

Using Music Technology in the Classroom

By Dr. Kirk Kassner



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What do Harry Houdini, Harry Potter and music technology have in common? All perform such fantastic feats that they appear to be magic. About his fanciful book on Santa Claus, Gregory Mone (2009) explains: "Santa uses tools that are hundreds of years beyond what we have at our disposal. As a result, it does seem like magic, but it's really all science and technology." As a music teacher, I often wished for a magic wand or spell to help my students learn more easily, quickly and completely. My wish was granted when I discovered technology for music education.

Technology is the magic that can solve many common problems. All music teachers struggle with chronic shortages of time:

- ◆ time in the overall schedule sufficient to teach a well-rounded music curriculum
- ◆ time for individual and small-group instruction
- ◆ time for individual student assessment
- ◆ time for delivering and pacing instruction with a variety of differently abled students
- ◆ time for involving children meaningfully in all nine areas of MENC's National Standards
- ◆ time for motivating our students and helping them achieve high standards.

We know some students need extra time to learn music concepts and skills, and others need to be stimulated with more advanced and challenging tasks. How can we be all things to all students? Besides using a magic time-expander or cloning ourselves (neither of which are currently available), where can music teachers get help? Maybe the district will reduce class sizes and hire assistants for us? Yeah, right! How about a group of highly trained, faithfully attending, constantly upbeat volunteers who come in whenever we need them? Dream on! How about technology? Now there's some real magic: magic that is available right now and waiting to be used.



Case Study 1

Kevin was one of my students having difficulty remembering the names of pitches on the treble staff (National Standard 5) until he went through lesson 10 of Music Ace Maestro and played the accompanying games. The wacky cartoon character, Maestro Max, humorously engaged Kevin in learning of pitch names, gave him opportunities to interact with new information each step of the way and periodically tested his new knowledge with frequent hands-on note-naming tasks. When he did some tasks incorrectly, Maestro Max patiently offered kindly, low-key correction and presented new problems, then rewarded him with praise as if he had completed each task without error. Following the lesson, Kevin chose to play the games over and over, trying to improve his scores and, in the process, became an excellent note reader. In addition, because the computer sounded the correct pitch of each note as it was presented on the staff, Kevin effortlessly learned to associate staff position with its corresponding aural pitch. His newfound self-confidence showed radiantly in his face: He could read music now! Just like magic!

Case Study 2

I had seen similar remarkable success in developing listening skills with second grade music students using the Making Music computer program. The children begged to play Making Music every class, and almost all could identify musical phrases that were either identical, higher in pitch, lower in pitch, in retrograde or in inversion (*National Standard 6*). Throughout the rest of the year, Making Music had a spectacular ripple effect on the children's ability to remember motives and melodies when listening to and analyzing music. Their compositions were using more interesting melodies and compositional devices as well. The children seemed to have moved beyond the experimental stage of sound exploration to a stage of intentional design (*National Standard 4*). The school librarian reported that the music software I had placed in the library was the one most often checked out by students for use in free time and at home. Several children reported receiving music software gifts for their birthdays or downloading software from the Internet. They were continuing to expand their music skills at home. Learning music was no longer confined to the music schedule or the music room. The magic of technology expanded time, space and music learning with little or no adult supervision.

Why Use Music Technology in the Classroom?

There are many reasons to use technology in the classroom. Three important ones include: 1) its ability to expand instructional time; 2) to engage students in meaningful, directed instruction; and 3) to allow each student to work at his or her own pace. Technology is able to effect such amazing accomplishments due to the thoughtful pedagogy embodied within well-written software. Good programs mimic good human teachers by introducing concepts and skills in a logical, understandable sequence of small steps. They provide stimulating music problems, frequent checks for student understanding, meaningful and useful feedback and added exercises to reinforce new skills and concepts. Programs, such as Music Ace Maestro, monitor student answers and move forward when students consistently respond correctly, or loop back for more instruction when students respond incorrectly. All the while providing interesting audiovisual stimulation, verbal encouragement, and positive feedback. For example, Maestro Max of Music Ace Maestro is consistently patient, assuring, helpful and funny (even when some students need the concepts explained several times). Maestro Max always responds with positive messages no matter how many times students need to go through the guided practice and understanding-check sections. I wish I could be "on" as consistently and patiently as Maestro Max.

What Technology is Available for Music Education?

The integration of technology and teaching music has been astounding. Twenty-five years ago, music education technology was limited to a few dozen programs that were basically "drill and skill"—electronic flash cards with low-quality graphics and sound focused more on testing than teaching. Over the years, many more programs of higher quality were developed to assist learning in all aspects of music education.

In addition to tutorial types of programs, open architecture programs, such as music printing programs and music sequencing programs (Finale, Sibelius, Band-in-a-Box, etc.), expand students' abilities to think in musical sound and construct musical compositions without the need to know the complexities of tonal harmony and standard western notation. Sequencing and printing programs eliminate traditional barriers to music composition by giving students tools to transform their ideas into actual sound, listen to their creations, self-critique and revise as desired (*National Standard 4*).

Today, thousands of programs are available to help people learn music. Most music educators who attended college after 1990 have some level of technology skills and have been exposed to instructional software, but may not be aware of the huge gamut of programs now available. A short sample of packaged programs and websites has been arranged below according to their usefulness in teaching each of the MENC National Standards. This is by no means a complete list!

Teachers can find music education software through local music retail stores, catalogue companies and on-line sources, such as Amazon.com. More may be found by doing an Internet search using “music education technology” with your favorite search engine. Most of these programs work best with elementary and middle school students, but some are useful for pre-schoolers, high school students and even students at the college-level. Music Ace Maestro, for example, is very effective for remedial learning with high school vocal and percussion students and has been used as an assessment tool for freshmen entering college.



How Can Music Teachers Use Technology in their Curricula?

To use technology most successfully, teachers need to make a paradigm shift — a new way of thinking about music learning and music instruction, as described in the following table.

Using technology allows for student differences in background, motivation, aptitude and learning rate. Many strategies have been developed for organizing and integrating technology instruction into typical elementary general music settings, and each is useful for meeting specific needs. Some teachers send individuals or small groups of students to the media center or computer lab to graze randomly in whatever programs interest them at the moment. Other teachers have developed more directed and integrated sequences using individualized or cooperative learning settings. Some important pedagogical principles must be considered when designing strategies for using technology and will be discussed in detail.

Decide Who Will Use Which Technology

Different types of programs satisfy different needs. Research shows that high-ability students prefer technology that allows them to be creative and are least likely to enjoy and learn from highly structured drill programs. On the other hand, low-ability students are the most likely to enjoy and learn from drill programs. Drill programs also can be especially effective when used by learners who have not yet acquired good study habits. Highly structured instruction seems to be especially effective at the elementary school level and less so as students grow older.

Technology can be used for entire classrooms to introduce or reinforce musical skills and concepts. Network systems can be used to serve many computers and hundreds of students. Effective instruction can be provided by having all students in the class take turns running a program on a single computer (see Kassner, 2000). Tutorial programs, videodiscs and CD-ROMs work well in whole group situations, much like a film or videotape resource, except students have more control and interact more with computers. For example, the program Peter and the Wolf can be projected on a large screen instead of having students crowd around a small computer monitor. Students can control the

pace and progression through the program by clicking the mouse when the cursor is situated over preprogrammed screen areas called buttons. Students are able to command the software to play the music, play the story, show visual representations of the characters in the story, display information about the instruments, display the music score of the different themes and experiment with substituting different instrument sounds for the themes.

Teachers can also invent game formats for adapting drill or game programs to whole class reinforcing activities. The Music Ace program, for example, instructs students about music note reading and music theory. This software was designed to be used by one or two students working at a computer, but it can be adapted for an entire class in this way: (1) Divide the class into teams of three or four students, (2) have each team send one member to the computer for a turn to operate the mouse, (3) award three points to the team whose member follows the teacher's directions through the program, (4) in the game section, give the points earned on the scoreboard.

In this way, all students can learn from technology at the same time just as they would from a video or recorded lesson. Once students are familiar with using particular software from the whole class setting, they can use the software independently in the computer lab, in their classrooms and at home to expand music learning beyond the music classroom.

National Standard	Program / website
#1 Singing	Carry-a-Tune; Sing!; Bach Chorales I and II; Barbershop Quartet Error detection: Carry-a-Tune, Music Ace Maestro
#2 Playing	Rhythm practice: ECS Tap-It; Rhythm Ace; Music Ace Maestro Piano pedagogy: ECS Kids; Musicware Piano; Alfred's Teach Yourself to Play Piano Guitar Coach, Playing Music Instrumental accompaniments: Music Minus One series, SmartMusic
#3 Improvising	Harmonization: Band-in-a-Box, Sibelius, Finale Instrumental accompaniments: Band-in-a-Box, SmartMusic
#4 Composing	Making Music; Music Ace Maestro (Doodle Pad), Sibelius, Finale, Garage Band, Band-in-a-Box, Creating Music
#5 Reading / Writing Music	Identifying pitches on staff: Music Ace Maestro; MiBAC Music Lessons Scales and key signatures: Music Ace Maestro; Practica Musica Sequencing and printing: Sibelius; Finale, Cakewalk; Garage Band, Carry-a-Tune
#6 Listening	Ear training: Thinkin' Things I and II; Practica Musica; Music Ace Maestro Tune It! Animusic I & II
#7 Evaluating	Music Ace Maestro, Carry-a-Tune, Animusic I & II
#8 Relationship w/ other disciplines	Animusic I & II, Animated Listening Maps Smithsonian Museum Education site http://www.smithsonianeducation.org/educators/lesson_plans/lesson_plans.html http://www.nyphilkids.org/main.phtml? http://www.artsedge.kennedy-center.org/teach/les.cfm
#9 Relationship w/ history and cultures	ECS TimeSketch Series; Zane Home and History Library; Great Composers Series; History of Music Series; Silver Burdett's Animated Listening Maps, Music Ace Maestro (doodle pad songs)

Sequence Learning in Small Steps

Learners prefer well-organized, logically sequenced instruction. Most tutorial and drill programs incorporate these principles in their design, and the music educator needs to keep these principles in mind when incorporating technology into the overall curriculum goals for musical skills and concepts. This can be easily accomplished by matching Student Learning Objectives (SLOs) itemized in curriculum guides with SLOs described in the documentation included with most programs.

Encourage Student-to-Student Interaction

Try to invent strategies that encourage student-to-student interaction. When working together, students are required to discuss, explain, interpret, demonstrate, relate, generalize, compare and justify their understandings. Hooper and Hannafin (1988) believe it is probably unnecessary and unwise to assign a computer to each student individually, because students who explain to others will develop descriptions that also help them in the learning process. Johnson, Johnson, Holubec and Roy (1984) believe that increased motivation and greater understanding result from group discussion.

Although new software is wonderful, there is one thing technology will never be able to provide: meaningful face-to-face human interaction. There is no substitute for a teacher's smile, a pat on the back and *"Congratulations! You did it!"* No amount of canned applause from a computer will ever lift a student's spirit as much as accolades from his fellow students and family. Scores on a machine may slightly increase self-esteem, but public recognition of accomplishment will raise self-esteem and status among his peers. Knowing the power of human interaction, teachers need to build in ways for students to interact and share their technology successes with each other.

	Traditional Music Instruction	Using Music Technology
Grouping	Whole class grouped together for instruction, with some instruction given in small groups and very little, if any, individual instruction	Instruction is often by individual or small group, with only a small amount of time spent in whole class instruction
Pacing	Instruction paced at the whole group level, with virtually no individual pacing	Instruction is paced mostly at the individual and small group level
Providing Individual Help	When the teacher needs to give special instruction to a section or individual, other students are not actively engaged in learning, which reduces time on task and creates opportunities for behavior problems	When the teacher gives instruction to some, others are usually productively engaged in learning activities
Testing	Individual students are not often tested and given specific feedback about their progress	Individual student responses are tested often and given much corrective feedback
TAIM	Technology Assisted Instruction in Music (TAIM) is very rarely used, if at all	Extensive use of technology

Incorporating Mastery Learning into Curricular Design

Mastery Learning is an instructional delivery approach, developed by Bloom (1981) in which the curriculum is divided into small parts, and students are allowed to take as long as they need to learn each part to a mastery level as measured by frequent tests. Students who do not achieve mastery in the first exposure to new material are re-taught with ancillary materials and approaches and then retested until they achieve mastery. From their meta analysis of research in Mastery Learning, Guskey and Gates (1986) found several prominent effects of Mastery Learning: 1) better student achievement, 2) higher grades, 3) higher standardized test scores, 4) better ability to learn complex and abstract ideas, 5) better ability to apply ideas to new problems, 6) longer retention of ideas, 7) more positive attitudes and greater interest in the subject matter and 8) better motivation for further learning. Having used Mastery Learning principles for many years in my classrooms, I can attest to these benefits.

Technology combined with Mastery Learning holds students ultimately responsible for their learning and provides opportunities for exchanging machine success with human approval and recognition (students report scores to the teacher, who marks criterion mastery on wall charts).

What Hardware is Needed?

Many programs run on older computers as well as new ones, and it is extremely easy to obtain slightly older computers for free from school districts and businesses upgrading to newer ones. Music software needs speaker systems and/or earphone systems to be heard. Some programs require the attachment of a MIDI keyboard. Others allow a MIDI keyboard, but can run without one. Still other programs do not need a MIDI keyboard at all. For whole-class demonstrations, large-screen monitors, computer projection devices or Smart Boards can be helpful, although usually not necessary in a normal-size room. In fact, after countless hours of working with kids and technology, I found the intimacy of crowding around a monitor actually helped kids keep focused and calmly learning. When I used a projection panel, kids sometimes behaved as if they were in a movie theater: talkative, fidgety, unfocused, etc.



Learning with music technology can take place in a music classroom (as a main event or on the side of the room), in an alcove, practice room, hall, office, computer lab, another classroom, school library, after-school day care center and students' homes. One complication teachers may need to overcome when using school computers, however, is the protection systems many district technology personnel install on its computers to lock out banned websites and prevent students from tampering with the computer. Many programs, especially those with record-keeping functions like Music Ace Maestro, require the computer to save data to the hard disk. Some protection programs prevent this and must be modified or turned off. Teachers need to check with their technology department for help with this. I got so frustrated with these block-out programs, I obtained several previous-generation computers from the district's recycling center and had the technology department remove all the protection software. They became dedicated music software computers, but were not able to connect to the Internet. This was OK as I used other computers for that purpose.

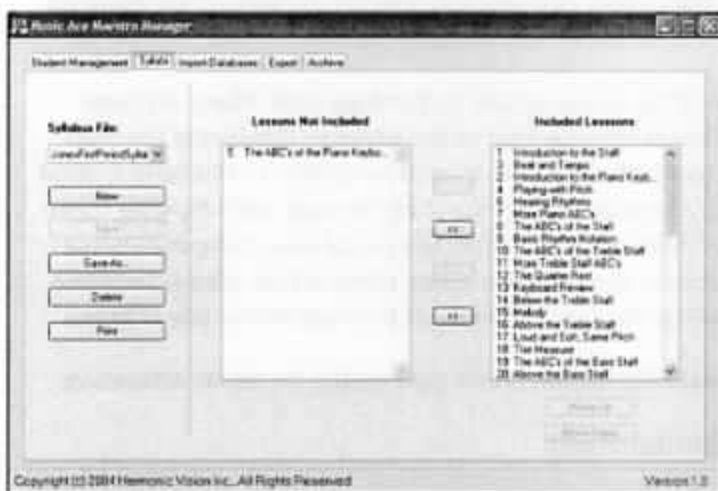
A Brief Introduction to Music Ace Maestro

Music Ace Maestro is a collection of 48 carefully sequenced lessons teaching students about piano keyboard fundamentals, pitch reading in the treble and bass staves, rhythm reading and performance, half-steps and whole-steps, sharps and flats, scales, key signatures and several other important music theory fundamentals. Each lesson contains four to six distinct sections that are accessed by clicking on the progress bar near the upper right hand corner of the screen. Each lesson is followed by several games using the concept introduced in the lesson. Students see the games as fun, but educators know the games provide important practice to solidify understanding of new skills and concepts. The Music Educator's Professional Edition of Music Ace Maestro (MAM) comes with an Educator's Guide that lists the subsections of every lesson and game. The Professional Edition also includes many good suggestions for using MAM, plus a handy music glossary, worksheet masters, progress chart and award certificates.

Music Ace Maestro has been specially configured for use in multi-seat environments—networks or computer labs. The Maestro Manager helps teachers manage groups of students and lets the teacher create custom syllabi based on student or class requirements.

Teachers can choose one of the default syllabi or easily make up alternate syllabi for different groups of students. For example, if you wanted students to focus on learning notes of the treble staff, you might select lessons 10, 11, 14 and 16. Similarly, having students learn about key signatures after they understand accidentals could be accomplished by selecting lessons 35, 40, 42, 44 and 46. Teachers can assign certain groups of students to work through syllabi appropriate for their stage of development.

The software keeps track of each student's progress through the lessons, and a progress report can be printed out at any time, showing the student's name, group, each lesson section completed and the date and time of the printing. What an easy way to report progress to students, parents, portfolios, report cards, etc.!



Students can choose to enter responses on a MIDI keyboard (if attached). This is especially handy for keyboard lessons 2, 5, 7, 13, 26, 29, 34 and 36. If they don't have a MIDI keyboard connected to the computer, students can still respond by clicking on the virtual keyboard on screen. Music Ace Maestro also comes with a Doodle Pad, a great place for students to listen to music literature while watching the note heads "sing" the pitches. The Doodle Pad has several other very useful applications to reinforce concepts

learned in the lessons and to allow students to experiment and compose their own music. Differently colored note heads can show several lines of music at once: great for learning about fugues, counter-melodies and part-singing.

Funding Music Technology in Tough Economic Times

Several strategies have been used to obtain the money necessary to buy equipment and programs. Teachers should use their music budget funds **ONLY** as a last resort. In some enlightened school districts with adequate funding, teachers are encouraged to buy and use technology with district funds. However, these districts seem to be in the minority, thereby requiring teachers to be proactive in funding their technology needs in other ways. In hard economic times, discretionary funds will dry up for most departments, but usually not for technology, which seems to have become a sacred cow in public schools.

Many districts have grant money available to teachers who write grant proposals. Teachers should investigate the grant programs their district promotes. Check with school principals, district technology departments and grant-writing specialists. Parent Teacher Associations, music booster clubs, local businesses and service organizations often will entertain grant requests as well. To receive money through the grant process, teachers need to include clear information about: 1) what they want to buy, 2) how much the technology will cost, 3) why they want to buy the technology (what it can do), 4) how the technology will fit into the existing curriculum, 5) which students will use the technology, and 6) the teacher's background with technology use. Some districts or organizations employ people to help write effective grant requests or provide forms for this purpose. Be sure to highlight how music software helps students learn not only music, but transfers to other areas, such as reading and math. I was able to buy several music computer programs for one school to use in a remedial reading class using specially dedicated funds.

Fundraising projects are another means of obtaining money for technology. This is often the last resort, but may be the only way to get technology into the classroom. Many companies exist to provide goods or services for fundraising projects, and they advertise widely in educational journals. Teachers need to choose a company with a good reputation and a good product that sells itself with a high return for effort and a minimum of bookkeeping and product management. Be sure to check with the school district to get permission and follow the proper process adopted by the district for fundraisers (Rohner, 1994).

Teachers could also consider establishing an after-school music technology club. Many districts have extra money for funding such after-school programs. Part of the expense of running the club would be funding the purchase of software needed for the activities. If no money is available to fund an after-school club, consider offering "private lessons" using music technology and charging those who volunteer a small rental fee for using the software. Over time, the rental fees could reimburse the teacher or school music budget for the cost of the software. Once obtained for after-school use, the software could also be used during the school day and loaned out to students for use at home.

Here are a few links to resources for additional information about fundraising for music education:

- ◆ <http://www.ti-me.org/OnlineFundraisingForBand.html>
- ◆ <http://www.fcrr.org/FCRRReports/PDF/TuneReading.pdf>

Where Can You Find Out More About Music Technology?

Major music textbook companies recognize and support the use of technology in general music classrooms. McGraw Hill's *Spotlight on Music* includes Harmonic Vision's Music Ace classroom education software. The curriculum also makes frequent references in the lessons of its teacher's guide to teaching with technology. There are many websites that offer guidance and advice on using music instructional technology in the classroom. Among recommended websites are:

- ♦ <http://www.learnnc.org/>. Search on "music" and "web"
- ♦ <http://www.konservatuvar.aku.edu.tr/Linkler.doc> will yield 18 pages of links to music education and technology websites.

Using an Internet search engine such as Bing or Google, with search terms such as "music education technology" or "music technology," will yield a variety of relevant links and references.

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About Dr. Kirk Kassner

Dr. Kassner has taught music for more than 40 years at all levels from pre-school to graduate school and in all course settings (general music, bands, orchestra, chorus, music methods, music theory and ear training). He has a PhD. in Music Education (1992), an MA (Teaching Music) (1973), a BA Music (1969) and is an MENC Nationally Certified Music Educator (1993).

He is a member of "Arts in Education," Grant Review Panel, Division of Cultural Affairs, Florida Department of State (1997). He was a member of the Editorial Board for *Music Educators Journal* between 2004 and 2008 and the Technology Column Editor at *General Music Today* from 1998-2008.

Dr. Kassner has had more than 70 refereed and non-refereed articles published and has been a contributing author to the college textbook, "Music in Childhood", Silver Burdett's "Teaching with Technology" and MENC's "Teaching Strategies" series.

In addition, he is a regular presenter at local, state, national and international conferences and symposiums on music, music education and music technology.

About Music Ace Maestro

Music Ace Maestro is designed for professional music educators teaching beginning music students primarily in elementary and middle schools. *Music Ace Maestro* combines the 48 award-winning music lessons from *Music Ace* and *Music Ace 2*, sequences them in pedagogical order and includes the "Maestro Manager" suite of student assessment and curriculum management tools

Developed as an attractively priced upgrade for current users of *Music Ace* products in the schools and private studios, as well as a complete music theory curriculum for new students, *Music Ace Maestro* comes in a stand-alone version and in lab-packs or network versions supporting from five to 5,000 workstations. For more information about Music Ace Maestro, visit: www.harmonicvision.com/Maestro.

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