A SURVEY OF MUSIC EDUCATION TECHNOLOGY AT COLLEGES IN THE SOUTHEASTERN USA

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The purpose of this study was to collect data concerning the implementation of technology in Southeastern United States college music education degree programs accredited by the National Association of Schools of Music. Participating institutions ($N = 69$) from the southeast completed a questionnaire, providing curriculum, facilities, and personnel data regarding music education technology. Results showed that not all the 69 colleges surveyed have adequate staff and facilities to provide music education technology courses to their students. The principal concerns expressed were resources, trained instructional personnel and a need for more research regarding the effectiveness of music education technology. Also discussed are issues of concern that music faculty face in implementing music education technology.

Technology is a required competency common to all professional baccalaureate degrees in music for accreditation by The National Association of Schools of Music (NASM). In its Handbook, The NASM states that students in professional baccalaureate degrees in music "must acquire: 1. A basic overview understanding of how technology serves the field of music as a whole, [and] 2. Working knowledge of the technological developments applicable to their area of specialization" (NASM, 2001, p. 83).

Although the NASM requirements are in place and other sources suggest the need for incorporating music technology in K-12 and college curricula, there is relatively scant published refereed research regarding its efficacy and use. While it would seem propitious to gather data before promoting and making implementation recommendations for music technology, this does not appear to be the case for NASM, MENC, nor The Technology Institute for Music Educators (TI:ME).

Higgins (1992) outlined the functions of using technology in music education, including technology as teaching machines, as well as audio and score recording in assessment research. He also noted the advent of computers in higher education in the 1950s, but their high visibility in music education did not occur until the 1970s, with the introduction of the personal computer. Berz and Bowman (1994) suggested that there are four distinct research cycles related to educational computing: the Early period (pre-1965), Mainframe period (1965-1978), Microcomputer/Traditional Com-

puter-Assisted Instruction (CAI) period (1978-1989), and the Emerging Technologies period (1989-present). They state that much research in music education technology has been concerned with the implementation of CAI and comparing CAI with traditional methods, but very little research has examined various possible methods of using CAI as an effective teaching tool or adjunct.

In 1999, MENC published *Opportunity–to-Learn Standards for Music Technology* as a supplement to the 1994 *National Standards for Music Education*. The committee that prepared the 1994 document was aware that new technologies have an impact on ways schools deliver music instruction. References are made to computers, software, MIDI equipment, CD-ROMs, and other resources that are important to contemporary music educators. In *Technology Strategies for Music Educators* (TI:ME, 2001), seven areas of competency in music technology are suggested: electronic musical instruments, MIDI sequencing, music notation software, computer-assisted instruction, multimedia and digitized media, internet and telecommunications, and information processing, computer systems, and lab management. The equipment discussed in these sources is not exclusive to music education. It is widely used in many areas of music by composers, performers, historiographers, and other musicians.

Opportunity–to-Learn Standards for Music Technology (1999) was intended to provide guidance to music teachers, administrators, and other decision makers who are involved in implementing the new standards for music education technology in their schools and districts. It contains outlines and guides for various areas such as curriculum, staffing, equipment, materials, software, and facilities for music education technology.

A recent survey (Reese & Rimington, 2000) of music technology in Illinois public schools found several areas that are a hindrance to the smooth implementation of music education technology in that state. The first problem is that many teachers have difficulty accessing formal training in music technology; consequently, many are self- or peer-taught. This problem is further augmented by a lack of proper equipment and facilities in K-12 school settings. Second is that the content of formal technology training, when available, focuses on general purpose administration applications rather than specialized training in music applications software. It was suggested that the reach of distance learning should be expanded via the Internet for those teachers who do not have access to formal training. Finally, it was stressed that teacher education programs need to emphasize models of instructional use of technology with specific applications for choral, general, instrumental, and music theory settings.

In another survey, Bauer (1999) examined music educators' uses of the Internet. He found that educators used e-mail, the World Wide Web, and Web-based discussion groups more frequently than other Internet resources. Because of the ease and seamless integration of Internet Web browsing with software packages, some respondents were accessing some Internet resources with their browser programs without realizing the different types of Internet

software and utilities that they had used. Bauer added that music educators in general are not extensively using the Internet professionally, and that many still feel more comfortable with traditional methods of instruction and communication. Interestingly, 29% of the music educators responding indicated that their students used the Internet to learn about music.

While previous research has examined the use of technology in music education generally and, in some instances, specifically in K-12 settings, little has been done to examine the implementation of music technology in college music teacher preparation programs. The purpose of our study was to gather data regarding the status of curricula, facilities, and personnel related to music education technology courses in music teacher training programs at colleges and universities in the Southeastern United States. It was our hope that this study would provide educators and administrators with specific information and databased guidance regarding the implementation and use of technology in music education. We principally investigated the following questions by means of a survey instrument.

1. What is the content of music education technology curricula?
2. What technology equipment and facilities are available for music education students?
3. What are the views and opinions of music education faculty about the status of music education technology in their states and institutions?
4. What are the demographic data regarding music education faculty involved in music education technology?

Procedure

Questionnaire Development

A questionnaire was developed by examining past survey research on music education technology, browsing Web sites on technology in music education, discussions with music education faculty, and studying the content in music education technology Web sites, courses and textbooks. An initial draft of a 40-item instrument, consisting of questions on curriculum, facilities and personnel, was developed based on these sources. The questionnaire was revised twice with critiques from colleagues. The final questionnaire consisted of 33 questions with open- and close-ended formats. It was piloted and timed by members of the faculty in a music education program in the southeast.

For the purpose of this study, music education technology was defined as computer hardware, software, and related peripherals, including electronic keyboards, synthesizers, and MIDI devices. It did not include other media such as analog audio and video recording equipment. We also did not pursue information about nonmusic software applications.

Participants

The population for this study was accredited programs in colleges and universities in the Southeastern United States (Alabama, Arkansas, Florida,

Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee) listed in NASM's Handbook (1997) that offer a Bachelor's degree program in music education. One-hundred-fifteen institutions were selected. We obtained these data by cross-referencing the NASM Handbook with the *Directory of Music Faculties in Colleges and Universities*, published by the College Music Society (1997), as well as looking at the websites of various music departments.

Questionnaires were mailed to the Chair of Music Education of the identified institutions or to faculty members who we could identify as capable of providing the information we sought. A cover letter was sent with each questionnaire that explained the purpose of the survey along with a self-addressed stamped envelope.

A postcard reminder was sent to respondents who had not returned their questionnaires after three weeks (as mentioned in the cover letter), and this was followed by e-mail (sometimes including an e-copy of the questionnaire) and telephone reminders. Of 115 surveys mailed, 69 were returned for a response rate of 60% (see Table 1 for details).

Table 1

Response Rate by State

State	Response N	Response Rate
Alabama	9	64%
Arkansas	5	55%
Florida	5	38%
Georgia	10	67%
Louisiana	8	53%
Mississippi	5	50%
North Carolina	10	77%
South Carolina	6	58%
Tennessee	11	71%
Total	69	60%

Results

Curriculum

Of the 69 colleges and universities responding, 39% indicated that they have anywhere from one to three technology courses specially designed for music education students. Thirty percent of the programs require students to pass a music education technology course, ranging from one to four credit hours. Also, 12% of the respondents require students to pass a music education technology proficiency examination.

What is taught in music education technology classes?

The five most common (> 50%) topics taught in music education technology classes are music notation software (61%), MIDI (56%), music sequencing software (52%), Internet (52%), and music hardware (50%). Interestingly, music education software is taught in less than 40% of the courses identified as music education technology classes (see Figure 1).
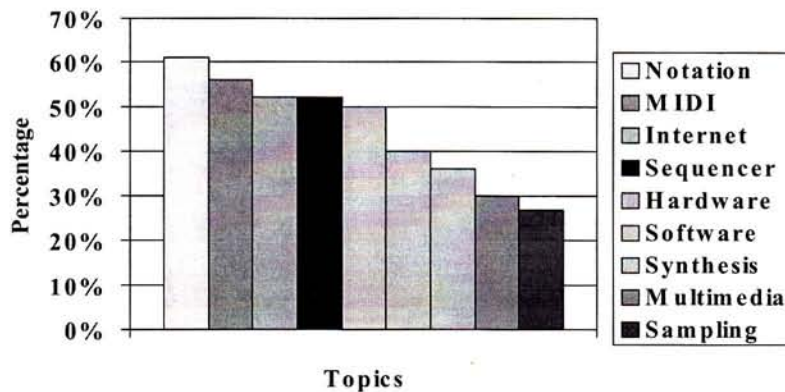

Figure 1. Topics reportedly taught in music education technology classes.

Another topic mentioned was band drill software (5%). In addition, 7% of the respondents indicated that in their music education technology classes, they also taught general nonmusic applications such as word processing, database, worksheet, presentation software, and Web page development, which normally are used for administrative purpose.

What type of music technology should be taught to prospective music educators?

This question was asked of all participants, although not all colleges surveyed offered music education technology courses. All except three (96%) respondents contributed ideas regarding what future music educators should

know about music education technology. As can be seen in Figure 2, everything was deemed quite important (> 70%), with the exception of sound synthesis and sampling (< 50%). Music education software ranked among the top three along with notation software and MIDI.
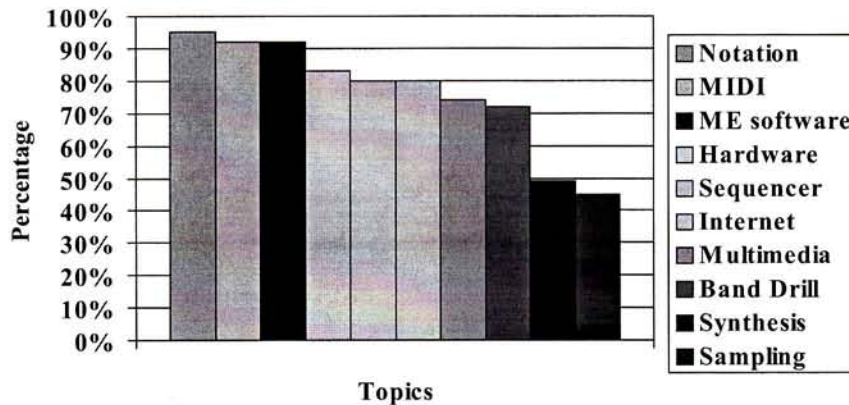

Figure 2. What our students should know about music education technology.

Computer Assisted Instructional (CAI) music education software

Colleges and universities also reported the types of CAI software used and taught in their music education technology courses. The most popular CAI software used is for aural skills (78%), followed by music fundamentals (69%), and composition/improvisation (65%). Performance and music history/appreciation software were considerably less popular (< 30%).

Faculty's opinion on music education technology

We asked respondents if a functional knowledge of music technology is vital for musicians and music educators of the 21st century, and all but one said yes. All but two of the respondents also felt that instruction in music technology should be an integral part of the music education curriculum. Among colleges surveyed, 63% reported having plans for changes or improvements in their music education technology curricula as well as for building new facilities for music technology labs and classes.

Facilities

We asked five questions about facilities for teaching and learning music education technology. Data collected indicate that the colleges surveyed have from zero to four labs or classrooms available for music technology instruction with a mean of 1.3 labs/classrooms per institution. A majority of institutions (64%) reported having one lab for music education technology,

followed by those with two labs (21%), with four colleges (6%) reporting three or more labs. Four (6%) reported no labs for music education technology and two (3%) did not respond. The reported number of workstations in these labs ranged from 0 to 50, with a mean of 12.2 per institution. A majority (69%) of institutions replied that they have adequate facilities and 83% felt their equipment was up-to-date (i.e., less than 5 years old).

Figure 3 shows the types of hardware reported as commonly used in music education technology labs. The three most popular types of equipment found in these labs are keyboard synthesizers (92%), MIDI (89%), and Apple Macintosh computers (82%). Over half the respondents indicate that additional music technology hardware such as multitrack recorders, CD burners (CDR/CDRW), sound modules, Microsoft Windows-based computers, and music samplers are also used in their technology labs. Other equipment such as DVD, drum machines, and wind controllers are less commonly available.
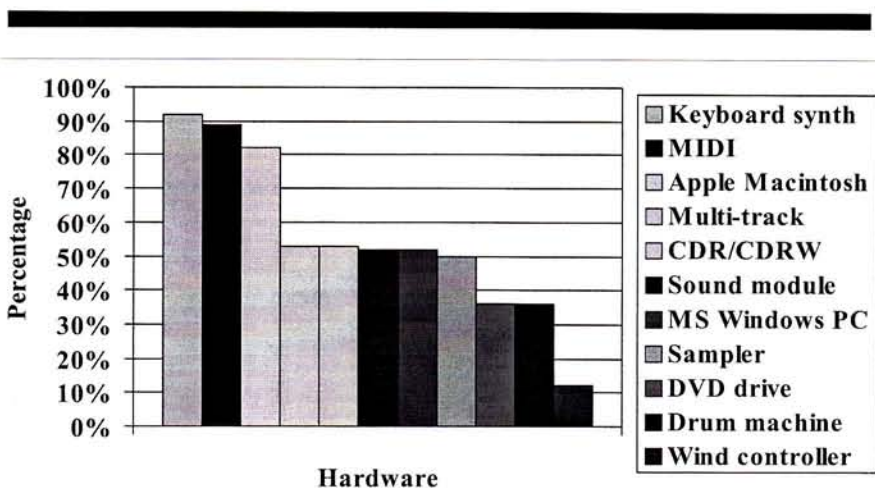

Figure 3. Equipment (hardware) installed at music education labs.

Personnel

Our profile showed that 78% of the respondents were music education faculty. Those who were not faculty are mainly from the composition/theory area, where they are typically responsible for music technology courses and labs in their institutions. Respondents ranged from senior professors with more than 25 years teaching experience to new instructors who are beginning their academic careers. The mean years of teaching experience for all respondents was 14.8 years, with a range of 1 to 33 years. Almost all respondents were full-time faculty (97%) and 35% of them had studied music technology as college students.

The institutions surveyed ranged from very large public universities to small liberal arts colleges. Sixty-seven percent reported having 100 or fewer music education majors, another 30% indicated that they had more than 100 music education majors, and 3% did not report this information. The number of students reported to be music education majors in the institutions surveyed ranged from 0 to 300 with a mean of 75.6 students.

While larger universities reported having up to 80 students enrolled in music education technology courses a year, some smaller colleges do not offer any courses. The average number of students enrolled in music education technology courses for all institutions that responded is 12.8 students a year. Sixty-five percent of colleges reported having fewer than 15 students enrolled in music education technology classes a year, compared to 20% that have between 15 to 29 students, and 15% that have more than 30 students enrolled in music education technology classes a year.

Some institutions surveyed do not have faculty who teach music education technology courses, while others reportedly have as many as six that could teach these courses. The average number of full-time faculty members per institution who teach music education technology courses is one. Less than 10% of responding institutions have a faculty member exclusively teaching music education technology courses. The average number of faculty members that respondents consider qualified to teach music education technology courses at their respective institutions is 2.3. Nevertheless, only 59% of the colleges reported having adequate staff to teach music education technology.

We also asked what Internet programs and facilities usually are used for teaching and research. Figure 4 shows that e-mail (94%) and Web browsing (92%) are by far the most commonly used Internet activities, followed by
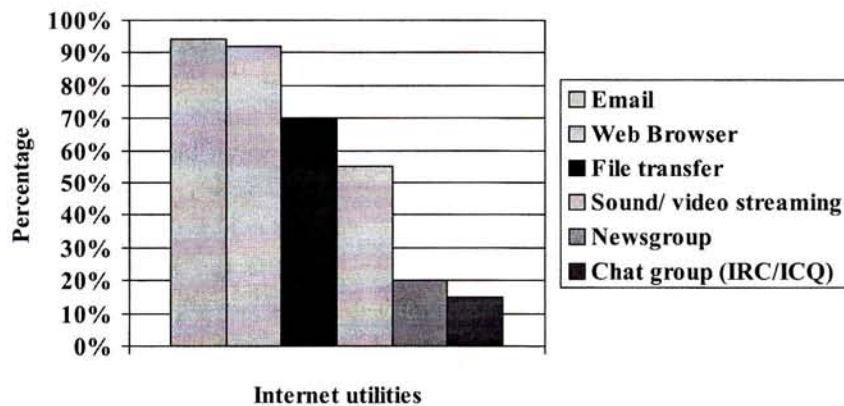

Figure 4. Internet utilities used by music faculty.

file transfer/downloading (70%) and sound and video streaming (e.g. Real Audio) (55%). Least popular were using news groups (20%) and network chat groups (15%).

Almost 100% of the institutions responded that their music schools or departments are listed on the World Wide Web. However, only 8% have contents of their music education technology courses available on the Internet, and only two respondents (3%) specified the number of music education technology courses they have on the Internet.

Issues

According to respondents, some of the most important issues regarding music education technology today can be summarized in two main areas. The first is resources, with more than 55% of the comments relating to this. Financial and personnel support were reported as being the main concerns. Also included were issues of access to hardware and software as well as a lack of resources necessary to keep equipment current. The high cost of purchasing and maintaining equipment was included among the main concerns.

The second area dealt with issues of teacher training and preparation. More than 40% of the respondents were distressed by a lack of trained personnel in schools and colleges. They also had reservations about possibly adding more music technology components to an already overloaded curriculum. Others mentioned the fast pace of change and developments in technology, and some described their uncertainty in deciding what is essential for students in music education technology classes, an issue requiring more attention.

Finally, we were interested to know whether music education faculty in colleges and universities thought that there is sufficient research being published about music education technology. Almost two-thirds responded that there is not.

Summary and Discussion

As of Spring 2000, not all institutions of higher learning in the Southeastern United States were equipped to teach music education technology to their students. Data showed that less than half of the colleges responding required the study of music education technology for music education majors. While many stated that their music education students are required to take a course in education technology, many of these courses teach only the use of general purpose administrative applications such as word processing, database, graphics, Web page design, and presentation software. What most often seems to be lacking is specialized training in music and music education applications.

It is striking that many prospective music teachers are not introduced to the use of music technology to augment their teaching. However, the situation is not as dire as it may seem given that 63% of the colleges surveyed report that they are in the midst of expanding their curricula to include a

component in music education technology. More positive news is that several programs reported getting the necessary support to acquire new space and equipment for teaching music technology. Since NASM has specified technology requirements for all undergraduate music degrees in order for programs to be accredited (NASM, 2001, p. 83), it is likely that music programs will increasingly support music technology instruction as institutions are reviewed for initial or renewed accreditation.

Many respondents suggested that the infrastructure for music education technology in their institutions is far from ideal. Based on their comments, many would like to see more integration of technology into their courses, as well as in other courses such as theory, history, performance, and teaching methodology. Those who have accepted the integration of music technology into their curriculum are also concerned about what types of software and materials will ultimately benefit teachers and students. Since digital technology is still a relatively new area in music education, many general music teachers and choir and band directors question its usefulness for their purposes. Also, there is a dearth of published data regarding the effectiveness of music education software and hardware. Indeed, almost two-thirds of the respondents indicated a need for more research in this area. The computer might be a useful adjunct to the director because of its availability and easy access to students regardless of time and space; however, this is far from certain.

Reese and Rimington (2000) reported that the Macintosh operating system is more common than Windows based PCs in Illinois public schools. This was also found in our survey. Typical music technology workstations include a computer (Mac or Windows), connected via MIDI to a keyboard synthesizer as a secondary controller and sound source. The advent of newer machines with more memory, larger drives, and faster processors has incorporated some of these functions into computers. New and more powerful computer workstations can run applications of virtual synthesizers and digital recorders, thus negating the need for additional hardware such as samplers or multi-track or even digital audio or video recorders. We should note that a majority of our respondents reported that they have adequate facilities and equipment that are up-to-date for teaching music education technology.

There does not appear to be a clear distinction between music technology for educators and other music majors. Less than 40% of music education technology courses report music education software as a topic, while more than 90% of the respondents deemed this content important. Prospective music educators should not only be aware of applications for most musicians such as notation and sequencing software, but over 90% of the respondents indicated that they also need to be exposed to instructional and productivity software that might prove useful to them and their students.

A resistance to new technology in music education appears to exist. Teacher educators as well as the future generation of music educators should have open attitudes towards new devices and try to uncover their potential

with an optimistic view. We believe that as music education software becomes more sophisticated and as new and younger teachers who were raised with personal computer technology enter the profession, the question of the integration of technology will become moot. It will be a part of everyday life, just like driving a car.

In the history of human civilization, new ideas and inventions have often met with much opposition or have even been ridiculed. The same might be said about the acceptance and application of music technology. Some of our respondents who tried to promote the idea of using more technology in their classes reported concerns about resistance by their colleagues and administrators. Ultimately it is decision makers, such as department chairs in colleges, who have control of fiscal support for music technology. Funding for technology purchases and maintenance as well as hiring skilled personnel in the field is a major undertaking. There is a need for more research to investigate the efficacy of the use of technology in music education. The respondents in this study are uncertain as to whether the expenditures necessary to include and integrate technologies into the music education curriculum are justified. Also, at present, published data are inconclusive regarding the effectiveness of the inclusion of music technology in music education curricula.

This study is a preliminary inquiry into the field of music education technology. More research is needed to explore its efficacy and potential as an aid in the development of music teachers and students. It is likely that there is a cost-to-benefit ratio that needs to be considered, but the present data are inadequate to address this and other issues.

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