Technology, at-risk intervention & the music classroom

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Abstract
This research paper will provide an overview of the music technologies available for students, address how the National Standards for music education are fulfilled by utilizing technology in the music classroom, and discuss how technology applications can aid learning in the music classroom. There will also be a description of several technology based workstations for the music classroom.

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Technology, At-Risk Intervention & The Music Classroom

A Graduate Research Paper
Submitted to the
Division of Educational Technology
Department of Curriculum and Instruction
in Partial Fulfillment
of the Requirements for the Degree
Master of Arts

UNIVERSITY OF NORTHERN IOWA

by
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July, 1998
This Research Paper by: Kurt M.J. DeVore

Titled: Technology, At-Risk Intervention & The Music Classroom

has been approved as meeting the research requirements for the
Degree of Master of Arts.

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ABSTRACT

This research paper will provide an overview of the music technologies available for students, address how the National Standards for music education are fulfilled by utilizing technology in the music classroom, and discuss how technology applications can aid learning in the music classroom. There will also be a description of several technology based workstations for the music classroom.
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CHAPTER ONE

Introduction

Every where you turn there is technology. Television shows are becoming more action packed as movie quality special effects become more readily available to lower budget production facilities. Stereo quality sound is available from the Internet with the correct receiving equipment. Blockbuster movies are jam packed with mind blowing special effects, sound effects and stereo quality sound. Increasing with the same frequency are the students in our school systems that require special attention and are classified as at-risk students. Forest's (1995) research suggests that technology can play an integral role in helping encourage these students to succeed. When we have these students we need to insure that this opportunity for success is present in our school environment and that we make use of our vast resources when they are available. Music teachers need to request the appropriate technologies and administrators need to begin budgeting for these technologies.

The outcome will be twofold. One, the positive engagement and success of all students will increase, and two, national standards toward computer literacy will be fulfilled as the students become more adept at using the specialized music equipment. With the advances in inexpensive music technologies music is the logical place to begin to include computer literacy. The purpose of this paper is to explore what kinds of music technologies exist for student use and how those technologies help to meet the music education national standards.

Terms used in the research paper are as follows: (a) CAI; Computer Assisted Instruction is a broad term that encompassing instruction supported by
computer technology, (b) MIDI; Music Interchange Dynamic Interface is the industry standard for the creation and transfer of music (audio) signals, (c) Quicktime; Apple Computer's standardized architecture for time-based media displayed on Macintosh computers, (d) Multimedia; a range of data types including analog and digital video, two-dimensional and 3-D animation, audio, and hyperlinks and digital ink. Also included is delivery media such as CD-ROM discs and drives, graphics, display hardware, and sound cards, (e) hypermedia; linking text, sounds, and graphics to allow a user to interact with the information and select the order of presentation, (f) LCD panel; liquid crystal display useful for transferring information from a computer to an overhead screen via an overhead projector, (g) dabbling; the joyful activity of the amateur, enthusiast, and hobbyist, occurring during informal, self-directed learning and collaboration, (h) ICN; Iowa Communication Network is a fiber optic communications network for all types of media, (i) Internet; an interconnected group of computer networks all over the world, (j) E-mail; electronic mail, messages sent by way of the Internet by way of a particular person, (k) Web site or Web page; a location on the World Wide Web, (l) HTML; Hypertext Markup Language, computer language used in writing Web pages for the World Wide Web.

Research Questions

1. What kinds of music technologies exist for student use?
2. How are the national standards for music education met by using technology?
3. How can technology applications in the music program aid at-risk student learning in the area of music?
CHAPTER TWO

Review of Literature

One of the most readily available resources is our computer lab. According to Fedrico (1995):

Dabbling is the joyful activity of the amateur, enthusiast, and hobbyist. It occurs during informal, self-directed learning and collaboration. Dabbling makes teachers of learners, and learners of teachers, and greatly increases our misunderstanding of our own learning processes and needs. It’s effective with at-risk learners, with gifted, with the bold, and with the hesitant. It is empowering, and builds self-esteem (p.13).

Federico goes on to support the belief that we ourselves will not sit down and read a manual cover to cover before we begin to use a new computer program, but that we will experiment, or dabble, with the program itself, use various sections of the manual for assistance, as well as discussing various parts of the software with coworkers.

When we look at our own learning style, we realize that we learn best by doing, experimenting, solving our problems by collaborating with others, as well as by actually reading parts of the manual. Johnson (1995) also supports this belief through informal survey results conducted at Lions and Rotary clubs in that we learn best by reading books that are not textbooks, speaking with experts in the particular subject area, and even by utilizing the Internet, but no mention was ever
made of referencing a text book. If we can encourage our at-risk students to do this by giving them the chance to explore, or dabble, on the computer, we will be deluging them in as many styles of learning as we possibly can without their even realizing that they are learning and actively engaging in the learning process. This is not to say that we should simply throw the textbooks out the window, however, to modify the given curriculum and the students IEP so that the equity issue is no longer a valid excuse for the question of why does that student get to use the computer.

Yamaha’s Music In Education (MIE) program is one example of a hands on technology based program that has shown significant improvement in student achievement. It provides a basis for acknowledging the assets of computer aided music instruction as compared to traditional music instruction. Arnett (1996) also gives an overview of what MIE is and how it is formatted for the classroom integration as opposed to using the program as the sole basis of instruction. Baker (1987) supports the belief that technology must be an enhancement of the curriculum and must be appropriate for the learner and for the learning. Johnson (1995) goes on to warn us that we should not try to teach the way we ourselves were taught. For many teachers this will be very hard to overcome and to realize that you need to modify the way you teach as quickly as the technology around us is changing and to integrate that technology into our classroom if only to target the at-risk students. Davis (1991) supports that we must learn how to learn and identify the ways that our students are most likely to learn in our classrooms. We must be aware that there are seven multiple intelligences that have been identified. Davis (1991) states through identifying the students within
these intelligences and enhancing their learning with the use of computers, we stand
a better chance of higher achievement levels.

Another way to encourage at-risk students is to give them hands-on use of
one of the most current technologies around, the ICN classroom, or distance
education. Kinnaman (1995a) says, “It’s about collaboration between teachers and
technology that overcomes the restrictions of time and space, enabling students to
learn more, in less time, and with far less overhead” (p.58). Here again we hear
about collaboration, not only of teachers, but also of students as well. Kinnaman
suggests that there is less cost involved. Engage the student in an actual open heart
surgery and spark an interest that wasn’t there before. Take them on a nature trail
and experience the openness and beauty of nature or a part of their own country that
they haven’t experienced before. Participate in a soil research experiment and
compare the data from across the United States and then across the globe. Discuss
world peace across a global link at the Children’s Summit, the results of which can
be found on the web.

We may also relate this to the instruction of music. Flowers (1993)
supports the ideas of music as a form of communication and as a science. When
we relate other curricular disciplines to music, we begin to draw on the similarities
of music and other subjects and supporting the interdisciplinary learning styles as
well as the multiple intelligences again. Gardner and Hatch (1990) state the
relativity to music as a multiple intelligence is again referenced and the need to
capitalize on the abilities of the students is first and foremost the consideration we
should give when designing lessons.
The Technology in Music Programme (TIMP) involves the use of musical instrument digital interface (MIDI) in conjunction with drum machines, keyboards, sequencers, and computers. According to Clarkson and Pegley (1993), when this method of instruction was compared to a more traditional music classroom student scores in performance knowledge and basic understanding of the material covered was at a significantly higher level than traditional music classroom students. This would support the research of Berz and Bowman (1995), where four cycle or patterns are identified as necessary for the identification of music research with regards to technology or computer based instruction. The four categories are effectiveness, adaptation, technological development, and feasibility.

Quesada (1996) found a high school social studies teacher's results of using the Internet, in conjunction with other media, "enabled students 'who were previously afraid to speak up in small groups to give hour-long multi-media presentations and conduct true intellectual discussions' about current events". Quesada also found the use of the Internet, initially through the use of e-mail, as a forum for the discussion of social issues to spark enormous excitement through the students. The response the students received prompted them to develop a school-based Web site. Since the development of their site, other schools have published there as well. The use of this current technology took students who were not particularly computer gurus from novices to publishing their own Web page, and to maintaining the pages so that other schools may publish there as well. Students here are engaged in active discussion of current up-to-date problematic social topics, as well as discussion on creating HTML documents for use and posting on their Web site. The students receive international response from peers as well as
scholars. There is no better way to tell a student who thinks the world hates him or her that the world does care than to have them have this kind of response. This does exactly what technology should do to be meaningful and be useful in life.

Boody (1992) describes a similar situation with the use and integration of multimedia techniques and the use of CD's for instruction in the music classroom to enhance listening skills. Opposed to the mundane task of paper and pencil work, again supporting the “real world” use of technology, and opposed to the use of technology as “filler” material, technology is given meaning.

Kinnaman (1995b) sites an example of a K-12 independent school in New Orleans that bases their school structure around technology. The top priorities are summarized in two goals, “To provide a comprehensive and ongoing program of professional development and support which will enable and encourage Newman’s faculty and staff to use technology...to develop and provide the finest possible education programs”, and “To identify and acquire the telecommunications infrastructure, computer/AV hardware, software/multimedia needed...to provide an educational advantage for Newman students” (p.98). Newman school district also hires teachers who are deemed Master teachers in their subject area and who will use the technology and adapt it to the individual learner as needed. The goals of Newman are best expressed by Milone and Salpeter (1996), “With leadership from creative computer-using teachers and school administrators, much is going right for at-risk students” (p.44). Webster (1990) warns that creative thinking is an occurrence that can and does happen without the use of technology. He also states that technology can be a benefit for music instruction as long as it is understood that music is a creative process.
Computer-assisted instruction (CAI) encompasses a wide range of uses when involved with music education. As with any discipline, the most common type of CAI is drill and practice. Students are given an example to either solve or to identify and are given immediate results for their answers. Berz and Bowman (1995) agree that this would be effective and feasible for certain learning environments.

Blakeslee (1994) cited:

A beginning note appears on the staff, and the computer system plays a short melody in the key of the triad. The student's challenge is to notate the melody by placing note heads on the staff at the correct pitches and with the proper time values. When the student finishes, the screen immediately shows the score... (p. 34-35).

Drill and practice takes on the form of instruction in many areas of teaching music. Students are able to identify intervals, note names, note values, time signatures, key signatures, rhythmic counting, melodic dictation, rhythmic dictation, melodic error recognition, rhythmic error recognition, chordal progressions, and harmonic structure of a piece. All of this with instant feedback on an individual basis, and at the speed of the individual learner. Nolan (1994) would also suggest the creativity of the learner is abounding here as well.

Another type of CAI is the tutorial program. These programs allow students to progress through a series of musical information and levels of information in a sequential pattern. Tutorial programs satisfy four out of the ten national standards for music education. Listening to, analyzing and describing music. Evaluating music and music performance. Understanding relationships
between music, the other arts, and disciplines outside the arts. And understanding music in relation to history and culture, dependent upon the type of tutorial. Boody (1992) encourages the use of CD-ROMs and multimedia to improve listening and complex reasoning skills as well as encouraging students to be task oriented and remain on task.

Hypermedia or multimedia programs are CAI because the user actively interacts with the information being presented. The student modifies the instruction by selecting which areas he or she would like to focus on. Some hypermedia programs also feature a test or quiz at the end of the unit of instruction, which is useful for teacher evaluation of the effectiveness of the current technology selection. Rudolph's (1996) findings indicated, “Currently there are multimedia programs commercially available to help students understand and recognize the relationship between music, history, and culture. There are multimedia programs related to classical, jazz, and contemporary music” [7]. This also qualifies the usefulness of the media under the national standard, understanding music in relation to history and culture.

Holland (1986) discusses the use of computer aided instruction to benefit music composition. His research deals with the use of musical instruments with the aid of the computer and the students being able to perform at their own level and be successful. There is also the use of music theory, music history, aural testing, and harmonization in the form of computer aided tutorials. All of these will further support Webster and Williams (1996a) in the following discussion of workstations.

Music workstations are another growing area in music technology. According to Webster and Williams (1996a) there are five types of workstations
having different components, as well as varying uses. Webster and Williams (1996a) believed, “In a multifunction computer lab, not all workstations are created equal. The individual workstations should be dedicated to specific applications like music, graphics, multimedia, and administrative applications” [15].

The first music workstation is entitled a Music Workstation. It consists of a Music Interchange Dynamic Interface (MIDI) keyboard, a MIDI sound module, a CD-ROM drive, 16-bit/44mHz digital audio, lots of fast disk storage, an amplifier, headphones, and speakers. The main use of this workstation is for music composition and playback of compositions that are either in work, or finished. Rudolph (1996) said a music workstation used for composition and playback of a piece of music satisfies the national standard, composing and arranging music within specified guidelines, when incorporated with Finale, Encore, or any other notation or publishing program. Reese (1995) also describes a similar setup for a MIDI workstation.

The second workstation Webster and Williams’ (1996a) described is a graphics workstation consisting of a scanner and graphics table with 24-bit color, a large screen color monitor, lots of memory and disk storage, and a fast machine. This station is primarily used for handwritten compositions that are to be scanned into the computer and then converted into a notation or publishing program such as Encore, Finale, or Nightingale.

Webster and Williams (1996a) next workstation was a Multimedia and CAI Workstation. Components here include 8- to 24-bit color, digital and MIDI sound, CD-ROM (possibly videodisc), large amounts of random access memory (RAM) and hard disk storage, an amplifier, headphones and speakers. This workstation
will centralize around drill and practice techniques as well as tutorial programs. This station matches criteria for the national standard, reading and notating music, and, listening to, and describing music.

The fourth workstation, Webster and Williams (1996a) presented was the administrative workstation. The administrative workstation included an extended keyboard, a large screen, printing and file sharing, and a reasonably fast computer with lots of storage. This workstation was used for the final compilation of any given musical work as well as general printing and file storage. The administrative workstation was also used to enter compositions into the computer via the musical keyboard. The administrative workstation satisfies the national standard, performing on instruments, alone and with others, a varied repertoire of music. This standard is also satisfied by the use of the electronic keyboard from the workstation, when the workstation is used as the accompaniment instrument for performing groups or soloist.

The final workstation is the teaching station with components including video projection and/or overhead, color display, and an amplifier and speakers. This station is used for class presentation and explanations. A liquid crystal display (LCD) panel is also useful in this workstation.

Webster and Williams (1996a) also stated, “If you need to buy just one workstation or a small set of four to six and cannot afford the multifunction concept, here is our recommendation for that one workstation, Macintosh or Windows/PC” [28]. For the computer, a PowerPC or Pentium, 24+ megabytes of RAM, 1 gigabyte hard disk space, 8X CD-ROM, digital synthesis built-in, MIDI interface cords and connectors are needed. For the MIDI workstation Webster and
Williams (1996a) recommended a 5 octave velocity-sensitive keyboard, drum kits effects generator, general MIDI, digital synthesis sound engine, audio system with speakers, amplifier, and possibly a small mixer.

The implementation and use of these workstations target several of the other National Music Standards as cited in Rudolph's (1996) article as well as Mahlmann's (1994). The first standard, singing alone and with others and having a varied repertoire of music, is accomplished with the use of a workstation and a sequencing program like MasterTracks, Claire, Vivace, or Audio Mirror. The sequencing program is used to accompany a student while singing a solo.

Another standard, improvising melodies, harmonies and accompaniments, is accomplished as well as simplified by the use of songs in MIDI format that are now being offered by textbook publishers. By utilizing the MIDI songs with Band-in-a-Box, the instruction is more readily directed to harmony experimentation, editing of accompaniments, as well as stylistic changes of the music. The tempo can be adjusted and once the students are satisfied with the modified sound of the song, they are ready to begin improvising with the melody lines. Marcinkiewicz (1996) researched the correlation between the use of MIDI keyboards and the possibility of building memory skills. The report found that the memory skills were not greatly affected due the lack of available instructional time, however, there was an increases in the memory skills in performance areas. It was believed there would have also been an increase in memory skills if time had permitted.

Webster and Williams (1996b) located at another website, The Internet for music and the arts, frequently asked questions (FAQ) discussed the uses of the Internet in conjunction with music and technology. This site includes the location
of various resources used in conjunction with music technology, resources banks of sound and graphic files, and terminology used on the Internet for identification purposes. This site also has links to other related sites on the web that correlate with music and technology. Williams (1995) described it as the following:

In our 'promised land' we will have servers all over the world, you won't care where they are, holding a rich resource of documents, digital video, digital imagery, digital recorded music, MIDI and digital sound samples, music notation, and multimedia instruction modules” [7].

Monagham (1993) describes the benefits of state-of-the-art music technology at the University of Northern Colorado. Music technology allows students to learn at their own pace and become more of an active participant in learning, rather than being lectured to and regurgitating back facts. Students are motivated to learn and feel unpressured to compete due to the set up of the program.

We must again consider the students who we are dealing with and determine if we are meeting their needs effectively and if the technologies we are using are appropriate. We must also be wary of creating a technology based music program, rather a computer/technology assisted program as suggested by Moore (1992). He goes on to say that technology should benefit the music program and the only way it would not do so, is if the teacher allows it to be a negative factor. Wagner (1998) supports this in his article, stating that to improve the quality of music programs, music instruction should be accentuated by the use of technology.
CHAPTER THREE

Summary/Conclusion

We need to be sure that when we have saturated the students with the
dabbling technique, we now make it useful to their every day life experience so that
it will be useful to them when they get out in the real world. As we develop our
teaching strategies, our lessons, our Iowa Communication Network (ICN) room
instruction, and all of the other technological advances, we need to integrate how
these pieces of technology will excel these at-risk student to the fore-front of the
pack and to even assist the chance for job placement and success in later life.
Although drill and practice has its place, if we merely continue to give the students
drill and practice day after day we are doing nothing but encouraging boredom and
decreasing the chances of excitement in learning or even any remote chance of self-
motivation by the learner.

The teacher will not be replaced by a computer, the Internet, or an ICN
classroom, the teacher and the technology need to be a team and work in
conjunction with each other to produce effective outcomes. A computer will never
replace the relationship between a student and a teacher, however it may definitely
enhance that relationship if used effectively.

How can technology applications in the music program aid at-risk student
learning in the area of music? We need to take the technological resources that are
available to us and put them to work. We need to take the energy and potential that
is bursting at the seams in the youth that are at risk and channel it in a direction that
is positive, productive, and eventually self-motivating. We need to ensure that each
and every one of these students is given the highest possible chance of success that
we can provide. In order to do this we need to be sure that we are committed to dedicating our teaching to all of the different learning styles that are present in our classroom and guide them to a meaningful end. We also need to be sure that we are indeed teaching toward the future and not necessarily teaching how we were taught.

As the national standards for music education move toward computer literacy, there is no better way to expose students to state of the art technologies than through technology associated with music. All of the standards for music correlate directly with the teaching of music with technology on an every day basis. Music educators need to push forward and give students the experiences they deserve by making these technologies available.

What kinds of music technologies exist for student use and how are the national standards for music education met by using technology? The standards are met as discussed above. As for what exists for music technologies, there are CAI drill and practice, tutorials, MIDI, notation or publishing software, hyper and multimedia software, and a vast array of Internet resources from sound files to MIDI files to multimedia files.

With the national standards in hand, and the direct correlation of technology helping to achieve the standards and combat the ever growing challenge of at-risk students, music educators need to direct their instruction to include computers and technology in their curriculum. The standards also serve as a resource to encourage administrators to increase the amount of funding for technology available to students in the music program. Music education develops well rounded students, and with increased technology in the school music programs the children are better
equipped to meet the national standards and achieve a higher success rate in their musical endeavors.
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