# ONLINE MUSIC LEARNING: INFORMAL, FORMAL, AND STEAM CONTEXTS

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## Abstract

The increased development and learning benefits of online learning technologies have prompted music educators to rethink the possibilities of learning music online (Crawford, 2013). Found throughout the Internet on sites such as Online Academy of Irish Music Online, BanjoHangout.com and MusicTheory.net, online music learning has firmly established a base of informal learning. The informal online music learning context has been built through specific affinity groupings - online communities and websites that promote learning music through identity, community or curriculum skill sets. The innovation of formal online music learning (i.e. post-secondary credited courses) utilizes the academic learner's affinity for music. According to preliminary data as identified in this paper, formal online music learning is currently increasing at an exponential rate of inclusion. While formal online music learning is not a fix-all for niche faculty programs like music, it can present opportunities for offering students flexibility in time and location, community of collaboration, and assistive learning modalities for broader ranges of students (Crawford, 2013; Johnson, 2016). Dove-tailing on the innovations available in online music learning, we conclude by highlighting the field of audio engineering - a discipline that requires both music and mathematical skills. As a connector to STEAM education, online learning becomes an important learning support for audio engineering students taking physics as they can better experience audio, visual and practical aspects of music and physical mathematics.

**KEY WORDS:** informal formal online music learning STEAM STEM

## 1. INTRODUCTION

Crawford (2013) describes music education at a pivot point for educational change – change that welcomes the 21st century education technology of online learning to become commonplace in the field of music education. With appropriate pedagogical supports for instructors, students in remote and rural areas can partake in interactive online music learning. Education is situated in a context of current technologies and its relationship to learning and innovation has prompted a world that is changing at a historically accelerated pace (Brown and Adler, 2008). While there remain tenured music faculty who are reluctant to embrace online music

learning (Johnson, 2015), the increased use of informal and formal online music learning opportunities may provide further impetus for such hesitant faculty.

Given the swift and educational-based opportunities in technology, it is understandable that post-secondary education evolves to include innovations that bring together the benefits of technology and student learning. Online learning is one such technology innovation that can provide students with interactive learning opportunities. "Whereas traditional schools offer a finite number of courses of study, the 'catalog' of subjects that can be learned online is almost unlimited… Furthermore, for any topic that a student is passionate about, there is likely to be an online niche community of practice of others who share that passion" (Brown and Adler, 2008, p. 28). Moreover, "the majority of researchers agree that online instruction is at least as effective as traditional ways of teaching" (Tallent-Runnnels, 2006, p. 105). Placed within the current needs of music education, online music learning addresses some of the current challenges of declining post-secondary music student enrollment as noted by Leonard (2003) and strategies for future formal arts education development suggested by Jones (2007).

The first accredited, online music course available at the post-secondary level is attributed to Valley City State University's Music Fundamentals course in 2004 (Klingenstein and Hagen, 2013). Given the relative newness of music in the post-secondary online course context, the importance of informal music learning in the online medium has been of great importance to the overall development and understanding of learning music in an online context. Drawing from the examples of informal online music learning communities, future possibilities for formal online music learning may be explored. Furthermore, the learning connectedness of the arts creates the STEAM terminology (i.e. Science, Technology, Engineering, Arts and Mathematics). Miller (2014) describes the inclusion of the arts as addressed in STEAM as an avenue of significance to develop authenticity of creative, problem-based learning. Together, informal, formal and STEAM learning identify the multi-faceted influences of online music learning possibilities. To this end, this paper will survey some of the current explorations of online learning for music through these contexts.

## 2. INFORMAL ONLINE MUSIC LEARNING

It is apparent that technology has been an important tool for teaching musical heritage in addition to providing opportunities to creatively explore our musical future. De Vaney and Butler (1996) described the use of audio-visual technology in early 20th century education. Prior to this technology, Hesser (1936) described the inclusion of teaching music courses via radio technology. As the 21st century unfolds, Purves (2012) and Webster (2007) described formal music education using technology as more of a supplementary and limited tool. However, researchers have confirmed the effectiveness of using online learning technologies for teaching music skills (Draper, 2008; Dye, 2007; Eakes, 2008, Hammond and Davis, 2005) and addressing the community needs of musicians (Salavuo, 2006).

The NAMM 2010 Global Report of "Attitudes Toward Music" U.S. Gallup Poll indicated that 58 percent of households in the United States have at least one instrument player and 43 percent have two instrument players – the highest levels since its initial 1997 poll. In the fall of 2015, a basic search on Youtube.com for videos categorized under "learn music course" identified 1.5 million videos. A similar Youtube.com search for "learn to play guitar" identified 1.09 million videos. Such simple searches demonstrate both the relevance of an informal context to music learning and the breadth of informal learning opportunities available on a single website. Such data aligns with Cope's (2002) assertion that there is a prevalence of informal music learning outside of the boundaries of a music classroom.

While questions of performance authenticity or pedagogical effectiveness are not regulated on public facing websites site like Youtube.com, this example does suggest that there are people looking to share and participate in informal music learning in an online context. The exploration of learning music online in an informal manner can be attributed to the desired for unique, or personalized learning objectives, motivations, and appeal to the intrinsic need for community. Given the vast opportunities for informal online music learning provided by the Internet, students can now choose how they wish to develop their music learning - by professional learning community affinity groups, desire for a particular social community, or by concrete, sequential manner. The following examples depict the diversity of informal learning offerings for music online.

## 3. INFORMAL LEARNING THROUGH IDENTITY

There are many informal online music learning opportunities regarding particular musical styles or learning to play an instrument. The Online Academy of Irish Music - OAIM (http://oaim.ie) is one of many examples of an informal online music learning opportunity. Described as having both free versions and a paid-version, this video-based online hub focuses on teaching music from the identity of Irish tradition. It provides students with opportunities to learn to play Irish musical instruments (e.g., Uilleann pipes, tin whistle, etc.) from instructors who are experts in traditional Irish music. While video and email assessments from tutors are available in a fee-based system, those wanting to learn basics of the Irish style, its musical identity and locate other affinity-minded individuals can freely explore their website. Kenny (2013) suggested that, "Rather than moving away from tradition, however, the study of the OAIM revealed the importance of retaining core pedagogical approaches of the genre as well as fostering this distinct affinity with Ireland and traditional music as crucial to its member's sense of belonging and collective identity" (p. 48).

## 4. INFORMAL LEARNING THROUGH COMMUNITY

A notable sense of community is found throughout the literature of informal online music learning (Salavuo, 2006). Furthermore, the pervasiveness of technology permits an unprecedented number of people, including those marginalized, to experience personalized learning through online learning (Brown and Adler, 2008). It can be suggested that participants in informal online music learning are not often common to one geographic location or nationality. These learners convene in an informal online learning community for furthering musical pursuits as well as engaging in social participation (Salavuo, 2006).

An example of how informal online music learning is sought through community and social participation and spans both geographic and nationality contexts is the Banjo Hangout (hĀp://www.banjohangout.com). Described in a cyber-ethnographic case study by Waldron (2011), the Banjo Hangout is an informal learning community of over 51,000 people that is centered on the affinity of the banjo instrument. Current to the date of writing this article, one of the forum areas had over 408,000 posts related to playing the banjo.

Forum members post their questions about the banjo and its style-related questions to seek responses from its members of varying playing levels and ages. This affinity community was built by providing opportunities for students to connect both with instructors in their local area, as well as instructors specific banjo styles. Online lessons are available to members through both asynchronous videos, and synchronous lessons from online instructors. While the banjo is generally associated with Bluegrass music (typically from the southern United States Appalachian area), it is easily observed that instructors in the Banjo Hangout are from a broad global community that includes, USA, Canada, Finland, and the UK.

## 5. INFORMAL LEARNING THROUGH CURRICULUM SKILL SET

Informal online music learning opportunities can also take a pointed curriculum focus as the means to developing musical understanding. These curriculum-based, online learning hubs tend to offer interactive learning for music students as well as used as a way to provide both traditional and online music students with immediate automated assessments and 24-7 resources.

MusicTheory.net is an example of an interactive online music theory learning hub, originally developed by Ricci Adams. Focused on assisting music students with learning the basics of music theory through to chordal music analyses, students have opportunities to use the web-based or app version to solidify their music theory skills.

This particular type of informal online music learning is focused on learning music theory via graduated skill sets, and generally do not seek to focus on building a community of learners. Informal online music learning opportunities such as this allow for students to progress at levels comfortable to the student, and offer remedial help as requested from student initiative. Koopman (2007) affirmed informal music learning. He suggested that, "Teachers should allow initiative: they should take care that pupils increasingly come to learn by themselves" (p. 160).

## 6. INFORMAL LEARNING THROUGH MOTIVATION OF GAMIFICATION

Music learning is further differentiated by an aesthetic understanding (Reimer, 1989) and praxis (Elliott, 1995). While aesthetic learning holds value for music appreciation and nominal learning constructs, the praxial understanding of music assists in the pragmatic application of music performance. While to some extent a learner requires procedural knowing before able to engage in music: "What music is, at root, is a human activity… Fundamentally, music is something people do" (Elliot, 1995). Given this necessary participatory aspect to music, whether it is learning to listen, perform, produce and/or compose, motivation is an underlying footprint for the ways in which students become involved in music making.

An example of how students are motivated by informal online music learning can be demonstrated in the interest of music gamification. While online learning sites such as the above mentioned MusicTheory.net exist for improving specific musical skill sets, informal online learning opportunities like "Friend Jam" from Roland Music Corporation (Eaddy, 2012; Donovan, 2011). "Friend Jam" combines the learning of musical skills sets (e.g. learning a particular song, etc.), assessment of performance through a virtual assessment analyses, and scoring the user in a world ranking. Linking learning and community through gamification motivation, students have asynchronous opportunities to improve their guitar or drum performance based on playing on physical instrument (i.e. GR-55 or VG-99). Unlike games like GuitarHero™, "Friend Jam" instruments are replicas of the actual instrument that allow for direct skill set translation to an acoustic guitar or drum set.

## 7. FORMAL ONLINE MUSIC LEARNING – POST-SECONDARY COURSES

Groulx and Hernley (2010) identified a lack of documentation for pervasive use of blended and online courses for music at the undergraduate and graduate levels. During this same time, general online academic courses in post-secondary education were offered to over 6.1 million enrolled students in 2010 (Allen and Seaman, 2011) and similar meta-analysis research prolifically demonstrated student assessment outcomes as similar or higher in blended and online courses than traditional face-to-face courses (Means et al., 2009). Allsup and Benedict (2008) and Purves (2012) suggested music education faculty viewed technology as supplemental in their teaching, which may explain the lack of formal learning through online music courses at the post-secondary level. However, as the following preliminary data analyses suggests, formal online music learning has recently begun to shift in popularity.

## 8. THE CURRENT STATE OF ONLINE UNDERGRADUATE MUSIC COURSES

To provide a better insight into the openness for use of online learning in music, the authors completed a preliminary study. A random sample (n = 262) of accredited National Association of Schools of Music institutions (N = 657) was completed Fall 2015. Data used was from each university's online course finder. Of the sample, 39% of the schools were identified as providing one or more music courses using 100% online course delivery method during the year 2015. Figure 1 identifies the sample's percentage of NASM accredited institutions that offer fully online undergraduate music courses.

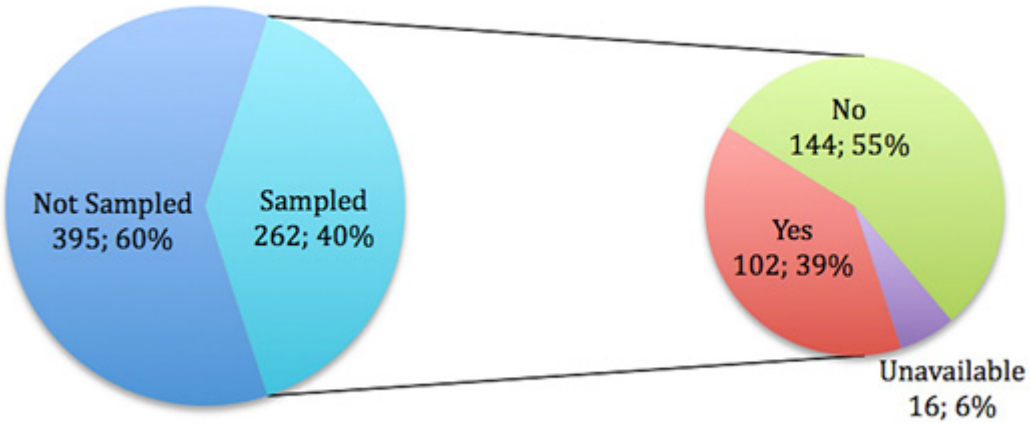


**FIG. 1:** Overview of online music course offerings for the years 2007 through 2015. A random sample (40%) of the 657 total NASM schools were investigated. From these it was found that 102 schools offered online classes, comprising 39% of schools sampled. The remainder of data and figures in this paper refer to these 102 "Yes" data subset schools.

### 8.1 Exploring a Subset Sample

From the random sample of institutions offering online music courses during the 2015 year, a subset sample of 60 programs was investigated. Data were collected from the current year (2015) back to the initial year online music courses were offered by each particular institution. Examination of data showed Angelo State University, Arizona State University and Abilene Christian University as being the earliest offerings of online music courses within the subset sample. These institutions started offering online music courses in 2007, 2007 and 2008, respectively. The initial courses offered included Music History and Music Appreciation. The total subset sample growth of online music courses from the initially reported start in 2007 to current displays an exponential trend as shown in Fig. 2.

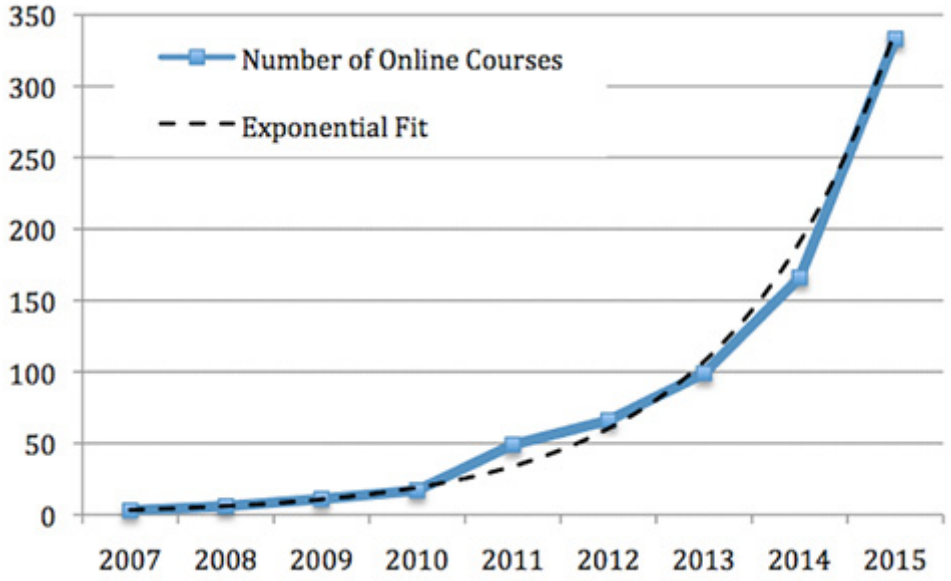


**FIG. 2:** Number of online music courses offered since 2007, taken from a random sample of NASM programs. The dashed line shows an exponential curve fit, corresponding to the linear regression shown in Fig. 3 (below).

To label the growth shown in Fig. 2 as "exponential" is not merely metaphorical, as illustrated in greater detail in Fig. 3, where a logarithmic graph of online course offerings shows a linear trend. This yields statistically significant linear regression value of $R^2 = 0.99$, representing a growth trend of $10^{x/4}$, where x is the number of years since 2007.

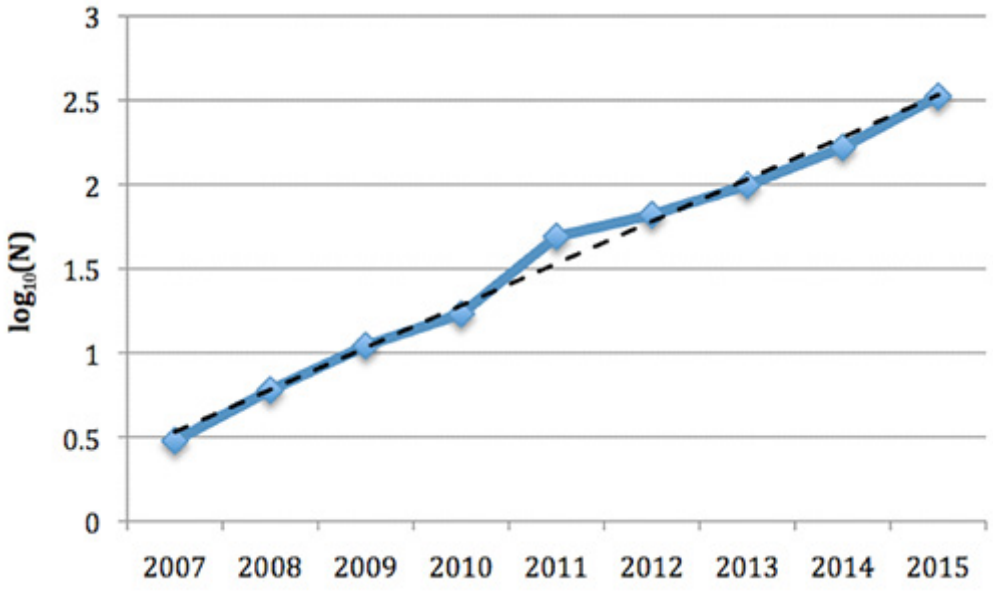


**FIG.** 3: Logarithm of N, the number of online courses taken from a random sample of NASM programs, for years 2007 onward. The dashed line shows a least squares fit with an $R^2$ value of 0.99 and a slope of 0.25.

Using all of the data collected from the subset sample over all of the years in the sample, the 60 unique schools offered a total of 728 online music courses. It was found that music history was the most popular course category to be offered in the online format. The second most popular course category offered was Music

Appreciation. The third most popular course category was Musicology, which consisted of courses surveying musical styles and general topics in music. These data are shown in Fig. 4.

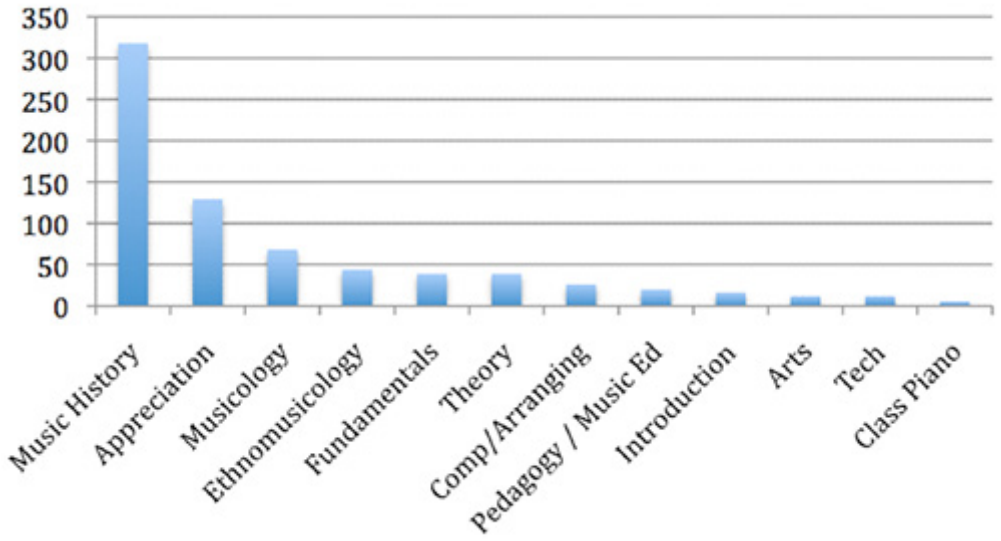


**FIG.** 4: Number of online music courses offered according to course title, taken from a random sample of NASM programs.

Because some of the institutions named their course titles differently, data collected were also combined according to course themes, illustrated in Fig. 5. These analyses demonstrated similar results to the initial analyses in that the grouping of music history was found to be the most common course theme at 44% of the total of online music courses offered. Combined, music appreciation, introduction to music and music fundamentals were found to represent 25% of the data collected. A combination of musicology and ethnomusicology were found to be third most popular at 15% of all online music courses offered.

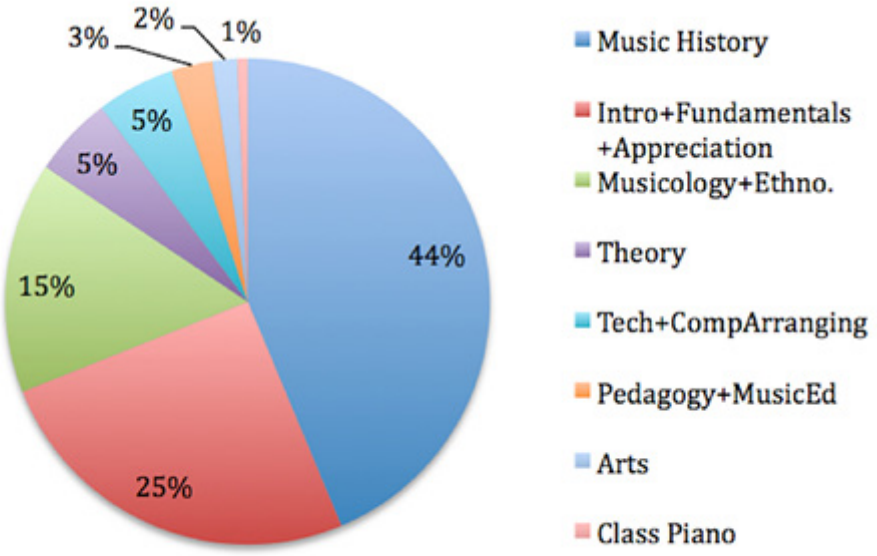


**FIG. 5:** Percentage of online music courses according to course topic, taken from a random sample of NASM programs.

Note: Due to the lack of consistency of course naming conventions across all NASM institutions, data percentages for Music History could be higher. For example, American Popular Music was classified as Music History by some institutions and as a Musicology course by others. However, this ambiguity does not affect the ranking outcome of Music History offerings as being the primary online music course offered as it would only shift data items from Musicology and categorize them under Music History.

## 9. FULLY ONLINE UNDERGRADUATE MUSIC PROGRAMS

In October 2013, Berklee Online, (http://online.berklee.edu/music-degrees) an online extension of the renown Berklee College of Music in Boston, MA began offering their first fully online Bachelor of Professional Studies degree program in Music Business and Music Production. While this program is not NASM accredited, its suite of online music courses culminate in a Bachelor degree. Berklee Online followed on the tails of Valley City State University. VCSU was the first accredited Bachelor of Music program in a fully online format with their initial online music courses started in 2004.

## 10. GRADUATE ONLINE MUSIC PROGRAMS

Groulx and Hernly (2010) compiled research data in 2009 that identified only nine NASM accredited online music graduate institutions. These institutions were identified as having at least 80% of the course offered in an online format. Their findings indicated that the following institutions offer online graduate music programs: Auburn University, Boston University, East Carolina University, Ohio University, Stephen F. Austin University, University of Hawaii at Manoa, University of South Florida, University of Montana, and University of Southern Mississippi.

Webster (2007) indicated that complete distance learning music courses were only "now more commonplace" (p. 1322). It can now be suggested that this emerging trend of offering music courses in a 100% online format is now becoming formalized. Identified online programs are geared toward graduate music education study, with individual undergraduate general music courses beginning to emerge as observed in university course calendars and online web searches. Evidence of the growth of online music programs is now available. Since the Groulx and Hernly (2010) article, the following additional institutions now offer online graduate music programs according to a web search: University of Florida (College of the Arts), University of Georgia, Rutgers University (Mason Gross School of the Arts), Duquesne University (Mary Pappert School of Music), and Kent State.

Those interested in audio engineering, musical acoustics, auditorium acoustics and physics of music are considered part of the music discipline in some institutions. From this connection of acoustics in music, programs in acoustics are also part of the formal online music learning array that bridges into STEAM. For example, Penn State (http://www.acs.psu.edu/DistanceEducation/) provides a formal Graduate Program in

Acoustics through its College of Engineering. Started in 1987 as a distance learning program, the program has grown to stream over 20 courses online, including courses in acoustics of musical instruments and architectural acoustics. This type of formal online learning is of significance as the learning of acoustics involves not only listening and production of sound sources, but the development of laboratory skill sets, device monitoring, and acquiring and demonstrating mathematical understanding - learning that was once viewed as particularly challenging for an online learning environment.

## 11. STEAM AND ONLINE MUSIC LEARNING

The incorporation of online learning for subjects in the sciences, mathematics, and languages is becoming commonplace in the research literature. Online learning studies investigate, compare, explore, and assess the

various subjects that were previously taught in face-to-face classroom teaching experiences. But has there been a tendency to regardonly "academic" subjects to signal the legitimacy of the online learning experience? Has it not been demonstrated that instructors can develop authentic problem-solving courses using an online learning structure that require high amounts of student engagement and cognitive skill learning? If the technology learning experience has set the stage to provide authentic learning as suggested 20 years ago by Jonassen, Davidson, Collins, Campbell and Haag (1995) for students in subjects such as the sciences, then it can be posited that this same delivery mode could authentically deliver arts education, specifically the discipline of music performance.

While music performance can be described as an artistic subject that is individual in expression, it has teaching components that require pedagogical strategies (i.e. scaffolding of technique proficiency, repertoire, artistic interpretation etc.), problem-solving skills (i.e. determining note choice in improvisation, instrument inventions etc.), language acquisition (i.e. understanding musical notation, transposition, orchestral arranging, etc.), and historical context (i.e. historical performance practices, instrument history, etc.). While tenured faculty may question the limitations of online learning medium for the arts (Johnson, 2016), perhaps such limitations have been assumptive or fear-based. With the legitimacy of online academic learning now firmly founded by research studies, it is time to break open the barriers to online arts education in higher education and explore the avenues to authentic design of online music learning experience in informal and formal learning contexts.

## 12. AUDIO ENGINEERING (MUSIC RECORDING TECHNOLOGY)

Programs in Music Recording Technology, also known as Audio Engineering, bridge the gap between 'purely artistic' concerns of music (e.g., composition and performance) and the 'technical' disciplines of applied electrical, mechanical and acoustical engineering. Many students in these programs are both musicians and engineers. As such, these programs serve as important test cases for the integration of STEAM-related concepts. Audio engineering is primarily concerned with the construction of sound signals that have the desired effect on the psychoacoustical perception of the listener. Thus students of audio engineering are highly trained in the perception, identification and modification of sounds and their causes, whether physical, electro-acoustical or purely synthetic. This requires facility with conceptual and technical aspects of both music and physics.

Belmont University's major in Audio Engineering Technology (AET) was the first Audio Engineering program to be accredited by the Accreditation Board of Engineering and Technology (ABET). As part of Belmont's program, students must complete a three-course physics sequence in order to provide them with a solid foundation in the science. These are courses upon which audio engineering practices and products are built, so that students can be more adaptable and competitive, and have greater insight, compared to vocational-school-trained students, whose educations may be more limited to merely operating current equipment. Such courses provide opportunities for students to use online learning resources to explore and investigate the phenomenon of acoustics through visualization and experiential learning.

In contrast to student majors in physics or traditional engineering disciplines, audio engineering students begin their studies with a limited exposure to mathematical rigor and little expectation that mathematics will be necessary, however the technical realities of quality engineering work often demand numerical precision. For example, a typical acoustics course in engineering or physics disciplines will incorporate differential equations, which audio engineering students are not expected to be able to handle. On a different level, even the algebra tasks that 'hard' science students may find trivial, can present audio engineering students with not only a computational challenge, but a nontrivial cognitive disconnect between the mathematical operations

per se and their conceptual implications. Indeed, a primary limiting factor in conceptual physics learning gains has been shown to be pre-instructionmathematicalcompetency (Meltzer, 2002), and not pre-instruction physics knowledge itself.

Regarding online learning, STEAM courses face a challenge when transitioning to the online learning environment due to the empirical and experimental nature of the sciences. Specifically, physics classes commonly require a laboratory component that is generally conducted on-location due to the need for specialized equipment and the need for instructor oversight (e.g. to fulfill regulatory safety requirements). The development of online learning resources for science disciplines is facilitating an optional shift towards fully online physics courses. An example of this shift is evidenced in Belmont's online Acoustical Physics course (PHY1100). Appealing to its music and music business students, the course is taught fully online, with an on-location laboratory component.

The development of mobile device sensors and related apps, provide an opening for students to perform some laboratory experiments "at home," off-site. The sophistication and ubiquity of mobile device sensors increasingly allow for a wide range of introductory physics laboratory experiments to be conducted without specialized equipment. Examples of laboratory exercise topics possible via smartphones are mechanics of acceleration and rotation, spectroscopy, magnetism and acoustics, and are further identified below. To this end, the exploration of visualization, web apps and online learning tools become integral bridge toward developing fully online courses.

## 13. VISUALIZATION AND INTERACTIVITY

To help make the connection between mathematical computation and conceptual understanding, some STEM educators have stressed the importance of visualization for student comprehension and retention. As an example, Dr. Yang-Hann Kim, recent recipient of the 2015 Rossing Prize in Education from the Acoustical Society of America, advocated the use of visualization techniques to help students (and researchers) understand the physics of sound, and wrote an entire textbook devoted to the subject of sound visualization (Kim and Woo, 2013).

Web-based applications can provide not only visualization but also interactivity, allowing for the addition of a 'tactile' component to learning. In physics classes for audio engineering students at Belmont University, students are provided with opportunities to experience the visual and tactile learning outcomes of physics using Java applets written by their instructor. These experiential, online applets illustrate principles such as simple harmonic motion, a transistor amplifier, and electronic filter circuits. These applets were designed specifically to demonstrate the conceptual implications of the underlying mathematically-governed physical processes, and are included in a peer-reviewed online library of similar instructional tools via the physics section of the MERLOT Resource Library (Hawley, 2014).

CircuitLab.com is an example of an online learning resource for both traditional and online physics courses. This resource is currently utilized in physics classes for audio engineering students at Belmont. This online circuit simulation service allows for students to build and simulate a diverse selection of relevant circuits, and can serve as a "virtual electronics laboratory" (e.g. www.CircuitLab.com).

## 14. PROJECT-BASED LEARNING

In the physics classroom, personalization of learning is furthered by the incorporation of various components of online learning, such as the design of learning tasks. One specific learning task given to audio engineering students at Belmont allows students to explore their understanding of practical physics theory through web

apps and online simulators. In particular, students are required to investigate a phenomenon of their choosing over the course of the semester, culminating in oral presentations and a term paper. This arrangement allows and encourages personalization of course content, as students are able to apply course content to topics which they are interested in, and contributes a boost to student motivation and morale. Topics have included musical instrument design, amplifier modeling, room tuning, remote sensing, and recently, mobile app development for audio applications.

As the music product industry becomes increasingly dominated by modeling technology and digital signal processing, the number of students with interests spanning music, audio engineering, physics and computer science has increased. Platforms such as mobile devices or the HTML5 WebAudio standard provide powerful environments in which students can rapidly develop interesting tools and investigate audio environments such as reverberation (via WebAudio's real-time convolution capabilities), Fourier synthesis and spatial audio. Most recently, students developed an iOS app for measuring reverberation times which could be used "on the go."

Miller and Doering (2014), in their book, *The New Landscape of Mobile Learning: Redesigning Education in an App-Based World* assert, "If there is one area of learning technologies where quality research is needed, it is within the field of mobile learning" (p. 188). The field of physics instruction is no exception to this. The body of peer-reviewed, anecdotal evidence from physics classroom practitioners is growing, as evidenced by the "iPhysics" column in The Physics Teacher (the primary publication of the American Association of Physics Teachers) and the "Smartphones in Science Teaching" program of The European Platform for Science Teachers. Kuhn, Vogt and Müller (2014) described how students were able to explore the phenomenon of a moving elevator by exploiting the accelerometer in a mobile camera. In an earlier writing, Kuhn and Vogt (2013) showcased the use of a phone's microphone for acoustics experiments. While such articles outline the mobile technology available to complete laboratory exercises, the extent and impact of student learning outcomes are typically not overtly addressed. In terms of the educational impact, it can be observed that the exploration and development of research in the field of physics laboratory exercises has implications on student learning and substantiates the impact of online learning for STEAM-connected courses.

## 15. CHALLENGES AHEAD

Amid long controversy regarding the complexities of delivering effective music education using information communication technology (ICT), questions such as how ICT impacts the music learning experience and the consequential effects on pedagogical approach and qualities of learning outcome are now at the forefront (Hebert, 2007). Online STEAM courses face similar challenges when transitioning courses which require laboratory components (e.g. empirical and experimental exercises) to a fully online environment. Research suggests that a basic face-to-face course cannot be moved to an online course without consideration of pedagogy and organization of content and cognitive learning styles (Tallent-Runnels et al., 2006). This then identifies the need for preparation of specific institutional supports (Johnson et al., 2012), alignment for digital music licensing, faculty development, and significant faculty resource areas to aid this burgeoning field.

## 16. CONCLUSION

Given the informal and formal online learning formats, music students are currently able to not only retrieve information about learning music, but interact and participate in social context of music learning - the horizon for online music learning is rich with opportunity and clearly identified as increasing exponentially. While we are faced with primarily pedagogical challenges to overcome, the opportunities and meaningful learning

students are encountering demonstrate that indeed, online music learning is not only a rich learning experience but one that can take place in the informal, formal and STEAM online learning contexts.

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