; Sperry 1973). The left hemisphere is predominately the logical and analytical side, which processes information sequentially, as in mathematics, logic, and language. It is also referred to as the verbal side,



which is structured, factual, controlled, rational, organized, planned, and objective (Miller 1997). In contrast, the right hemisphere is the nonverbal, creative side, which is spontaneous, emotional, disorganized, experimental, empathetic, subjective, intuitive, and in search of relationships. It focuses on art, color, pictures, and music (Jourdain 1997; Polk and Kertesz 1993).

As you might have guessed, the educational system has emphasized the predominance of the left brain. Ergo, the plot of *Mr. Holland's Opus*, in which a high school music program gets cut in favor of more important, basic left brain courses and the athletic program. However, there seems to be an increasing appreciation for what the right brain can contribute to learning. The best news is that music taps both hemispheres. The left side processes rhythm and lyrics; the right side listens for melodies, sounds, and harmonic relationships over time (Bever and Chiarello 1974; Hébert and Peretz 1997; Schlaug et al. 1995). When children study music, the connections between the two hemispheres increase as they age (Schlaug et al. 1995). Clearly, music can be an effective tool for engaging both hemispheres.

**Triune brain.** A cross-section of the brain would reveal that it has three layers: (1) the stem, or *reptilian* brain (5%), which is responsible for such basic functions as breathing, blood pressure, and heartbeat, and determines the nature of sound—its direction, volume, and potential threat; (2) the inner layer, or *limbic* brain (10%), which is the center of our emotions and reacts to music with appropriate emotions and triggers long-term memory; and (3) the outer layer wrapper, or “bark,” called the *neocortex* or *cerebral cortex* brain (85%)—which controls hearing, vision, language, and higher-level functioning, and responds to music intellectually (MacLean 1990). The latter “thinking brain” absorbs the sounds of the reptilian brain and the feelings of the limbic system and organizes them into music. This triune concept facilitates our understanding and creation of music.

**Brain-wave frequencies.** Another aspect of brain functioning is brain-wave frequencies. Among the four types of waves—delta, theta, alpha, and beta—that relate to various levels of consciousness, the alpha and beta have particular implications for music (and for fraternities on most college campuses). Delta waves represent deep sleep, when the waves are least like they are when we are fully awake. Theta waves represent shallow sleep, deep contemplation, and free-flowing creativity, which may be most characteristic of students when the teacher just talks. Alpha waves occur when students are in a relaxed state of awareness, such as after they wake up in class. The right hemisphere is primarily engaged in the alpha state when students are reading, studying, or reflecting. The



emotions are dominant, and the left hemisphere's rationality drops out of sight temporarily. Slow, minor-key music fosters alpha waves. It relaxes the brain, which can be useful when reviewing content so that it passes into long-term memory (Millbower 2000).

Beta waves are the patterns of a fully awake mind, when the left hemisphere kicks into action. This is multitasking mode for the Net Generation, when they are functioning at optimum speed. Fast, up-tempo, major-key music can snap to attention students who are in a drifting alpha or meditative theta state, leaving them super alert and ready for whatever activities the teacher has planned (Millbower 2000).

**Music-brain conclusions.** The value of music as a teaching tool lies in its potential to do the following: (1) tap the core intelligences of musical/rhythmic and emotional (interpersonal and intrapersonal); (2) engage both the left and right hemispheres; (3) appeal to the reptilian, limbic, and neocortex layers of the brain to sense the nature of sounds, react to music emotionally, and appreciate it intellectually; and (4) manipulate students' alpha and beta brain waves to relax or alert them for learning when they're not sleeping in delta- or theta-wave land. It would be a shame not to stir up these intelligences, hemispheres, layers, and waves in the classroom to promote learning. For an opposing perspective on the adequacy of the preceding cognitive neuroscientific findings and their implications for educational practice, see Waterhouse's (2006a, 2006b) critical review of the evidence.

## The Effects of Music on Learning

Beyond what is known about how our brain functions, what research has been conducted specifically to determine whether music has any positive effect on learning, especially with regard to the outcomes listed at the beginning of the chapter? This section reviews the evidence on the following: (1) *Sesame Street*, (2) "Mozart Effect" or not, (3) "active" and "passive" concerts, and (4) music and learning by subject area.

**Sesame Street.** Have you watched the Emmy Award-winning *Sesame Street* recently? If you haven't, shame on you! It is the most effective educational children's program in history, give or take a month. For nearly forty years and more than 4,100 episodes broadcast in 120 countries, *Sesame Street* has used music almost nonstop throughout its programs in segments with live people, muppets, or animation; video clips of people and animals; and even in the extremely popular "Elmo's World." It is a key tool for teaching children basic academic and life skills. The lyrics are chock-full of content to help kids remember numbers, arithmetic, geometric forms, letters, words, cognitive processes, and classification. Catchy melodies and upbeat tempos excite children and



keep their attention while slipping content into their long-term memory. Researchers found that when the music and action stopped—such as in scenes taking place on *Sesame Street* consisting of dialogue between adults—children stopped watching (Fisch and Truglio 2001).

This music-action formula to learning has not been kept secret by the production staff of *Sesame Street*. Yet how many K–12 teachers have taken advantage of these powerful learning effects? The time for waiting is up; the Net Generation demands it. Students today have minimal patience with content requirements and the attention span of goat cheese (Berk 2008). They want everything “now.” These behaviors, however, are by choice. They can spend hours playing video games or participating in other activities in which they are interested (Prensky 2006); they just find most school subjects boring. Unless the content is on their radar screens, they can’t stay with it.

These characteristics of the Net Geners suggest that teachers should consider the music-action formula *Sesame Street* uses for preschoolers. Teachers need to create elementary, middle, and high school student versions of *Sesame Street* in their live, face-to-face classrooms. The application of music will be a start to break the mold of traditional teaching practices.

**“Mozart Effect” or not.** There have been several studies on the effects of instrumental music on spatial-temporal reasoning. Couched within the context of neurophysiological theory (Leng and Shaw 1991), the first study by Rauscher, Shaw, and Ky (1993) found that listening to music and executing spatial tasks share neural pathways in the brain’s cortex. The music serves to prime, or warm up, these neural transmitters for the subsequent execution of spatial reasoning tasks. This finding was referred to as the Mozart Effect, named after Beethoven’s Fifth Symphony, which was used in the study. Wrong! It was a Mozart piano sonata. College students listening to the first movement of Mozart’s Sonata for Two Pianos, K. 448, had a significant but short-lived (10–15 minutes) improvement in spatial reasoning. The researchers followed this up two years later with another study, which produced similar results (Rauscher, Shaw, and Ky 1995).

Rauscher, Shaw, Levine, Wright, Dennis, and Newcomb (1997) then investigated preschoolers who studied piano. They found that those children performed significantly better in spatial and temporal reasoning ability than those who spent the same amount of time learning to use computers. This work was extended by Graziano, Peterson, and Shaw (1999) with 237 second graders who had both piano keyboard training and innovative math software. Those children scored significantly higher on proportional math and fractions than the control group, which had no



piano keyboard training. These results suggest that the spatial-temporal approach can be generalized to teach other math and science concepts.

Three other investigations by Rideout and Laubach (1996), Rideout and Taylor (1997), and Sarnthein, Stein, Rappelsberger, Petsche, Rauscher, and Shaw (1997) confirmed the Mozart Effect findings. The second study replicated the original 1993 study using two different spatial reasoning tasks. The other two were EEG coherence studies, which found that the presence of right frontal and left temporo-parietal activity induced by listening to Mozart carried over into two spatial-temporal tasks.

Others have attempted to replicate the effect with musical pieces from Yanni, whose music has similar properties to Mozart's; minimalist music by Philip Glass; music of the dance group Aqua; and pieces by Albinoni and Schubert. To date, however, there is no published research on the effect using any nonclassical musical selections. The most recent two-part study of the Mozart Effect used an up-tempo Mozart piece and a slow piece by Albinoni (Schellenberg et al. 2007). This research found that Canadian undergraduates performed better on the symbol search subtest after listening to up-tempo Mozart compared to slow Albinoni, and Japanese five-year-olds produced drawings that were more creative, energetic, and technically proficient after singing or hearing familiar children's songs than after hearing Mozart or Albinoni.

Despite many of the above results in support of the Mozart Effect, another series of studies by Stough, Kerkin, Bates, and Mangan (1994); Kenealy and Monseth (1994); Newman, Rosenbach, Burns, Latimer, Matocha, and Vogt (1995); and McKelvie and Low (2002) found no Mozart Effect. The first three studies concluded that a brief listening to classical music does not enhance the spatial problem-solving of college students; the last study found no effect for children with an average age of twelve. In fact, it has been difficult to reproduce the effect experimentally (Rauscher and Hinton 2006; Steele, Ball, and Runk 1997; Steele, Bass, and Crook 1999). No other researchers have been able to replicate the effect in a rigorous control-group study. Furthermore, other researchers have argued that the spatial intelligence increase is nothing more than a shift in the participants' arousal (Steele 2000; Thompson, Schellenberg, and Husain 2001) or their preference for the music (Nantais and Schellenberg 1999).

In order to make sense out of all of this confusion over whether a definitive Mozart Effect exists, Chabris (1999) conducted a meta-analysis of sixteen studies on the effect based on 714 subjects. He found a trivial increase of 1.4 general IQ points for all studies and a 2.1 increase for those that only used spatial intelligence, compared to the 1993 study (Rauscher et al.), which produced an increase of 8–9 points in spatial



intelligence. Hetland (2000) then reviewed every Mozart study to date, with a combined total of 1,014 subjects. She concluded that Mozart listeners outperformed the comparison groups more often than would be expected by chance but with small effects, which could be attributed to gender, ethnicity, musical preference, training, and spatial ability. Most recently, Waterhouse (2006a, 2006b) argued that the use of music in instruction should not be based on the inadequate empirical support from the Mozart Effect studies.

Overall, the research reviews and the bulk of evidence from the foregoing studies attempting to search for a Mozart Effect to boost spatial intelligence indicate *trivial, nonsignificant, and nonreplicable findings* compared to the original study fifteen years ago (Rauscher et al. 1993). What's even more discouraging is the quality of research being conducted. Most of the investigations cited previously by Rauscher, Rideout, and Steele lack an independent control group, which precludes a comparison of scores between listening to Mozart and attempting spatial problems, measured only by the Stanford-Binet spatial subtest. Furthermore, many of the sample sizes were inadequate, and no demographic descriptors of the children or the college students participating in the research were provided, which could be correlates or explanations of IQ score increases.

**“Active” and “passive” concerts.** In the 1960s, Bulgarian psychiatrist Lozanov explored techniques to use music to increase learning and memory. The theories, research, and strategies he developed emerged into what is now known as accelerated learning (Lozanov 1978). The use of background music lies at the foundation of his techniques. Lozanov created two very different but equally effective learning environments, or concerts: active and passive.

An *active concert* activates the learning process mentally, physically, and/or emotionally by playing an up-tempo piece of music and reading or reciting language phrases in time with the music. This has been found to produce high memory retention. An active concert during movement activities can increase productivity, energize students, grab students' attention, and make learning fun.

A *passive concert* involves slower, Baroque-type music to relax the students' alpha brain-wave state and stabilize the students' mental, physical, and/or emotional rhythms to increase information absorption. Students enter into a relaxed state of awareness, opening their minds to incoming information. The music helps them maintain focus and concentration. By tapping into the pleasant emotions of the limbic system, information passes into long-term memory. Lozanov found that students could learn language skills at least four times faster via this approach compared with traditional methods; hence, the term “accelerated learning.” Brewer





(1995) has recommended that background “passive” music can be played while students study, read, or write to increase attention levels, improve retention and memory, extend focused learning time, and expand thinking skills. This music can also be effective during reviews and tests.

Lozanov’s techniques also included other ways to promote a positive learning environment, such as playing music as students enter and leave the classroom and during break times. (This is particularly appropriate for teachers who have a revolving door.) Playing music this way can set the tone or mood for the entire day (Sousou 1997; Stratton and Zalanowski 1994).

**Music and learning by subject area.** Since Lozanov’s work, there has been a growing number of studies related to using music across the K–12 curriculum to increase learning. Based on Lozanov’s research, several studies have examined the effects of background music on writing tasks (Hallam and Godwin 2000), behavior and mathematics performance (Hallum and Price 1998), reading (Brown 1986), memory and reading comprehension (Furnham and Bradley 1997; Mullikin and Henk 1985), and science (Davidson and Powell 1986).

Others have explored how music affects reading and mathematics performance (Gardiner et al. 1996), mathematics skills (Graziano, Peterson, and Shaw, 1999; Vaughn 2000), reading and verbal skills (Douglas and Willatts 1994; Ho, Cheung, and Chan 2003; Lamb and Gregory 1993), reading speed (Miller and Schyb 1989), spelling and phonological skills (Overy 2003), and creativity (Adaman and Blaney 1995; Mohanty and Hejmadi 1992). Butzlaff (2000) conducted a meta-analysis of twenty-four studies of music and reading and concluded that a strong association exists between music and performance on reading/verbal tests.

To date, there is a scarcity of research in all subjects, especially at the middle and high school levels. The evidence accumulated at the preschool and elementary school grades suggests that music used as a systematic teaching tool can have a positive effect on learning reading and mathematics. Further controlled, well-executed studies with adequate sample sizes are still necessary to confirm that suggestion and furnish a body of evidence at the secondary level to justify the pedagogical value of music in a variety of courses.

## **Technology Tools in the Classroom**

Our culture has been flooded with burgeoning technology. It is almost impossible to keep up with all of the amazing products that keep hitting the streets. Among all of the tools currently available, which ones do students use, and which ones have potential for classroom use? The



answers to those questions are examined in the following two sections: (1) tools of the trade for students, and (2) tools for the classroom. Of course, by the time this chapter has been published, the information in those sections will be out-of-date. In fact, it's probably a good idea to rip these pages out of the book and trash them. That's just the nature of the technology beast.

### Tools of the Trade for Students

Today's Net Generation is so sophisticated in terms of technology that they have been branded *digital natives* (Prensky 2006). "Digital" is their native language. They are "native speakers" of the language of computers, video games, and the Internet. As you observe these students, you will notice wires coming out of every part of their body. Attached to those wires are MP3 players, iPods, iPhones or smart phones, PCs, and all the other tools of the digital age (Berk 2008).

That brings us to our first multiple-choice question:

1. What are they doing with all of this equipment?
  - A. Listening to music.
  - B. Playing PC/video games.
  - C. Talking on iPhone.
  - D. Sending e-mails or text messages (TMs).
  - E. Watching videos and/or TV.
  - F. Multitasking on at least 3 of the above.
  - G. Multitasking on all of the above.

Recent estimates indicate that these students spend from 6.5 to 11 hours per day multitasking on the above activities (Jenkins 2006). They live in a complicated remixed, mashed-up, digital, mobile, always-on media environment. The students function at "twitch speed," thanks to their exposure to video games and MTV. They listen to music on their PCs, Macs, iPods, Zunes, Zens, iPhones, RAZRs, and BlackBerrys. Their experience with the technology has enabled them to master complex tasks and make decisions rapidly (Prensky 2006). Classroom exercises need to extend the capabilities they already possess.

In contrast to these digital natives, teachers are referred to as *digital immigrants*. They still have one foot in the past, and "digital" is their second language, which they continue to learn—and sometimes struggle with—on the fly. For example, immigrants may still print out an e-mail, print a document to edit it, or phone someone to see if he or she received their e-mail. Can you believe that? Is that you? I know. Me too.



## **Tools for the Classroom**

This topic is almost a no-brainer given what students can do with the technology. For small-group or class-size activities, music can be played on a CD player or boom box or PC with portable speakers, or an iPod or MP3 player can be inserted into a speaker system. On a more sophisticated level, music clips can be inserted into PowerPoint slides on a PC or Mac, with audio output from the sound system in the room—if a teacher gets very lucky. There are a variety of configurations; if a teacher runs into difficulty, his or her students will be able to find a way to play the music.

## **Selecting Appropriate Music**

Choosing music for classroom use involves several issues. This section provides guidelines for teachers in the following areas: (1) criteria for selection, (2) types of music, and (3) sources for selecting music. After this section, it'll be time to consider ten techniques for integrating music into teaching.

### **Criteria for Selection**

The lyrics of some of the pop music to which children are listening, especially hip-hop and rap, are out of control in terms of inappropriate language and offensive content. If music is going to be used as a teaching tool, criteria must be established for what is appropriate and acceptable in a teaching-learning context. Each teacher should set his or her own standards for music, just as standards may have already been set for other types of classroom behaviors, such as offensive humor (Berk 2002, 2003), inappropriate or disparaging comments, and issues of civility.

There are two sets of criteria that must be considered: (1) the students' characteristics, and (2) the offensiveness of the lyrics. The first set of criteria relates to salient sociodemographic characteristics: age or grade level, gender, ethnicity, and language-dominance. Teachers know their students, and these characteristics are a must consideration in choosing the right music. The second set of criteria concerns the possible offensiveness of the lyrics: profanity; obscenity; put-downs or ridicule of females, racial and ethnic groups, professions, politicians, and celebrities; and other offensive content.

Clear standards for "acceptable" music should be delineated. The music is being used to facilitate learning, not impede it. A student who is offended by a music clip will withdraw, turn off, and harbor anger, which are emotions hardly appropriate for learning. What is interpreted as offensive is a very personal decision by each student based on his or



her own values, beliefs, and principles. The teacher should make every effort to reject any lyrics that are even borderline or potentially offensive. The pool of available music is so large that picking the right stuff should not be a problem. If it is a problem, the instructor should seek counsel from colleagues who would be sensitive to such issues.

## Types of Music

There are a variety of music types that can be used in the classroom. The actual choice will depend on the characteristics of the students and their interests. The sources identified in the next section will suggest methods for obtaining that information. In the meantime, here is a shopping list to keep in mind: (1) classical; (2) early romantic; (3) late romantic; (4) twentieth century; (5) TV, movie, and Broadway soundtracks; (6) pop (e.g., Top 40, country, easy listening, rap, hip-hop, rock, rhythm and blues); (7) jazz; and (8) new age (Millbower 2000). Other factors to consider—such as emotional effects, visual imagery, and instrumental versus lyrics—are briefly discussed next.

**Emotional effects.** All of these types can evoke or induce anger, excitement, activity, motivation, love, laughter, whimsy, tears, dreams, calmness, relaxation, sleep, and a coma. Music can have powerful emotional effects. Teachers need to decide the effect they want to produce in a given learning situation. Applied inappropriately, the music can distract and decrease learning, even incite students to riot. Unless rioting is a specific learning outcome, teachers should be very discerning in their choices.

**Visual imagery.** The emotional arousal evoked by music may also be accompanied by visual imagery. There is an individualized jukebox full of memories inside every one of us. Hearing a piece of music automatically brings those special memories into focus like a photograph (digital, of course). Hearing the music alone triggers a response similar to what has been called a “flashbulb memory” (Brown and Kulik 1977; Sierra and Berrios 1999; Winograd and Neisser 1992).

Music serves as a retrieval cue for those personal memories. When the teacher presses the “play” button, the students’ mental picture buttons are pressed into action. Snapshot images suddenly pop into their minds. These images may provide recollections of any of the following: (a) the person performing the song or composition; (b) the person with whom the student associates a scene from a particular TV program, movie, or musical; (c) the person with whom the student heard it; or (d) the time and place where the student heard it. Other details may be recalled as well. All of this occurs in a nanosecond. This image creates feelings, emotions, and moods related to that previous experience. They may be



positive (joyous, romantic, humorous) or negative (anxious, discomfoting, very painful). Teachers need to be sensitive to the possible negative effects of music that some students might exhibit and handle them appropriately. This is essentially music-induced nostalgia, for better or worse.

**Instrumental vs. lyrics.** The form of music used in the studies cited previously was predominantly classical. It served as the background to reading, mathematics, and other activities. The slow-tempo selections set a classroom mood and tone that transcended cognitive learning blocks that students' may have experienced. It reached into deeper alpha-wave states to relax students and create a nonthreatening, safe environment to absorb information into long-term memory and foster creativity (Millbower 2000). The fast-tempo pieces snapped their minds to attention and maintained it in betaland. In all of these applications of music, it is the right hemisphere that is called into action. The instrumental selections can be played before class and throughout the day to systematically orchestrate learning activities. The specific techniques will be described shortly.

When music with lyrics is introduced, both hemispheres and the interaction between them are engaged with even greater learning potential than with instrumentals alone. Lyrics add to the familiarity of the music, its meaning and depth, and its overall impact. They can increase memory by association with the content or they can be rewritten to become the content itself. Words synchronized with music are easier to learn than words by themselves. Have you ever sung songs in school (or privately in your own room or shower) to help remember material you were taught? I bet it helped.

When choosing music for class, the specific outcome to be achieved should guide that choice. There are twenty outcomes listed at the beginning of this chapter. For each outcome and technique for using the music, two key questions must be addressed: (1) Do the students need to identify the title of the song for it to work? and (2) How do the lyrics match the content? For some outcomes, the title of an instrumental selection may not be pertinent, such as in the classical pieces referred to in the research. In other cases, it is essential for the song's value to be realized; all students must recognize the song title to make the intended connection with the context.

When lyrics are included, they must relate to the content and context within which they are played; otherwise, they may come across as pointless. Teachers may observe a lot of puzzled looks on the students' faces. Songs with lyrics are obviously more restrictive than instrumental music. The lyrics must have an instructional point. An alternative method



is to write new lyrics derived from the actual content. That strategy can be a powerful learning tool. The title of a song with or without lyrics can also be changed to put a relevant spin on the song. The new title alone can have a significant impact on learning and memory.

### Sources for Selecting Music

Music selected for classes across the K–12 curriculum is not the same as music chosen for a school’s music program. The purposes are very different. Music for the former consists of clips with which most if not all students in the class should be familiar; in the case of the latter, the intent is usually to acquaint students with music forms with which they are most likely unfamiliar. The sections that follow cover published sources and Web sites, identification of music in the students’ world, formal student surveys, and CD versus Internet.

**Published sources and Web sites.** There are several music sources that provide inventories of various types of music for classroom teachers. These sources include books by Andersen, Marsh, and Harvey (1999), Brewer (1995, 2007), Brewer and Campbell (1992), Campbell (1992, 1997, 2000), and Millbower (2000). The Brewer and Millbower books even match the musical selections to the recommended methods for using them. Furthermore, there is a Web site called “Songs for Teaching: Using Music to Promote Learning” (<http://www.songsforteaching.com>), which contains thousands of pages of lyrics, sound clips, CDs, and downloads of music, cataloged by educational subject and grade level, along with teaching tips, songbooks, and sheet music. Also, see Berk (2002) for other Internet sources.

**Identification of music in the students’ world.** Despite all of these available sources, the primary underpinning for the music techniques that follow shortly is to pick music the students recognize, with which they are familiar and in which they have an interest. Therein lies the connection between their world and the content teachers need to cover. Teachers are not teaching them new music. The aforementioned books do not consider that criterion for the music that is included.

Where does one find music in the students’ world? The answer to that question leads us to our second multiple-choice item:

2. What is the most appropriate source from which to select music for class?
  - A. *TV program theme* music based on Nielsen Media Research survey results for the specific age group
  - B. *Movie* music based on cult classics, Oscar winners, and most recent and popular flicks



- C. *Pop* music based on Top 40, including hip-hop, rap (Be Careful!), and R & B
- D. *Broadway* music based on shows performed in schools and *High School Musical*, *High School Musical 2*, and *Camp*
- E. Informal and formal student surveys of what music they prefer
- F. All of the above

**Formal student surveys.** Let's chat about choice E for a few sentences. This choice means that teachers should ask their students. Talk to them at every opportunity to find out the latest and most popular music to which they are listening. Furthermore, teachers should conduct formal surveys of their students at the beginning of the first class in the fall and spring semesters, which will furnish a wealth of music information. Each one can be completed in less than ten minutes. Here are eight steps to follow:

1. Pass out two 3" x 5" cards to each student.
2. Have students number each side of each card in the upper right corner with 1, 2, 3, 4, and 5. (Kidding about 5. A little index-card humor.)
3. On side 1, have them list their *three favorite TV programs*.
4. On side 2, have them list their *three favorite movies* seen over the past 3–6 months.
5. On side 3, have them list their *three favorite Broadway shows*.
6. On side 4, have them list their *three favorite pop songs*.
7. Have students pass the 1-2 card to the right and the 3-4 card to the left.
8. Collect all of the cards. (Of course, they will be all mixed up in the wrong piles.)

Now the teacher can collate, compile, categorize, compute, and identify the music to which their students are listening. He or she should take side one and create a frequency distribution of the top ten TV programs the students are watching. A distribution should then be computed for each of the other three sides. Those distributions will yield four top-ten lists that can serve as the pool of music from which clips can be extracted for the entire semester. That pool provides sources from which the teacher can draw TV music themes, hit music from movies and Broadway shows, and pop music with which most of the students will be familiar. That's more than forty different music sources. This is probably the *most accurate inventory of musical selections* a teacher can use.



**CD vs. Internet.** There are two principal sources from which to obtain music: original CDs or the Internet. There are several factors to consider in using these sources. If the music needs to be extracted and converted to a format compatible with Microsoft's PowerPoint (PP), the Internet may already have the converted version; otherwise, the teacher will have to do the extracting and conversion with specific software, such as Sony Sound Forge Audio Studio 8 or 9, unless he or she has a Mac. Other factors include the following:

<b>Factor</b>	<b>CD</b>	<b>Internet</b>
<i>Cost</i>	Expensive	Free or cheap
<i>Quality</i>	High	Good–High
<i>Format</i>	Not PP compatible	Some PP compatible
<i>Most recent music availability</i>	Very good	Very good
<i>Related music</i>	Excellent	Not available

## Ten Generic Techniques for Using Music in Teaching

There are several resources to consider for specific methods of using music in the classroom and examples of music for those methods. Books by Brewer (1995, 2007), Brewer and Campbell (1992), Campbell (1992), and Millbower (2000) are very useful starting points, and were mentioned previously as sources of music. The music lists are extremely helpful to guide the choice of appropriate music for the method and intended outcome.

Since a teacher's choice of music and specific techniques for using it are contingent on the students' characteristics and musical interests as well as the content to which they are applied, the methods described here are somewhat different than those in the references cited above. The history for the development of those techniques is also very different. Over the past decade, I developed a bunch of methods for incorporating music into one of the most universally hated subjects on this planet: statistics. Just saying the name of the subject conjures up the sound of the "shower" music from *Psycho* along with mental images of the butcher knife and curtain. On the first class of the semester, my students are usually thinking, "Why don't you just kill me now?"

As the foregoing sections revealed, music can be a powerful teaching tool, but it has an untapped potential. Classroom practices using music in a wide range of subjects and courses have to be implemented and tested. The paucity of research evidence cited previously is inadequate to argue wholeheartedly for the positive instructional effects of music, Mozart or





otherwise, but maybe we can argue halfheartedly. This is a nontrivial challenge for teachers in order to meet the needs of the Net Geners in their world of music.

The ten generic strategies described next are derived from ten years of practice and research on their effectiveness (Berk 2001, 2002). Two studies were conducted: (1) a survey of 385 students in two undergraduate and five graduate statistics courses over two and a half years was administered to evaluate forty musical selections, and (2) a survey of 232 students in one undergraduate and three graduate courses was distributed to determine whether twelve music pieces in combination with class demonstrations helped students learn the material.

The first survey requested the students to rate the effectiveness of the music to (1) grab their attention and focus, (2) increase their interest in the topic, (3) relax or reduce their anxiety/stress on the topic, and (4) make learning the topic fun. The median ratings for the music were “Extremely Effective” or “Very Effective” for all four outcomes. According to the students, the music significantly increased their level of engagement, helped them relax or reduce anxiety, and made learning fun.

The second survey asked students to weigh in on the music-demonstrations’ ability to (1) facilitate their understanding of the statistic, (2) help them remember the statistical concept or process, and (3) help them learn the statistic when they applied it. The research reviewed in earlier sections also examined understanding and memory, although this design was a self-report rather than experimental. Here the students’ median ratings for all twelve selections were “Very Effective.” Overall, 86 percent or more of each class felt the music-demos improved their understanding, memory, and learning of the statistics.

Based on these studies, the ten highest-rated strategies for using music in teaching are presented here. They are applicable to any subject matter and grade level. Hopefully, future research on their effectiveness in K–12 classrooms will furnish evidence of their usefulness as teaching tools.

### **I. Prelude to Class and Class Opening Tune-Ups**

As students are settling in with their backpacks, coats, and snowshoes and the teacher is preparing for class, background music can be played to set the tone and mood for the day. It can be up- or slow-tempo, depending on the day and the desired effect. It should be played for 1.5 to 5 minutes. The music provides a break in the typical “chatter” noise that occurs as students settle down. It also permits them to check their mental baggage at the door, unwind, relax, or get an emotional boost before class begins.



When the music stops, class begins. Students should be told that that is the cue to end talking and shift gears into learning mode. (*Note:* In the elementary grades, this strategy may be repeated every time the students enter the room from lunch, recess, physical education, or field trips to New York to see *Mary Poppins*.)

Once students are ready, different music may be used to begin the day. For example, the recording of the first violin revving up an orchestra to open a show or concert can be played. This can be followed by a PowerPoint slide of a curtain being raised (transition “uncover” up) to the up-tempo “Everything’s Coming Up Roses” or “That’s Entertainment,” which will engage all of their hemispheres in the room.

## 2. Opening Day Blockbusters

At the beginning of the school year or semester or after a long holiday break or the teacher’s sabbatical, an opening blockbuster should be prepared. The first class, in particular, is critical. From a student’s perspective, it can be the forecast of a smash hit or a flop year. It is their first face-to-face impression of the teacher, the content, how he or she teaches, course requirements, expectations, and clothing styles, which are frequently highly predictive of the rest of the year. Since the students do not expect any fireworks, any effort to jump-start their minds and hearts for learning will be appreciated. The blockbuster is also an effective strategy to reduce anxiety, stress, and tension in subject areas that students absolutely dread.

One type of blockbuster is a parody of a popular TV program, movie, or Broadway show with which all of the students are familiar. A parody has both music and humor to which the students can relate. If the parody can be linked to the content in some way, it will be even more meaningful. A well-written and executed parody is a powerful method to kick off anything. Although it may require only a minute of class time to present, the impact can be memorable and perhaps unforgettable. Here are a few thoughts:

*Gourd of the Dance: A Halloween Treat*

*Harry Potter Gets Lasik*

*Indiana Jones and His Angioplasty*

*Meal or No Meal*

*Mission: Improbable*

*Phantom of the Opera Meets Jack Bauer*

*Card Bored: The Net Generation*



Students watch parodies regularly on TV, on YouTube, and in the movies. Teachers should make every effort to involve students in the planning and execution of the production, which is limited only by the teacher’s imagination and creativity. The teacher is the writer, director, and choreographer, as well as the scene, lighting, sound, and costume designer (Berk 2002). It’s all in the preparation. The TV programs, movies, and Broadway shows from a teacher’s top-ten student survey are fair game for class parodies. Instructors can get ideas from the following lists of parodies. Most of the TV programs are on Comedy Central and many of the movies are cult classics.

<b>TV Programs</b>	<b>Movies</b>	<b>Broadway Musicals</b>
<i>The Daily Show</i>	<i>Scary Movie I-IV</i>	<i>The Producers</i>
<i>The Colbert Report</i>	<i>Austin Powers</i>	<i>Young Frankenstein</i>
<i>Reno 911!</i>	<i>Airplane!</i>	<i>Spamalot</i>
<i>MAD TV</i>	<i>Scream I-IV</i>	<i>Avenue Q</i>
<i>SNL</i>	<i>Fatal Instinct</i>	<i>Forbidden Broadway</i>
<i>Chappelle’s Show</i>	<i>Not Another Teen Movie</i>	
<i>Mind of Mencia</i>	<i>Young Frankenstein</i>	
<i>South Park</i>	<i>The Producers</i>	
<i>Scrubs</i>	<i>Blazing Saddles</i>	
<i>youtube.com</i>	<i>Monty Python and the Holy Grail</i>	

### 3. Topic Introductions

One of the most attention-grabbing, tone-setting, anxiety-reducing strategies to segue from one topic to the next is to play music with a topic slide. The music can be instrumental or with lyrics, but must be related to the content of the topic. Here are a few instrumental examples from our world:

<b>Topic</b>	<b>Music</b>
<i>Mathterpiece Theatre:</i> LOOOOONG DIVISION	Theme from <i>Masterpiece Theatre</i>
Law 101: “Make My Day!”	Theme from <i>Law &amp; Order</i>
Korean War	Theme from <i>M*A*S*H</i>
Writing a Coherent Paragraph: Just When You Thought It Was Safe to Go to English!	Theme from <i>Jaws</i>
Today’s class is brought to you by the no. 15 and the letter M	Theme from <i>Sesame Street</i>



Music with a topic slide is the simplest method to incorporate music for a topic introduction. Costumes and props can also be added, such as a smoking jacket and a calabash pipe for *Masterpiece Theatre*, to exaggerate the effect as the music is playing. Four other strategies are the parody mentioned above and content grabbers, class demonstrations, and collaborative learning productions described in techniques 4, 5, and 6, respectively. These theatrical alternatives draw on at least four intelligences, in addition to musical/rhythmic, and can serve as the anchor for how the topic is subsequently covered. The next three sections will suggest a few ideas with examples of how they can be executed.

#### 4. Content Grabbers

Carrying the preceding technique one step further, music can be integrated into the content material being covered, which will be totally unexpected. The right music can pump life into the most boring content. Teachers should not stop with the topic introduction, but build on that music to add other selections as the content is being revealed. They should search for every content nook and cranny to insert up-tempo music. Costumes and props can also accompany this music to provide a visual treat to dramatize the effect. This will keep the students' attention, interest, motivation, engagement, concentration, and emotions in the content rather than drifting elsewhere. Here are a few suggestions with music from our world:

##### **Content**

Relationships

Support Networks

Classroom "Survivor":

The Good, the Bad, and

It Could Get Ugly!

The Heart

##### **Music**

Theme from *The Odd Couple*

"You've Gotta Have Friends"

Theme from *The Good, the Bad, and the Ugly*

"Simply Irresistible"

#### 5. Introductions to Class Demonstrations

A visual demonstration of a concept, theory, or process can be a powerful vehicle for learning. It requires students to see the process, solve the problem, or critique the encounter. Students will use higher-order thinking skills plus verbal, quantitative, visual/spatial, bodily/kinesthetic, intrapersonal, and interpersonal intelligences, depending on the demonstration. When the "Not-Ready-for-Classtime Players" are called into duty, the demonstration becomes instructional CPR or a defibrillator to resuscitate a dead topic or pump life into boring content.



The demonstration involves transforming a verbal or quantitative concept or process into a visual image. The techniques a teacher can use borrow heavily from the experience and craft of theater (Diamond and Christensen 2005; Millbower 2003; Patterson, McKenna-Cook, and Swick 2006; Spolin 1986; Timpson et al. 1997). Imagine what it would be like to sit in the students' seats and see through their eyeballs how their classmates act out an equation, a poem, or a chemical reaction.

“So where’s the music and musical/rhythmic intelligence?” Wait. It’s coming. The effectiveness of the demonstration hinges on the students’ level of engagement. There are four stages to maximize that engagement: (1) pre-demo setup, (2) grabbing the students’ attention, (3) seeing or walking through the demo, and (4) post-demo Q & A follow-up. Let’s focus on stage 2. The other stages with examples are described elsewhere (Berk 2001, 2002).

Stage 2 involves the music, which serves as the hook to grab the students’ attention and prime their minds, cognitively and emotionally, for the demonstration. Both hemispheres are engaged. When the music stops playing, the students should be on the edge of their seats in anticipation of the demo.

Here’s the procedure:

1. Preselect one or two groups each of 4–6 students by gender a few classes before the demo is scheduled. The groups should be equal in size.
2. Tell the students exactly what will happen: The girls will be asked to line up in the back of the room and start walking to the front when the music begins. They will line up across the front; then the boys will do the same. That’s it.
3. On the day of the demo, the class is given a serious setup for the demo (stage 1).
4. The first group of students is told to “Get ready.” The girls go to the back and line up. The music begins and they walk to the front.
5. Say: “Where are my boys? Get ready.” The music begins and they walk to the front.



So what's the big deal? The MUSIC! Here are a few music choices:

### **Boys**

“Bad Boys” (Theme from *Cops*)  
 “Gonna Fly Now” (Theme from *Rocky*)  
 “Bad” (Michael Jackson)  
 “Born to Be Wild” (*Steppenwolf*)  
 “Law & Order” (Theme)  
 “Stayin’ Alive” (*Saturday Night Fever*)

### **Girls**

“What a Feeling” (*Flashdance*)  
 “She’s a Lady” (Tom Jones)  
 “I Enjoy Being a Girl”  
 (*Flower Drum Song*)  
 “Friends” (Bette Midler)  
 “All That Jazz” (*Chicago*)  
 “Dreamgirls” (*Dreamgirls*)

Think about those songs for a moment, all of which are played with lyrics except “Gonna Fly Now” and “Law & Order.” Remember, this musical event occurs in English, mathematics, science, history, and every other subject where it doesn’t belong. What happens is totally unpredictable. As the students walk to the front, they may dance, box, use hand and arm gestures, or mimic the lyrics. Anything’s possible. Sometimes costumes, such as hooded sweatshirts for Rocky or white gloves for “All That Jazz,” may be used to exaggerate the effect.

The music and the students’ antics become the punchline. It is unexpected by the class. The students erupt with laughter. It takes about 15 seconds for each group to get to the front of the room. Sometimes they’ll end with a hilarious group pose. Those 30 seconds create an amazing effect, one which the students will long remember.

When the music stops and everyone settles down, the attention of the class is riveted on the visual demo. What a powerful supercharged opening this music can create, instead of students just walking to the front of the room.

Despite the preparation involved behind the scenes to create the demonstration, the execution by the teacher consists of just pressing the “play” and “stop” buttons on whatever player is being used. The element of surprise is also an essential ingredient in the success of the demonstration. The class never knows when the next one will occur. The students involved in the demonstration are sworn to secrecy. If the demos are sprinkled throughout an entire semester, usually above-average attendance can be ensured. Intermittent reinforcement does work. If a student misses a demo on an important concept or process, there will be no repeat performance.



## 6. Insertions into Collaborative Learning Productions

Once the teacher presents a parody or demonstration that involves groups of students, it's time for him or her to take one step back and assign students the creation of the production. Based on a basic theater model applied to collaborative learning, groups of five students can be given different concepts or processes to role-play the following:

1. *Director*: guides everyone to focus on a content principle, concept, or process to develop a skit/parody/demonstration with or without a script
2. *Designer*: creates scenery, costumes, props, lighting, sound, music, videos, and games
3. *Technician*: determines equipment, tools, and resources to execute skit/parody/demo
4. *Writer*: prepares script, if required, and sequence of steps to execute skit/parody/demo
5. *Actor(s)*: perform skit/parody/demo

This production team will flesh out the visual image it wants to create using the following teaching tools: music, videos, sound effects, games, props, costumes, lighting, sets, and movement. The demonstration can be scripted or unscripted following the rules of improvisation (Berk and Trieber, in press; James and Williams 1981; Newton 1998). A maximum time limit should be imposed. A 10-minute block is usually adequate. When the final product is performed to illustrate a principle, concept, or process, it will be an unforgettable experience for the team, the performers, and the entire class.

This collaborative learning activity matches the technology-savvy, kinesthetic, experiential, participatory, team-oriented characteristics of the Net Geners and their cultural world (Berk 2008; Prensky 2006). Moreover, it instructionally draws on at least five of their multiple intelligences; their leadership, artistic, technical, and musical gifts; and their learning styles, while fostering deep learning.

The teacher should meet with each group to monitor ideas and progress. Most of the work should be done outside of class. He or she can also make suggestions or assist with technical support, such as the music and videos, or the students can produce their own. Similar to the class demonstration directed by the teacher, this student production engages everyone in the preparation and possibly everyone in the live performance. Here the music is only one requirement. The choice of music and videos must be approved by the teacher.



## 7. Class Activity Background Interludes

Anytime students are requested to write or type an assignment in class requiring anywhere from 30 seconds to 3 minutes, the time frame presents another opportunity for music. What happens when students are writing answers to one or two questions, writing a minute paper on the three most important points just covered, or solving a problem or case? What do you hear? NOTHING! Dead silence. It's like morgue time on *CSI*.

Background music can be played to help students relax and drift into alphaland or to produce a chuckle or two in betaworld. The music chosen is critical. The goal is not to distract but to facilitate the activity so that students are more insightful, reflective, accurate, and creative in their responses than they would be without the music. Low-tempo selections might include classical music or "The Rainbow Connection" (*The Muppet Movie*); up-tempo, chuckle-inducing music could be themes from *Jeopardy!*, *Sesame Street*, and other favorite TV shows. The music should be related to the activity and timed with the length of the activity. When the 3-minute music piece is over, the work stops and papers are collected. This use of music should be planned carefully and implemented occasionally with the element of surprise, similar to all of the preceding techniques.

## 8. Test Reviews with Games

There are so many games, but so little time. Students love games, especially video games. I'm not sure teachers can produce video games in class, although some students probably can (see Prensky 2006). Popular TV games, however, are a real possibility. The games can be used to teach material and review content for a test. The music theme and game-background slides available on the Internet make it even more authentic and exciting to play than a board game.

The most widely used games adapted to teaching are *Deal or No Deal*, *Who Wants to Be a Millionaire*, *Hollywood Squares*, and *Jeopardy!* The template slides allow teachers to supply their own content (see <http://qbx6.ltu.edu/natsci/games.shtml>). Other games can also be used, but the identifiable theme music is a must to provide an instant connection with students.

## 9. Postreview Pep Rally

After conducting a test review, the teacher should hold a pep rally in or out of the classroom to get students pumped up and motivated to do their best on the test, just like it was the day before a football or basketball game. Why should sports events get all of the attention and hype? Why not academic events like tests and projects?





Once the review is completed and before the students leave, the teacher should ask if there are any remaining questions. He or she should then give a few words of encouragement, make the expectations clear for the test performance, and offer up “We Are the Champions” (Queen), “We Will Rock You” (Queen), “Hakuna Matata” (*Lion King*), the high school football fight song, or some other up-tempo, appropriate music. Students should depart with the proper supportive tone and the feeling that the teacher really cares about their performance. In this application, the teacher creates the context; the music sets the tone.

### 10. Posttest Pick-Me-Ups

After test or project results have been posted or handed back to students, the teacher should comment on the class’s performance, placing each score or grade in the context of the rest of the assessments. If some of the students are disappointed with their performance, the teacher should tell them: “Think about the words to this song” (and press “play”). Here are a few suggestions:

“Tomorrow” (*Annie*)

“Don’t Worry, Be Happy” (Bobby McFerrin)

“What a Wonderful World” (Louis Armstrong)

“Happiness” (*You’re a Good Man, Charlie Brown*)

The above selections always produce a few smiles. The music says something positive to all students—especially to those who didn’t do as well as they had expected. It can change the tone and attitude of students faster than anything the teacher could possibly say, except maybe “That F doesn’t count.”

### Finale

This chapter was designed to acquaint you with the potential value and uses of music across the K–12 curriculum. Music is a virtually untapped resource for teaching the Net Generation and for drawing on their multiple intelligences to increase the success of every student. Its learning potential was expressed as twenty instructional outcomes at the outset and ten specific techniques at the end. The material in between those anchors was mostly research filler. The theory and research on the brain and music and learning were reviewed and critiqued. The research on music and learning was more encouraging than informative. The results accumulated so far are merely suggestive rather than conclusive. A considerable amount of research evidence needs to be collected in all subjects and grade levels.



The technology requirements and the sources for selecting appropriate music were also described. However, when applying the Olympic judging criteria of “technical merit” and “artistic impression” to the instructional uses of music, it seemed that the technical aspects were the easiest to implement. It’s the artistic side that is the most challenging; the effectiveness of the music depends on the teacher’s creativity, imagination, and artistic gifts, which will inevitably make the greatest difference in the classroom. Those gifts, moreover, must be accompanied by systematic planning and preparation, which is very time consuming.

I challenge all teachers to seriously consider the ideas presented in the foregoing pages along with the lists of available resources for music to add a dimension to their teaching that will change their classroom approach forever. Once they incorporate music into all that they do, their view of teaching and their students will never be the same. In the years to come, maybe students will request CD soundtracks of their classes to download onto their iPods, iPhones, and MP3 players rather than the movies they’ve watched. Then they can play and relive those magical teaching moments with music. Wouldn’t that be a shift?

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