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Critical listening assessment in undergraduate music technology programmes

ABSTRACT

This article explores the general lack of specific course sequencing that measures critical listening skills designed for undergraduate students in music technology, commercial production and vocationally focused degree programmes. Although traditional music performance and education curricula prescribe a sequential examination of history, theory, keyboarding and aural skills, a comprehensive set of standardized listening competencies focused on preparing students for the realities of working in the commercial music, audio and media fields do not exist. This article envisions a balanced collaboration between industry expertise and peer institutional review to conceive a new rubric for evaluating critical listening in undergraduate music technology programmes that meets accreditation standards while preparing graduates for entry-level employment in media-centred fields. This article explores the potential collaboration of audio industry professionals and organizations with educational institutions to create a set of competencies that are workforce-specific, but suitable for academic purposes. This article explores such collaborations through cognitive apprenticeship and multisensory learning.

KEYWORDS

critical listening
audio critical listening
music technology education
cognitive apprenticeship
multisensory learning
industry and higher education
reflective learning

INTRODUCTION

Outside of regional accreditation, the National Association of Schools of Music (NASM) is the primary accrediting body for community colleges and four-year institutions offering undergraduate degrees in music-related areas in the United States (National Association of Schools of Music 2014). Although the organization provides an extensive set of requirements for institutional membership, there exists little information on how to rate music technology for practical classroom use along with a set of best practices suitable for technology-specific assessment of learning outcomes (Walls 2000).

Music composition and audio engineering programmes using multimedia technology to meet production-centred competencies at the undergraduate level realize student exit outcomes while encouraging creativity (Cubric et al. 2011). At present, no standardized rubric or course degree sequence exists that addresses aural skills specifically for music producers and audio engineers. This lack of accreditation standard creates an inflexible learning gap in both vocational-based training programmes and undergraduate music production degrees whose primary goal is to prepare students for an ever changing field heavily dependent on technology (Boud et al. 2009). Course development that fosters and encourages overall media literacy is a strong indicator in achieving desired student learning outcomes (Hobbs and Frost 2003).

As a rapidly expanding field that is heavily dependent on technology, no comprehensive and audio-centred rubric exists for evaluating critical listening skills in undergraduate music technology degrees largely due to the multidisciplinary focus of sound-related fields (Kemmerer, cited in Tough 2010: 152). This is particularly evident in audio engineering and music production courses delivered via the Internet. Because the influence of media technology permeates all aspects of course design and delivery, addressing how to evaluate audio-focused listening skills in traditional and asynchronous course delivery systems is an important next step.

Chen's (2014) recent study with tablets and mobile devices in traditional aural skills courses shows how successful technology implementation improves rhythmic and melodic skill acquisition. Using smaller, portable devices for delivering skills-based content changes how aural skill sets are measured. Historically, evolving music technology platforms directly influence the ways listeners consume and assimilate commercially produced music. In essence, major advancements in delivery platforms require a new form of digital literacy by musicians and consumers alike (Durant 1990).

Rossing et al. (2012) note generally positive student responses when using mobile devices to support in-class musicianship lectures citing the student's ability to quickly access supplemental information and interact in multifaceted ways with the technology. Although these emerging technologies offer exciting ways to explore musical content, instructors should add mobile devices carefully with thoughtful attention to in-class activities (Rossing et al. 2012). Detailed instructions using supplemental open-source software proved useful for students completing acoustical ear training exercises (Pejuan and Novell 2009: 386).

MUSIC TECHNOLOGY AND ACCESSIBILITY

The accessibility of digital recording technology inspires an outpouring of artistic expression, particularly in students in post-secondary institutions. Those forms of expression intersect with music technology, informal classroom instructional techniques and a deep connection to personal expression (Cubric et al. 2011). Young children exposed to digital audio workstations have basic skill with music technology before college matriculation. Hobbs and Frost's (2003) research suggests students in post-secondary institutions improved their fluency with digital media through a creatively implemented series of audio and multimedia messages.

Music technology and audio engineering students are evaluated by rubrics set forth by regional and national accreditation standards through NASM and similar agencies. Tough (2010: 150–51) notes college music administrators tasked with curricular decisions generally lack awareness of the rapidly evolving skills sound and media professionals need for successful job placement after graduation due to their lack of recording studio experience.

The power of Internet-based media delivery alters the theoretical way consumers measure audio quality (Edwards 2011). The result is a democratization among audio engineers, music producers and hobbyists largely in part due to a duel process of consumption and production by media enthusiasts (Tough 2010: 150). Exploring media and web-based software implementation that tests aural comprehension offers cost-effective solutions for instructional designers and faculty members (Hannan 2006).

The literature refers to instances where web-based ear training software facilitates equal levels of success between experienced musicians and novice players while supporting the fact that strong aural dictation skills translate well to other music-related disciplines (Nishimura 2013; Rogers 2013). Moulton's (1995) ear training companion series pioneered disc-based supplementary materials for use in technical courses. A balanced music curriculum coupled with cooperative listening environments may prove useful for both audio and traditional music students (Smialek and Boburka 2006).

As the evidence suggests, aural training through non-traditional means has been successful for music students in traditional programmes. The next logical step includes the development and evaluation of software and mobile applications that challenges undergraduate audio engineering and music technology majors to understand frequency ranges, production aesthetics, the creative use of effects and recreating examples of finished mixes.

AURAL SKILLS FOR AUDIO ENGINEERS AND MUSIC PRODUCERS

A solid mastery of the core precepts of audio engineering includes basic acoustic concepts, analogue and digital recording formats, historical trends in recording practice, dynamic controls, timbre, microphone properties and placement, signal flow, session planning and protocols, problem-solving and troubleshooting, stylistic tendencies and final delivery formats. Corey (2010: xi) differentiates this practice from traditional conservatory approaches through the creative use of signal processing in recording environments to shape the listener's experience. Audio engineers and music producers must carefully evaluate the relationships among track volume, stereo imaging or panorama, equalization and frequency range, timbral characteristics, sound's interaction with other surfaces, proper listening environments and creative best practices. In this scenario, perceived sound occurs in a three-dimensional context (Dittmar 2012). Moylan (2002 cited in Draper 2013: 4) bridges these specific technical parameters with thoughtful analyses of essential recordings to illustrate the creative decisions audio engineers make throughout the recording process.

Everest (2007: 2) observed audio-specific critical listening skill acquisition as a series of small, incremental listening exercises in which the engineer must recognize sonic issues through repetition, adjustment and memorization. Everest (2007: 2) and Corey (2010: x) note these skills may be nurtured and refined through relevant audio experience. Audio-specific curricular structures must balance hands-on session experience with essential theoretical concepts reinforced through critical listening textbooks and accompanying media (Moulton 1995; Everest 2007; Corey 2010).

While traditional music ear training courses provide important foundational information about melodic, harmonic and rhythmic dictation, they generally do not focus on the relationship between pitch and frequency range, amplitude, and how sound is manipulated for artistic purposes. Even music-specific ear training exercises delivered via mobile platforms show that students generally score better in rote memorization of certain pitches and rhythms (Chen 2014).

Pejuan and Novell (2009) explore the possibilities of multisensory training using free digital audio software acquired from the Internet where students explore the basic sound properties of simple recordings, with a closer study of pitch/frequency relationships, loudness and timbral quality. These cost-effective laboratory exercises introduce the basic acoustical theory that establishes a powerful connection between critical listening skills and visual analysis. The assignments are easily accessible to students with a computer (Pejuan and Novell 2009: 380).

Most traditional aural skills courses focus primarily on pitch identification, rhythm, harmony, form and melodic structure. Although this training provides a broad foundation in music, it overlooks acoustical theory and the creative applications of digital signal processing. The audio-specific listening gap involves a general lack of understanding in the precepts of practical sonic manipulation for creative expression. On a broader level, limited musical study minimizes the power creative sound design has on connecting with the listener's ability to visualize and characterize timbre in specific ways (Back and Des 1996: 2–4).

Aural-skills training for music technology students may include recognition of frequencies, dynamics processing, a chronological examination of recording technology from distinct eras in musical history, instruments commonly used in both electronic music and acoustic ensembles, musical examples of creative application of effects including reverberation and delays, and supplemental readings. Draper (2013: 10) encourages audio researchers and educators to explore diverse pedagogical approaches through creative projects, reflective exercises and peer evaluation.

APPRENTICESHIP, PRACTICAL COGNITION AND MULTISENSORY EDUCATION

Miskiewicz (1992: 1–5) thoroughly explored the connections between identification of changes in timbral quality, acoustical principles and influence on the listener. These audio-specific competencies supported a rubric that codified timbre in a balanced and relevant way that considered the particular listening needs of the audio engineer. Designing the course sequence over a period of years ensured sufficient time so that students deeply acquired essential critical listening skills useful in a recording environment (Miskiewicz 1992: 1–5).

Quesnel's (1994: 38–41) timbral ear training software development explored a multifaceted process in aural skills comprehension through a tiered system that guided students towards vital skills-acquisition while supporting their learning through faculty mentorship and cognitive apprenticeship. Collins et al. (1991) observe the need for intersection of practical application of knowledge through relevant skill-based exercises and thoughtful teaching that fosters critical thinking and problem-solving abilities. As timbral ear training is refined and sharpened, students may use technology independently and with a keen awareness throughout their entire training cycle (Quesnel 1994: 38–41).

Students with proper training in contemporary signal manipulation develop a new aural awareness that is not entirely dependent on musical context. Honed critical listening skills pass through a series of exercises on a balanced set of tools including signal generators, AC and DC circuits, and digital audio workstations. Designing similar types of learning exercises must consider the audio engineering perspective. The literature suggests meeting these aims through open-source educational courses provided by respected higher education institutions (Oppenheim 2011).

Audio-focused critical listening courses may incorporate a tiered system of memorization of frequency bands, microphone polarity patterns and placement, instrument and amplifier types and common problems encountered in the recording environment including distortion, phasing, clipping, jitter, buzzing and noise along with recorded examples of each. Through repetition, the novice listener will recognize particular aspects of sound that are vital for audio engineers to understand. While each institution would have some freedom to adapt these principles to taste, a codified system, in describing and measuring the qualities of sound, is imperative. Additionally, there is new research towards the development of audio-based ear training software that may ultimately replace the need for an instructor's presence while the audio student completes the exercises (Kaniwa et al. 2011: 439).

Meaningful and action-driven course design in music technology and audio education examines the various roles of scholars, theorists and practitioners with a particular emphasis on emulating industry-driven best practices. Thompson and McIntyre (2013) note that many courses in audio production taught by practitioner/scholars generally mirror the intricacies of the recording studio and practitioners mentor students based on relevant professional experience outside of higher education. Additionally, that practical experience coupled with a solid foundation in pedagogy and an awareness of institutional mission guides students towards realizing their creative potential (Thompson and McIntyre 2013).

Specific aspects of the audio presented in an aural skills class should include supplemental discussions of how sound manipulation influences creative decisions dictated by equipment and workflow choices, historical and cultural context, and musical tendencies (Corey 2012: 1–4). Additionally, supporting course content should include acoustical theory, noting how certain listening environments influence listeners in a visceral way. Students may produce soundscape recordings later analysed for sonic and emotional content (Cain et al. 2013). These supporting activities broaden the scope of critical listening in a way that explores how sonic changes support analytical thinking concepts (Corey 2012: 1–4).

Practical, audio-centred ear training need not be limited to just the wholly technical aspects of sound properties. This curriculum may also include a historical overview of the development of recording technology, observing how those advancements change our perceptions of music creation (Chanan 1995: ix–1). Just as music history courses provide a broad context about the craft of music composition over several centuries, the evolution of recording contextualizes the evolution of contemporary music production tendencies (Chanan 1995: ix–1).

Supporting the cultural and technical aspects of music ear training includes careful, reflective practice by the student. Beyond recognizing the specific aspects of the sound and production sensibilities, exercises may include a listening journal required each semester. Classroom discussions and online content should encourage students to connect with the material they hear, particularly its context and influence on the listening experience. Students may compose a short piece in the style of the assigned listening using modern tools including digital audio workstations and basic notation software. This practical application of attentive listening encourages their creativity while supporting reflective learning outcomes and empowering teachers (Barton and Ryan 2014). The additional reflective practice may come from evaluating the recording, editing and use of technology to complete similar assignments (Tobias 2013: 216–17). When relevant technology is used, student interest in the subject matter is also positively emphasized (Pejuan and Novell 2009: 386).

As the undergraduate audio major strengthens their technical and theoretical understanding of the key properties of sound, basic acoustical theory and historical evolution of recording practice, an audio-focused critical listening sequence must then address some of the possible aesthetic decisions and creative approaches through appropriate mixing exercises. The lab portion of the critical listening course sequence addresses the potential artistry creative mixing inspires (Izhaki 2013). Gottlieb (2007: 8–13) observes the relationship between sound and aesthetics as deeply personal. Beyond the technical exercises, classroom discussions might explore how personal tastes subjectively influence positive responses to creative decisions.

The traditional process of songwriting, music creation and recording intersect and often overlap, generally straying from the predetermined aspects of music production commonly associated with the studio environment (Tobias 2013: 214–15). Workflow strategies throughout the creative process evolve and change in a more holistic fashion, largely determined by the musician's access to production tools. Meticulous and careful listening is an important part in the successful completion of supplementary composition exercises as the student must evaluate the structural and sonic aspects of their piece along with the recording environment when capturing sounds (Tobias 2013: 219).

As the student's technical and practical knowledge of sound increases, so too does their ability to decipher the possibilities of media delivery formats and possible impact of mixing decisions on the audience. Corey (2012: 1–4) observes some emerging trends in the subjective measurement of sound quality by various manufacturers through online advertisements and discussion forums. Classroom discussions and reflective exercises on sound quality may enhance student understanding of accurately measuring the recording quality of a final master along with improving their ability to synthesize course content (Corey 2012: 3–4).

Ultimately the audio-specific critical listening course sequence should embrace a systematic approach that guides students towards autonomy in making creative, aesthetic and technical decisions through relevant lab work, historical and social context and independent discovery. Collins et al. (1991)

observe how this diverse and thoughtful model of education encourages a collaborative relationship between the teacher/practitioner and the student apprentice.

PARTNERSHIP WITH INDUSTRY

A focused collaboration between audio engineering and music technology industry expertise and peer institutional review may conceive a new rubric for evaluating the merits of an audio critical listening course sequence over several semesters that meets regional and programme-specific accreditation standards. Institutions collaborating with the audio industry establish a strong collaboration to address workforce and academic competencies in music technology. There exists a mission to educate and offer training for instructors in post-secondary institutions in effective implementation of music technology into existing curricula under the standards of the Technology Institute for Music Educators (Richmond 2005). Colleges and universities may provide similar training for current faculty while ensuring their pedagogical best practices match those deemed most essential. Additional peer evaluation of facilities, technology and curricular programming provided by the Joint Audio Media Education Support (JAMES) system in the United Kingdom includes industry and academic professionals (Joint Audio Media Education Support 2013).

There exists a comprehensive accreditation standard for audio engineering and music technology programmes with the JAMES System in the United Kingdom. This organization collaborates with both higher education and industry experts to evaluate the facilities and overall programme outcomes of each participating college (Joint Audio Media Education Support 2013).

A close analysis of JAMES reveals an extremely fluid relationship in the collaboration between participating academic institutions and recording industry professionals. Although the accreditation process is like that of NASM regarding peer review, the JAMES accreditation team consists of working professionals with an inside knowledge of the intricacies of technical programmes and necessary workforce skill sets (Joint Audio Media Education Support 2013).

Industry perspectives on critical listening skills are particularly useful in vocational programmes designed to prepare students for the workforce in a relatively short period. Although these courses are shorter in length and scope, their primary aims are to respond to the needs of employers in the field while remaining current with technological trends and are useful to adult learners (Eurich 1990).

Undergraduate music technology majors replace the traditional apprenticeship model in which critical listening skills grew through real-time creative practice in recording studios and similar facilities. The timing is right to consider a practical revision of assessment and learning outcomes in the educational sector to bridge competencies honed in the audio engineering programme with those found in the workplace after graduation (Davis and Parkers 2013).

For on-campus music technology programmes, significant communication between educational institutions and leading audio manufacturers ensures students understand the protocols in using and troubleshooting common equipment found in the recording studio and production facility (Scheirman 2013). Additionally, audio engineers with decades of practical experience mixing contemporary music also provide essential feedback on curricular decisions related to technical ear training and best practices in how to apply those listening skills in recording, mixing and mastering sessions. Industry professionals may also guide music professors in common and accessible ways they can integrate music software into daily classroom activities.

Effective implementation of available music production, notation and ear training software must consider how that technology truly enhances student learning and the most practical ways classroom instructors might find it useful (Webster 2007: 20). Although the industry perspective is valid when considering how audio engineers use their ears creatively in the workforce, further research must determine how the development of standardized audio training software benefits music technology students in measurable ways (Webster 2007: 20–21).

Between 2008 and 2011 members of the Audio Engineering Society (AES), Game Audio Network Guild (GANG) and the Interactive Audio Special Interest Group (IASIG) joined to formulate a suggested curriculum for institutions specializing in game audio and related subject areas (Onen et al. 2011). The institutions focus on a broad sense of interdisciplinary skills that embrace career trends (Onen et al. 2011).

The collaboration of these organizations prescribes a similar first-year common course sequence for students to follow while encouraging institutions to adapt the curriculum to meet their specific needs. More importantly, the prescribed curriculum achieves a balance between technical skill building and honing interpersonal communication skills and commonly found best practices in the areas of game design and audio (Onen et al. 2011).

Partnership with industry should not be limited to accreditation and assessment. Thompson and McIntyre (2013) note that designing an industry component in recording projects with local labels provides students with an important context for evaluating their work in the professional world along with building positive social networks. Moreover, educational institutions that seek to build relationships with industry partners also guide students towards professional opportunities after graduation (Thompson and McIntyre 2013).

CONCLUSION

Commercial music, audio engineering and technology-based undergraduate programmes need curricula that balance workforce-specific requirements with critical thinking, problem-solving and soft skills. A critical listening course sequence should chronologically explore the fundamentals of sound properties, look at the historical evolution of recording technology as a craft, incorporate specific mixing, production and composition exercises that emulate historical periods of recorded sound or key albums, and consider the influence of technology on creative decision-making in the studio and beyond. Courses should include supporting readings that explore multiple genres of music, a technical analysis of the recorded music and observe some of the changes in technology and their influence on music culture over the past century and beyond. Additionally, students should prepare for reflective activities including listening journals and analytical listening exercises. Moreover, courses should include an integrated classroom structure that fosters a guided and thoughtful apprenticeship model along with encouraging students to use their eyes and ears.

A careful balance should address the purely technical aspects of sound, basic musical concepts, and some of the broader cultural and historical trends in recording practice. Composition, production and mixing exercises should progressively increase in difficulty and correspond to the historical periods in which those productions took place, either through the creative sound manipulation of existing multitrack sessions, or by creating new musical ideas that share commonalities with the productions studied in the course. Critical listening discussions should include a biographical look at the engineers involved in the sessions, the basic technology used to capture that sound, and how the engineer's creative decisions influenced the final product.

Audio critical listening courses need not replace training in musical aural skills and theory completely. As more empirical research reveals the collaborative possibilities between the commercial audio sector and higher education on the identification, evaluation and quantification of listening competencies, curricular decisions should consider the specific institution's needs, resources and mission.

Ultimately, an audio-focused critical listening sequence validates the need for relevant aural skills training that legitimizes emerging commercial music production sensibilities in higher education. Educational institutions should pragmatically work with the private sector to conceive practical course matrices that are equal parts relevant and comprehensive; the result is a synergy between the vocationally focused skills found in the workplace and the theoretical concepts acquired in a successful undergraduate music technology programme.

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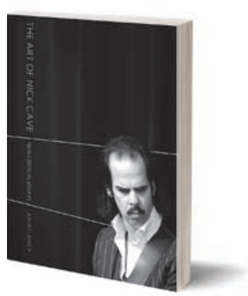

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