Balancing Innovation with Tradition: Maintaining a Relevant College Music Curriculum

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Abstract

The paper considers the innovations and impacts of technology on the fine arts. It explores the effect of technology on how music is taught, studied, performed and created. There is a brief historical account of the recent advances in personal computers, MIDI, synthesizers and music software. The standard of technology competency, set by the National Association of Schools of Music (NASM) is discussed. Other points of information include technology as a catalyst for institutional collaboration. Also considered are ways in which technology supports problem based and collaborative learning methods.

Technology is a cohesive bridge to the fine arts and often changes the context of study, creation, and performance of music. Personal computers, MIDI, synthesizers and software are changing the way educators present the fundamental principles of music. As college departments strive to maintain a relevant college music curriculum, technology is a compelling factor for change and can be the imperative crux of an evolving music program. Music hardware, computer aided programs, and internet connectivity inspires curricular modernization as well as projects based on technological innovation. Lecture based instruction is shifting towards teaching strategies based on principles of student discovery and collaborative problem-based learning. This paper will address some of the projects, challenges and changes brought on by the infusion of technology. Recommendations based on a model program at Bergen Community College will be considered and may be useful in contemplating existing or absent parallels at other institutions.

The relatively recent advances in technology have had a profound impact on college music courses. The 1958 *Columbia-Princeton Electronic Music Center* and Robert Moog's analog synthesizer (c1960) were two innovations that paved the way for the merger of personal computers, digital synthesizers, and MIDI keyboards of today. The first-generation of software, created on large mainframe computers during the 60's and 70's was costly but proved the feasibility of Computer-Based Music Instruction (CBMI). The first music software leaders of CBMI included Fred T. Hofstetter's GUIDO ear-training curriculum and Don Bitzer's PLATO system.[1] By the 1980's, analog electronic music keyboards had given way to digital synthesizers, and the development of Music Instrument Digital Interface (MIDI) protocol which

[1] G. David Peters, "Music Software and Emerging Technology." *Music Educators Journal*, Vol. 79. No. 3 (Nov 1992): 23.

united computer and synthesizer technology. The stage was then set for interactive music making among musician, keyboard synthesizer/sampler and computer.[2] As pricing eased for computer, software, and synthesizer, collegiate music departments around the nation embarked on courses in electronic music, computer-based recording, and other technology based music courses supported with CBMI software.

For the past decade, the National Association of Schools of Music (NASM), an accreditation agency for music schools in the United States, has included technology as one of the six critical competencies necessary for Baccalaureate Degree graduation. The NASM expectation describes that, "each student must acquire the ability to use technologies current to their area of specialization."[3] It has been further explained, "Students should be made familiar with the capabilities of technology as [it] relates to composition, performance, analysis, teaching and research.[4] NASM sets a standard that
two and four year colleges strive to emulate. Educators, like Deal and Taylor, have taken the time to examine this mandate, consider and delineate what is essential to all undergraduate music majors. They recommend six components in technological mastery for the undergraduate music major:

- Knowledge of computer basics including, but not limited to, file management and storage, document process ad printing, operating systems, database management and spreadsheets.

- Knowledge of the fundamentals of computer-based instruction (CBI) and of software available, especially in the areas of teaching and the testing of basic musicianship skills.
- Basic knowledge of notation programs, sequencing programs, and MIDI, as well as a more advanced knowledge of one notation program

[2] Peter Webster, "Historical Perspective on Technology and Music." *Music Educators Journal*, Vol. 89, No. 1 (September 2002): 40.

[3] National Association of Schools of Music Handbook 2007-2008. (2007): 85.

[4] John J. Deal and Jack A. Taylor, "Technology Standards for College Music Degrees," Music *Educators Journal, 00274321*, July 97, Vol. 84 Issue 1 (July 1997): 2.

- Knowledge of the fundamentals of multimedia including hardware, software, and basics of courseware development.
- Concepts and techniques of Internet access
- Knowledge of and experience with software designed as interactive or automatic accompaniments to performance.[5]

Although each individual institution determines the definition of competency in technology, the model above seems reasonable for college programs to consider.

Goals set by individual institutions are in part based on the financial support available, and often demand creative solutions to adjust to financial limits. Beginning in the 1980's with interest in the GUIDO system by Hofstetter, the Bergen Community College administration and faculty set a vision of technology readiness for the arts and music programs. A multidisciplinary, high-end technology laboratory was formed in 2000 combining the music and art disciplines. The advantage of a "dual discipline system" generates student population interested in courses such as electronic music, computer recording, game design, and computer animation. Students familiar with the world of computers find exciting opportunities for cutting-edge experimentation in computer generated music composition and performance. Although different in sophistication and the conceptual origin of past music composition courses, students create viable compositions using the latest software that supports sequencing, editing, and mixing use synthesizers/samplers. In courses such as Electronic Music I, and II, Computer Based Recording I, and II, one project takes students through the steps of creating a CD and video of their own music. The lab supports 2D and 3D computer animation. Machines loaded with music software such as; *Sound Forge, Pro Tools 7.1, Reason*, and *Sonar*, as well as art software such as *Avid, Soft-image, Premiere, Aftereffects, Photoshop,* and *Illustrator* [6] allow

[5] Ibid. 3.

[6] The MIDI lab houses 19 Hewlett-Packard 8400 workstations, with dual dual-core Intel Xeon processors, for four processors per machine. They are 2.66-gigahertz server chips, the model number from Intel being 5150. The machines have 4 gigabytes of RAM, 24-inch LCD screen monitors, and NVIDIA Quadrofx 1500 graphics cards. Monitors are 1600x1200 resolutions at 24 bits per pixel. Audio is handled with MAudio Firewire 410 outboard boxes, each coming with Pro-tools. The box has balanced and unbalanced inputs and outputs, 2 headphone amplifiers and a MIDI controller. Every other machine has an AVID Mojo video capture device, and all machines are linked on a 12 terabyte AVID Isis Unity media area network. According to some experts, AVID is the absolute

students the advantages of a complete multi-media playground. Also essential to the educational two-year commercial music program is a recording studio with primary live tracking capability incorporating the aspects of digital recording, composition, sound design, MIDI, and audio editing. Bergen's studio features a fully automated console, digital mixer, *Pro Tools HD* system, and various outboard processing devices, samplers and synthesizers. Projects in film audio, video post-production, and integration with animation, radio, and new game design programs reach finalization in the recording studio.

Technology and Collaboration

Advances in technology can serve as a catalyst to promote collaboration between disciplines and institutions. By far, one of the most innovative models of technological collaboration is *Internet2*, a research and development consortium led by over 200 US universities working in partnership with industry and government to develop and deploy advanced network applications. Its function is to promote and create global stages, enable remote instruction, allow participatory discovery, and open access to rich collections of media. It redefines how we create, teach, perform and collaborate.[7] A particular project, ***Synchronicities: Internet 2 Collaborative Arts Project*** is a collaborative effort involving New York University (NYU), University of California at Irvine (UCI), and Bergen Community College (BCC). It joins both East and West coast uniting the two tiers of education, namely the community college sector with two four-year universities. The project will include trial runs and experiments with set-up of the Internet 2 technology among NYU, UCI, and BCC. Dancers and musicians from the three locations will collaborate to create a student and faculty presentation of music, dance and art. Held in the media center, and using large projection screens for each site, the final performance involves a collaborative improvisation with pre-determined music and movement. The collaboration offers community college students the opportunity to work with students from four-year universities. It also sets the stage for new curriculum development articulated between the participating colleges by means of telematic courses.

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industry standard in video, film, and, including *Pro-Tools*, audio editing and mixing. These products are used on many Academy, Emmy, Golden Globe and Grammy award winning projects. Bergen is able to teach these products in the same lab, promoting economies of scale and opportunities for cross-Departmental collaboration.

[7] www.internet2.edu

Technology and Curriculum

Music combined with technology adds momentum to the music curriculum. What is most interesting is how technology changes the dynamic between teacher and student. Classes supported with technology are less dominated by formal lecture and oriented to a greater degree towards activities that encourage student discovery. Technology promotes active and problem based learning, an interactive hands-on approach. For example, students in computer recording labs create projects within set parameters such as setting a rhythm track, sequencing, sampling, and adding a melody track to create a three-minute song. With problem-based learning, the software used is the tool by which students complete the assignments given, while gaining mastery over the software product through experience. When classes are supported with technology, less class time is spent with formal instruction, allowing students to explore and maneuver through the software solving the problem delineated. At Wake Forest University, Stewart Carter employs *Finale*, a product of *Coda Music Technology* to create drills and exercises. *Finale* is the software choice because it allows for customization. The instructor creates shared "read-only" folders from which students retrieve assignments. *Finale* has playback capability for drills in music theory and ear training using the computer soundcard, but can also be used with a MIDI interface. Written exercises are created in layers, allowing students to view the correct answer after an initial attempt.[8] Strategies such as these can be useful in basic ear training and musicianship courses.

Another software program that sets new standards in methods of teaching ear training is P*ractica Musica* by Ars Nova Software.[9] It provides students with a concise visual and aural experience that can be repeated indefinitely. Rote learning and memorization are practical processes that can be supported by software programs and tailored to increase in complexity at each level. In the end, the professor is freed from the tedious work of drill and has ample time for individual students and other group activities. A coordinating textbook, *Exploring Theory*

[8] Stewart Carter. "Finale: A Useful Tool for Music Theory Instruction." *Interactive Multimedia Electronic Journal of Computer Enhanced Learning*. http://imej.wfu.edu/articles/1999/1/03/index.asp.

[9] Practica Musica by Ars Nova Software, LLC. http://www.ars-nova.com/moov/index.html

with Practica Musica by Jeffrey Evans, compliments the fundamental principles of Ear Training and Music Theory I.

Audio demonstrations are also available at http://www.ars-nova.com/moov/index.html.

In a perfect scenario, students receive formal Music Theory and Class Piano instruction along with the explorations into Electronic Music I or Computer-Based Recording I. Course patterns such as these promote comprehension and application of music fundamentals through electronic music projects using the selected software. As the level of understanding increases, the level of difficulty per project can be adjusted. As an example, in a course such as Music Theory I, instructors delineating the parameters of a melody begin parallel or question answer phrasing, harmonized by a basic tonic to dominant relationship. This exercise can increase in complexity to include a classic song form structure harmonized by substitution and secondary dominants chords in root or inversion. Further parameters of construction can be explored to consider various compositional genres.

Recent developments in software and sound design include notation programs such as *Finale* and *Sibelius*. Previously, musicians laboriously notated musical ideas with pen in hand. Today, students and musicians have numerous software programs available to notate, play and orchestrate. Software packages used by professional musicians, composers and audio engineers include *Cubase, Pro-Tools, Sonar, Finale, Digital Performer, Logic* and *Sibelius.* These packages give students the opportunity to create electronic music and sampled sound in a myriad of combinations. Although problematic editing will be taken into account with most software packages, students will have the opportunity to record in notation format while playing and creating full scores with the choice of a template. Institutions employing a notational software package will be meeting one of the NASM standards.

Class Piano

Twenty years ago, most collegiate class piano studios were comprised of analog electric pianos. Today, institutions can select from a myriad of digital keyboard instruments. Bergen's class piano preference is Yamaha Clavinova CVP-300 and CVP-400 series keyboards. These keyboards, with touch sensitive weighted keys are connected to a MIDI interface and computer. Used as tutorial units with computers equipped with *Finale* and *Sibelius* software, students have the opportunity to study music fundamentals and ear-training. The CVP-300 keyboards can record internally and to floppy disc. Class Piano courses in a lab such as this, even at the most elementary level, are a satisfying musical pursuit. Unique rhythmic accompaniments are added at the touch of a button. Ensemble performance takes at a new dimension with the technological innovation of sampled instrumentation. The newest models of Yamaha CVP-400 synthesizer/pianos, have Internet connectivity. The instruments give students the ability to download music arrangements and accompaniments from the Yamaha Educational Suite server known as the *Digital Music Notebook* and *MusicFinder*. Performances can be captured in real time and recorded in a number of ways. In addition to recording to disc or internally, students can perform and record through *Finale* software. Granted there will be notational editing chores to represent concise notation, the performance can be captured in notational format.

Problem-based collaborative learning is optimized with the technological support of superior digital pianos. As an example, in the scenario of class piano, students are divided into two groups, while group one plays the melody while the other more advanced group is given the task of realizing a chordal accompaniment suggested by the melody. Group I is given the task to choose what voice sound to employ, as well as what rhythmic pattern to use. The rhythmic patterns are found in folders from the rhythm bank on the instrument. Group II must select, as a group, the manner in which the chords will be played. Student may choose a whole note root chord per measure, a half note root chord and half note first inversion, or half note first inversion chord and half note second inversion chord. During an activity such as this, students have collectively selected instrumentation and rhythmic pattern, played in real time as an ensemble, and practiced
root and inversion chordal accompaniments.

"Rote learning, memorization, and convergent thinking are more likely to be augmented or even replaced with discovery learning, problem solving, and divergent thinking by the use of some forms of technology."[10] In formal lecture courses taught in *Smart* classrooms, courses such as Music Appreciation, Music History, and Music Business can have a myriad of presentation patterns that support these learning processes. A smart classroom is one that is technologically up-to-date. It incorporates technology such as an Internet ready computer, digital LCD data projector, DVD, CD player and document camera. With these resources,

[10] Peter Webster, "Historical Perspectives on Technology and Music." *Music Educators Journal* Vol. 89, No. 1 (September 2002): 38-43

students can apply styles of learning through demonstration, analysis, synthesis and collaboration using *PowerPoint* presentation, and other formats. In a classroom such as this, technology can support an abundance of music listening servers. Libraries that subscribe to music servers such as *Rhapsody.com*, *itunes*, or educational music servers such as *Naxos Music Library*, or the *Smithsonian Global Sound*, and others, are resources that give online access to a tremendous number of recordings. Additionally, while listening, instructors and students can read insightful information about the composer and composition.[11]

Conclusion

Technology is an exquisite and elaborate bridge to the fine and performing arts. Most students of today come to college with a high degree of computer skill. It is essential that faculty and administration meet today's student with instructional pedagogy and technological hardware that incorporates the latest advances in technology. Computer aided learning is a real advantage, and in most cases, can enhance course content. Schools that offer students technological skill development are preparing students to meet the challenges in the performing and working world.

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