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THE ROLE OF TECHNOLOGY IN MUSIC EDUCATION: A PRECONFERENCE SATELLITE SYMPOSIUM FOR TANGLEWOOD II

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A seminal event in the history of 20th Century music education, the Tanglewood Symposium (held in 1967) provided an opportunity for leading scholars of the era to meet and exchange ideas about the direction of the field. Meeting at Tanglewood in the Massachusetts Berkshires, these 34 scholars gathered for the primary purpose of examining the role of music in American society. As a means of expanding the scope of the event and the perspectives offered, this group was addressed by 17 guests and spent considerable time in dialogue with one another. As a lasting record of this conversation, a report was published containing an assessment of the current state of knowledge and providing vision for the future (Choate, 1968). During the decades since its publication, this collection of papers has been among the most oft-cited sources in the field of music education.

To commemorate the original Tanglewood Symposium and celebrate its legacy, a 40th anniversary event is being organized. Under the title "Tanglewood II," the symposium was held June 25-29, 2007, at Williams College, a 30-minute drive from the original site.[1] An international group of 32 scholars was invited to participate in the continuation of the dialogue initiated in the 1960s, building upon the findings of the 1967 congress and integrating knowledge gained from recent research in many related areas of study including music perception and cognition, multiculturalism, music technology, and many others. The present author is honored to have been selected as the individual responsible for presenting on the topic: "The effects of technology on music learning." Other invited presenters and their topics include:

- Randall Allsup (Columbia University): Music as a people-centered process
- John Kratus (Michigan State University): Music education and democracy
- J. Mark Scearce (North Carolina State University): The value of music in society and education
- Margaret Schmidt (Arizona State University): Psychology of the learner of music
- Terese Volk (Wayne State University): Global effects on music education
- David G. Woods (University of Connecticut): Transcending borders

- Frank Heuser (University of California, Los Angeles): Out of the box: Outstanding programs

Each of these invited speakers was responsible for organizing a pre-symposium "satellite conference." Participants in these regional events was to include scholars in higher education who are considered experts in the field, colleagues from other related disciplines and perhaps most importantly, grassroots input from K-12 teachers.

In the following pages, I will share with you the excitement and energy that emerged from the two-day satellite symposium on music technology, hosted by the University of Minnesota (UMN) School of Music on April 6-7, 2007.[2] As organizer, my initial task was to identify individuals who are considered leaders in the integration of technology for the purpose of enhancing music learning in our schools, both K-12 and higher education. From the outset, I realized that it would be imperative to ensure the participation of leading experts from across the country who are involved in music technology-related research, practicing teachers in K-12 schools, arts administrators, and experts in related fields of inquiry. I was very pleased to succeed in getting top-notch scholars to participate for the duration of the two-day event: Nancy Barry (*University of Oklahoma*), William I. Bauer (*Case Western Reserve University*), Sara Hagen (*Valley City State College*), Rocky J. Reuter (*Capital University*), Kimberly Walls (*Auburn University*), and David B. Williams (*Illinois State University*). We also were joined by Anthony J. Palmer (*Boston University*), one of the Directors of the Tanglewood II Symposium. Charles Miller (UMN Learning Technologies) represented other faculty at the University of Minnesota, as he shared his expertise related to software design. Three K-12 teachers, Josh Countryman (Brooklyn Center High School, Minneapolis), Peter Hofmann (Burroughs Community School, Minneapolis), and Jeremy Mann (Westwood Middle School, Blaine, MN). Two arts administrators, David O'Fallon (President, MacPhail Center for Music) and Pat Teske (Arts Coordinator, Minneapolis Public Schools), informed the dialogue significantly, sharing their own experiences as practicing teachers and/or supervisors. The many voices heard during these sessions resulted in a depth and breadth of understanding that simply would not have been possible otherwise.

Invited Presenters

Each invited attendee was asked to provide an introductory presentation on a topic agreed upon prior to the satellite conference. A brief summary of each of these presentations is provided below. Due to space limitations in the present article, there is simply no way that these reports can do justice to the innovation and creativity inherent in the complete presentation. If the reader is interested in learning more, I encourage you to visit the satellite conference web site http://tanglewood.umn.edu/, where you can

view the event program, photos, videos of each presentation in its entirety, and other related information.

Sara Hagen. School Music: Support for the Use of Technology in a Standards-based Curriculum

Dr. Hagen opened her presentation by reviewing recommendations resulting from the 1967 Tanglewood Symposium, including establishment of a committee on Advanced Educational Technologies, training of selected MENC members to become leaders in technology applications, and creation of in-service training for practicing teachers. She also transported us back in time to review some of the technological advances present in schools during the late 1960s: duplicating machines, audio recordings, consumer video recordings, classroom teaching aids, television, and the beginning of individualized instruction using computers. Two primary developments accurately identified by those present at this initial congress were the predictions that (a) libraries and collections of music would be programmed into computers to be readily available anytime and anywhere and (b) computers would be able to use their incredible processing power to adapt repetitive teaching tasks to students based on their individual needs and past performances.

Following the 1967 Tanglewood Symposium, an Arts and Humanities program was initiated during the 1968-69 academic year with the purpose of carrying out projects designed to develop and utilize appropriate instructional media and technological aids to facilitate music learning (Lehman, 1968). In addition, the November 1968 issue of the *Music Educators Journal* was devoted to the topic of electronic music, including its history and ongoing evolution, new sounds in the classroom, and student compositions. Dr. Hagen then reviewed the development of the National Standards for Arts Education (MENC, 1992) and identified technology-related presentations on the program at the National Music Educators Conference the year these standards were published and primary technology-related MENC publications during the years since that time.

Equally important to the dissemination of information related to technology applications in music was the development of a number of important organizations and scholarly meetings, including the Association for Technology in Music Instruction (ATMI), Technology Institute for Music Educators (TI:ME), and the National Symposium on Music Instruction Technology (NSMIT). Establishment of the *Journal of Technology in Music Learning* in 1999 was another highly significant development. She concluded her presentation by referring to several online resources beneficial to teachers interested in utilizing technology in meaningful ways, including:

- Music Teachers and Technology created by Dr. Sam Reese at the University of Illinois, Urbana-Champaign
  http://www-camil.uiuc.edu/mtt/

- K-12 Resources for Music Educators
  http://www.isd77.k12.mn.us/music/k-12music/

Nancy Barry: Technology in Music Teacher Training

Dr. Barry began her presentation by emphasizing the fact that more than any preceding generation, technology is a part of our current students' culture. The use of the Internet, email, text messaging, instant messaging, Weblogs, and chat rooms are becoming more and more common for educational, social, and entertainment purposes. The popularity of music in digital format (MP3, ACC, etc.), eventually embraced by an initially reticent music industry, has resulted in a wholesale transformation of the music distribution process in both newly released and repackaged classics. Apple's iPod and other portable media players are becoming ubiquitous aspects of student life. YouTube (http://youtube.com) and other similar websites open the door to a whole new world of possibility regarding access to media of almost any description–historical and contemporary–from anywhere in the world with an Internet connection. As educators, however, most of us have yet to harness these technologies in meaningful ways that enhance our students' learning experiences.

Dr. Barry suggested that typically technology can be found in teacher training programs in two primary categories: (a) tools for school and (b) interactive student learning. Essential technology skills for academic study (i.e., tools for school) include word processing, presentation programs (*PowerPoint, Keynote,* etc.), electronic portfolios, music notation software, electronic library resources, marching band drill design software, and "smart" accompaniment systems (e.g., *SmartMusic*). Types of interactive student learning include music composition (sequencing, loop-based software, etc.) and technology-based music performance.

Distinguishing generational differences, she identified current students as "natives," born into a world of digital technology. In contrast, university music teachers tend to be "immigrants," struggling to adapt to this new cultural age. Given this already-present disparity, Dr. Barry asked, "How will music teacher-educators prepare future teachers to be fluent in the native language of today's tech-savvy students?" This general question raised a number of related philosophical issues. First, will it be necessary to expand our present definition of "music literacy?" For example, does a high level of fluency with software like *GarageBand* constitute music literacy? Second, how does instructional technology fit within a school music culture that continues, by and large, to be dominated by performance-based outcomes (solo recitals, ensemble performance, etc.)? Related practical concerns quickly emerged. For example, amidst the many responsibilities assigned to teachers at every level, how is it possible to stay abreast of rapidly

evolving technologies? Also, during a period when education budgets continue to be cut, how can K-12 school programs afford to invest in technologies proven useful as a means of facilitating student learning? In addition to the initial investment associated with such integration, updating hardware and software upgrades also must be factored into any budgetary planning process.

Dr. Barry concluded that a paradigm shift will be required in order to allow the kind of forward-looking thinking that will ensure success. We must reassess, and perhaps expand, our definitions of "music making" and "musical experience." In addition, it will be essential that related professional organizations (Music Educators National Conference, American Music Teachers Association, American Choral Directors Association, American Band Directors Association, etc.) become actively engaged in this process, formulating standards, publishing useful materials, and disseminating information via conferences and workshops.

William I. Bauer: Transforming Music Teaching via Technology

Dr. Bauer clearly established his belief that the key ingredient in any classroom for student learning is the teacher. Based on this fundamental belief, he queried: "What knowledge, skills, and dispositions related to music instructional technology are necessary for music teachers to transform their teaching and their students' learning via technology?" A review of related literature revealed a number of opinions on the matter. Deal & Taylor (1997) concluded that students need training in the basics of computers (file management, operating systems, databases, spreadsheets, etc.), computer-based instruction & available software, notation & sequencing programs, MIDI, multimedia hardware & software, courseware development, using the Internet, and accompaniment software. The Technology Institute for Music Educators (TI:ME) identifies six areas of technological competency: (a) electronic musical instruments, (b) music production, (c) music notation software, (d) technology-assisted learning, (e) multimedia, and (f) productivity tools, classroom and lab management (Mash, 2007; TI:ME, 2007). According to the National Association of Schools of Music handbook, "Students must acquire the ability to use technologies current to their area of specialization" (NASM, 2007, p. 97). The National Council for the Accreditation of Teacher Education (NCATE) has aligned itself with the International Society for Technology in Education (ISTE) and as a result, several NCATE standards refer specifically to technology-related requirements.

> "COMMITMENT TO TECHNOLOGY: The unit's conceptual framework(s) reflects the unit's commitment to preparing candidates who are able to use educational technology to help all students learn; it also provides a conceptual understanding of how knowledge, skills, and dispositions related to educational and information technology are integrated throughout the curriculum, instruction, field experiences, clinical practice, assessments, and evaluations." (NCATE, 2006, p. 13)

The ISTE frameworks (ISTE, 2007) provide National Educational Technology Standards for students (NETS-S), teachers (NETS-T), and administrators (NETS-A). Walls, Bauer, & Richmond (2005) and Bauer (2005) address the implications of the NETS-T framework in music learning contexts. As we move into the future, music educators will benefit greatly from a closer association with the broader educational community.

When determining the potential of technology toward transforming music teaching, two types of teacher learning need to be considered: pre-service music teacher education and in-service music teacher education (i.e., professional development). An AERA review of research literature (Resnick, 2005) suggests that professional development has a better chance of creating a lasting impact on the practices of teachers in the classroom and their students' achievement when it is subject-specific and focused on student learning, instructional practices, and the development of teachers' understanding of content within their discipline. Also, professional development is more effective when it is aligned with the classroom environment in which students are taught. In addition, professional development appears to result in improved teaching and learning when it is connected to authentic curricular materials, district and state academic standards, and the actual assessment instruments and processes that are used to measure student achievement. Finally, it appears that more time spent on professional development leads to greater change in teacher practice. In reality, however, we must acknowledge that teachers tend to spend limited time engaged in professional development activities.

Dr. Bauer shared results from a collaborative study (Bauer, Reese, & McAllister, 2003). Participants engaged in a one-week workshop on music instructional technology, consisting of a total of 30 hours of training. Three indicators of effectiveness were assessed: teacher knowledge, teacher comfort, and frequency of teacher use of technology. All three measures improved significantly in a post-training assessment. Most important, 9 to 10 months later, although the measurable improvement had receded somewhat, all these indicators of effectiveness remained significantly higher than they were prior to the one-week training session. He concluded his presentation stating that "to truly establish the conditions where music technology can transform the music teaching/learning process, teachers need opportunities for high quality professional development that is designed around research-based principles and targets the knowledge, skills, and dispositions necessary for success."

Scott D. Lipscomb: What Does Research Tell us About the Efficacy of Using Technology in Educational Settings?

I opened my presentation by providing a brief chronology of research approaches to music technology integration from the 1950s to the present, identifying a number of important reviews of this literature published within the past 15 years (Berz & Bowman, 1994; Higgins, 1992; Peters, 1992; Walls, 1997; Webster, 2002). Then I discussed a number of periodicals and

conferences in the period since the 1967 Tanglewood Symposium (Britton et al., 1968) that have provided opportunities for scholars to present their research findings and network with like-minded colleagues. Dedicated serial publications include the *Journal of Computer-based Music Instruction*, the *Journal of Technology in Music Learning*, and the *New Journal of Music, Technology, and Education*. Related papers sometimes are published in other primary music education journals such as the *Journal for Research in Music Education*, *The Bulletin of the Council for Research in Music Education*, the *Journal for Music Teacher Education*, *Contributions to Music Education*, *Music Educators Journal*, state MEA periodicals, and many other resources. The two primary educational associations in the field of music technology are Technology Institute for Music Educators (TI:ME; primarily for K-12 teachers) and the Association for Technology in Music Instruction (ATMI; serving primarily higher education).

I discussed in some detail a model of the research/development process proposed by Berz & Bowman (1994). In this model, the development of new technologies emerges as a result of collaborative relationships established between industry, government, and higher education institutions. The adaptation of these newly developed technologies involves a process of feasibility testing and assessment of effectiveness for use within an educational context. If determined to be feasible and effective, higher education institutions serve as the conduit for introducing these innovations into K-12 classrooms. My primary critique of the Berz & Bowman model lies in the fact that the model represents the involvement of the K-12 classroom as a one-way input, an external infusion of sorts. I proposed instead a revised model of technology development that *emerges from* the K-12 classroom where technology needs to serve educational objectives are best determined and, in collaboration with higher education partners, can be passed on to the developmental process involving industry and/or government. Then higher education and K-12 participants would become actively engaged partners in the feasibility testing and assessment of effectiveness as the educational technology evolves systematically into a pedagogically meaningful application of technology to music learning.

Kim Walls: Distance Learning in Music Education

Dr. Walls opened her presentation by defining distance learning as "technology-mediated interaction of a community of learners separated by time and/or space." She then expressed her belief that distance learning changes the way music teachers and students interact. Then she discussed statements made by those involved in the 1967 Tanglewood Symposium. Max Lerner (1968) predicted that communications and education would be *the* industries by the year 2000. The Committee on the Impact and Potential of Technology stated explicitly that both man and machine must be considered (Britton et al., 1968). In other words, not only must we consider what technologies are being developed, but significant attention also must be paid to the implications of these technologies for society at large.

Following a brief review of some of the technological developments of the mid- to late-1960s, Dr. Walls provided numerous examples to suggest that many of the predictions of this previous era have been, or are being realized. Of the questions posed by Choate & Kaplan (1967), she focused on four specific items during her session. First, considering what was considered the virtually unlimited potential of television (commercial, educational, and instructional), what steps might be taken to realize the potential for music? In recent years, we have certainly seen the options available for widespread distribution of music rise. We now have access to hundreds of television channels (including dozens of music-only stations), streaming radio via the Internet, video on demand, PBS instructional video downloads, PBS lesson plans on the web, and many other resources too numerous to mention. Even *American Idol* has been used for educational purposes and to facilitate the development of critical thinking skills.

A second question regarded the matter of the "new leisure" and its impact on the wider use of the arts and music. According to Dr. Walls, many baby boomers have resumed music lessons and as a result of technological developments, now it is possible to take music lessons via distance learning. This technological development has incredible potential for those in rural areas who do not always have ready access to music teachers or private instructors. Instructional videos can offer some of these same benefits. In addition, the evolution of Web-based communities for musicians provides almost unlimited possibility for creative musicians interested in promoting their own music, networking with others interested in common musical styles, and learning about places, both online and physical, where more information can be found.

A third question involved the means by which technology might be utilized to bring music to a wider audience. The use of videoconferencing technology by the Manhattan School and many other academic institutions at the leading edge of technology development provide opportunities for master classes and performances in remote locations that could not have been otherwise realized. Live streaming of audio–and sometimes video–of recitals and ensemble performances by universities makes these performances significantly more available, especially when digital files are archived and available for playback at any time via the Internet. *YouTube* archives contain many rare performances by master musicians, a potential treasure trove of educational materials involving both sight and sound. One of the most significant breakthroughs in recent years is the decision by most recording companies to make music available for download in digital format via the *iTunes* Store and other online distribution centers. Music in a dizzying array of genres and musical styles has never been more readily available to consumers.

Finally, Choate & Kaplan asked: "What are some prospects for further technologies in the teaching process? What aspects of the learning process, or of teacher-student relationships may be most affected?" There is no doubt that technology has had a significant impact on the teaching process

and the associated relationship between student and teacher. As one example, office hours are often replaced these days by a series of email communications. Dr. Walls concluded that though technology will not replace the teacher, a new set of skills undoubtedly is required.

David Brian Williams: Reaching the "Other 80%." Using Technology to Engage "Non-traditional Music Students" in Creative Activities

Setting the tone for his presentation, Dr. Williams began with a quotation from a statement by the well-known behaviorist, B.F. Skinner. In reference to teacher preparation around the time of the Tanglewood Symposium, Skinner (1965) stated that "college teaching, indeed, has not been taught at all ... the beginning [college] teacher receives no teaching preparation. He usually begins to teach simply as he himself [sic] has been taught and if he improves, it is only in the light of his own unaided experience" (p. 80). Such a "teach as one was taught" pedagogical approach is of questionable value in an era when so much has changed within our educational system, including the dramatic advances in music technology.

Williams reviewed a selected list of recommendations and predictions proposed at Tanglewood in 1967. An impressive number of these have been successfully integrated into music education, e.g., constructivist teaching strategies, individualized computer aided instruction, software for music creativity, high quality digital audio and video, ethnomusicology (now treated as a discipline within music), and many others. Of critical importance, however, are specific recommendations that did *not* develop as anticipated. The most critical, he feels, are the recommendations that emerged from Tanglewood papers and panels that made a strong appeal for providing music education for *all* students, including nonperformers. The Tanglewood report noted, for example, that some 20% of high school students in 1967 were engaged in school music programs (Kaplan, Bailey, Hartshorn, Lawson, Roberts, & Wersen, 1968) and that students who arrive at college with nontraditional forms of musical experience (rock musicians, performers on non-Western instruments, etc.) find themselves turned away from most conservatories and university music programs (Bruck, Stahl, & Williams, 1968). Dr. Williams noted that this situation is little changed today. He referred to an "inverted pyramid of music experiences" that begins with the widespread availability of participatory musical experiences during elementary general music at the top ("music for all") and diminishes with the specialization inherent in the high school ensemble experience at the bottom of the model ("music for a few;" see Williams, 1987).

Confirming the current state of participation in school music programs, Williams shared some of the research work of his graduate students. Edwards (2006) collected data from four geographically disparate states: Florida, New York, California, and Ohio. The percentage of "non-performers" in grades 6-12 ranged from 70% in Ohio to 88% in California, with an average of 82% across the four states. Little national data exist to shed further light on the percentage of secondary students not served through music educa-

tion. The data that are available suggest that current music programs in secondary schools serve less than 20% of the total number of students, severely limiting the impact of such musical training on the general population of American youth. Williams refers to this unmet population in secondary music education as the "non-traditional music student" (NTM).

Based on his students' work in the schools and anecdotal data from other music teachers nationally, Williams characterized the NTM student as an individual in grades 7-12 who does not participate in a school's traditional performing ensembles, may have a music life completely independent of school music, may or may not play an instrument (if so, it will most likely be drums, guitar, or voice), reads very little if any music notation, and may be unmotivated academically or a source of disciplinary problems. A timely book by Lucy Green (2002) provides case studies from her research into "how popular musician learn" and offers unique insights that are useful in understanding the nature of the NTM student and appropriate teaching strategies for reaching this group.

McAllester's (1968) predictions in the Tanglewood report were incredibly prescient, Williams emphasized, and relate directly to "the other 80%" (NTMs).

> "We have a splendid beginning in the early grades, when children are sometimes lucky enough to get acquainted with rhythm and melody on all sorts of simple and unconventional instruments. They have the thrill of exploring the delights of free creativity without a long apprenticeship in technique first.... We might entertain the idea that someone who never does develop skills on conventional instruments could become a gifted performer on unconventional ones.... Someone who never learned to read conventional notation might nonetheless become an outstanding composer in some medium where notation has yet to be invented, or may even be impossible to invent" (p. 97).

Technology, Williams suggests, offers new tools for reaching the nontraditional music student. Software creativity tools empower individual expression for music, graphics, animation, home design, script writing, and many other artistic pursuits by removing many of the technical skills required for entry activities. Specifically in relation to music learning, technology is opening new doors to musical creativity and expression, accessible to the nonperformer and nonreader of traditional music notation, what may be termed the "GarageBand phenomenon" (see Williams & Webster, 2006). He proposed that, looking forward, we can project the potential of an "every-person's Renaissance" as we move from the Information Age to the "Creative Age" that is brought about by this new generation of sophisticated and artistically "intelligent" software creativity tools.

Williams concluded his remarks by challenging Tanglewood II to revisit the 1967 Tanglewood recommendation for MENC in respect to students in grades 7-12: "promote a greater recognition of music education's importance for the "non-performing" student and to further an understand-

ing of appropriate materials and strategies of instruction by music educators at the senior high school levels." (Kaplan et al., 1967, p. 132).

Rocky J. Reuter: Using Technology as an Integral Part of Performance

Dr. Reuter opened his statement by sharing his own personal experience during his early training, while working with a fifth grade general music class. The first couple of class sessions proved extremely discouraging, as the students seemed uncooperative and unmotivated. In his efforts to engage these students, he came to the realization that they were not "brain dead" (his initial assessment); rather, they had been "brainwashed." They had grown to hate general music class: It was boring and they simply didn't care about it. He later learned that these students had spent most previous class sessions passively watching videos. As an aspiring teacher, Dr. Reuter began to create a student-centered classroom environment within which participants collaborated in the process of creating a composition of their own, under the guidance of their young teacher. Along the way, he was able to teach them a little about music notation, history, theory, and other related areas as such topics became relevant to the learners.

In preparation for his presentation, Dr. Reuter found himself particularly inspired by a posting to the Roundtable Discussion (a forum for virtual discussion on the Tanglewood II web site) concerning a book by Ronald B. Thomas (1970). The set of "considerations" included in the Preface to this text remain highly relevant today, several of which served as a framework for his presentation:

- In improvisation a musician employs instant musical judgments.
- Notation is only a coding device, a storage and retrieval thing ... a system for translating musical ideas for future recall, not for acquiring or developing musical sensitivity or sensibility.
- Electronic music is here to stay. It is not even really avant-garde, since we are well into the third generation of electronic composers.
- Webern is no longer contemporary–in fact he's an historical landmark–music is either pre- or post-Webern.
- Popular music lets people act like musicians–not like statisticians, computers, abstract designers, mechanics, or finely honed tools to be manipulated.
- Young students, whose minds have not been closed by the educational system, do not think Berio or Stockhausen are unmusical and peculiar.

Dr. Reuter noted the limited opportunities available to music students for experience in improvisation within the context of most high school or university programs. The ability to create music spontaneously is not yet a consistently valued capability expected of our students.

Opportunities for students to explore "musical palettes" other than traditional instruments–though not absent from the institution–remain in a

less prominent, secondary role within most music programs. Primarily a "traditionalist" (90% or more of his compositions are acoustic), Dr. Reuter was attracted to electronic music because it offered an alternative palette of musical timbres for utilization in his creative process. In an effort to meet the needs of his students, he has worked to create both a traditional B.M. degree in Music Technology and also a B.A. track in Music Technology within a Professional Studies degree at Capital University that does not require an entry audition, completion of the music theory & ear training sequence, keyboard fundamentals, or participation in traditional ensembles, but does require that students successfully complete the requisite music technology courses.

The remainder of his presentation consisted of a tour of some useful online electronic instrument resources and demonstrations of technology-based music performance, including:

- 120 Years of Electronic Music – http://www.obsolete.com/120_years/
- Michael Brecker Plays EWI – http://www.youtube.com/watch?v=kOEF7f2HGoE
- Capital University MIDI Ensemble – http://www.capital.edu/internet/default.aspx?pid=2397
- James Morrison and the Morrison Digital Trumpet – http://jamesmorrison.com/

In closing, Dr. Reuter allowed Bob Moog to present his posthumous assessment (via streaming video) of the current state of the recording industry:

> "What's been happening over the last several decades is that music is becoming more and more something that producers do by themselves for listeners who listen by themselves. Where if you go back, say, before electronics, music is always something that was done by musicians and listeners being together and interacting. I think that kind of interaction is the most important aspect of music culturally."

According to Dr. Reuter, this kind of interaction is also one of the most important aspects of music technology. Providing phenomenal tools for creativity and productivity, available technologies allow composers, arrangers, and anyone who wants to be involved in the creative process a ready means to do so, thus making it easy to hear a composition immediately after sequences of sounds have been conceived. However, until we bring these musical ideas to the stage, transform concepts into musical sound, and establish a cultural interchange in a live setting, the promise of music technology will never reach its pinnacle. Dr. Reuter proposed that such music technology performance opportunities could provide a promising means of reaching "the other 80%" of traditional non-performance students to which Dr. Williams alluded previously.

Following each presentation, the entire group of participants engaged in an animated question and answer session, evolving into a focused group discussion on the topic under consideration. The content of these discussions was documented with the assistance of two note takers and large Post-It™ sheets that were used to capture essential items during the discussion periods.

After this initial series of presentations, the core group of discussants was joined during the Friday afternoon session by Charles D. Miller, a member of the Learning Technologies faculty at the University of Minnesota. His insights into matters related to "aesthetic design" and "expressive aesthetics," specifically as they relate to software creation & development, were incredibly valuable to us as we considered music-related technologies. The group was joined on Saturday morning by a group of three K-12 instructors who actively integrate technology into their classrooms and two arts administrators who added their experience-based insight concerning the use of technology within arts curricula. This lively session presented many familiar themes associated with technology use (pitfalls, challenges, and promise) and introduced to us a number of issues that will require a significant amount of work to resolve if we truly wish to make technology available to all students for use in pedagogically meaningful contexts. The information gained from these individuals, involved daily in the process of practical application in the classroom, were both inspiring and humbling.

In final preparation for the Tanglewood II Symposium, it was my task, with the assistance of these highly talented colleagues with whom I have recently had the opportunity to work closely, to organize, collate, and codify the many topics of discussion, valuable insights, and visionary ideas emerging from our discussions into a coherent set of recommendations for the consideration of music educators at all levels. Each recommendation was associated with one or more "action item" intended to move the field toward the intended objective.

I am energized by the potential benefits that have emerged as a result of the two-day satellite symposium described above. I hope that the reader will take time to navigate to the official Tanglewood II web site and peruse the materials that will be archived there to document the events that transpired this summer. After all, the primary objective of this entire process is to benefit our students in the classroom and to facilitate the processes of music teaching and learning.

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Footnotes

[1]For more details about the Tanglewood II Symposium, visit http://www.bu.edu/tanglewoodtwo/

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