2011

Technology-Based Music Courses and Non-Traditional Music Students in Secondary Schools

Josh A. Bula

THE FLORIDA STATE UNIVERSITY

COLLEGE OF MUSIC

TECHNOLOGY-BASED MUSIC COURSES AND NON-TRADITIONAL MUSIC STUDENTS IN SECONDARY SCHOOLS

By

JOSH A. BULA

A Dissertation submitted to the
College of Music
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

Degree Awarded:
Fall Semester, 2011

Josh A. Bula defended this dissertation on November 4, 2011.

The members of the supervisory committee were:

Brian Gaber
Professor Directing Dissertation

John Drew
University Representative

Clifford Madsen
Committee Member

Steven Kelly
Committee Member

The Graduate School has verified and approved the above-named committee members, and certifies that the dissertation has been approved in accordance with university requirements.

This work is dedicated to everyone who has given me
unconditional love and support throughout my life and career,
including my parents, family, friends, students, teachers,
and basset hound.

ACKNOWLEDGEMENTS

I would like to thank the many outstanding professors, teachers, and mentors at the Florida State University whose knowledge and guidance have been invaluable throughout my education and experience. I especially wish to thank my major professor Brian Gaber for his time and expertise in the planning and preparation for this document and for allowing me the experience and growth as a teacher I experienced as his graduate assistant. Thank you also to Dr. Clifford Madsen, Dr. Steven Kelly, and Dr. John Drew for your assistance as members of my committee and for the musical, educational, and personal growth I have experienced through your teaching.

I would also like to acknowledge that as an undergraduate student at FSU, Dr. James Croft, Dr. Bentley Shellahamer, and Dr. Michael Allen were instrumental in my inspiration to become the best teacher, musician, and conductor I could possibly be. Thank you all for your friendship and support from the very beginning and throughout my career as a music educator.

Thank you to the teachers of technology-based music classes who contributed their advice and knowledge as subjects in this study, including Dustin Hinzman, Curtis Edwards Jr., Clark Burris, Matthew Hill, Marjorie LoPresti, Mellissa Sandusky, Dustin Summey, Tyrone O'Neal, Lisa Lehmberg, Carl Pinder, Aaron Penfield, John Brindle, Emilie Bova, Thomas Dean, Scott Lipscomb, Stewart Schlazer, Louis Nemec, David Champagne, Jim Mullen, and all of those who chose to remain anonymous.

Finally, I would like to honor the memory of Dr. Michael Allen, who first made me realize what it means to be a true master teacher, and the memory of Steve Jobs, whose innovative products and software had a profound effect on music, musicians, music education, and the music industry.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

The purpose of this project was to informally gather information about technology-based music classes being taught in secondary schools for the purpose of assisting traditional music teachers in the development and teaching of non-traditional music classes that focus on using technology. A quasi mixed-method design was used. This project should not be considered typical descriptive or statistical research but rather informal information gathering in preparation for future curriculum.

Teachers (N=307) participated in a survey regarding technology-based and commercial music classes. Teachers who teach technology-based music courses were asked about curriculum, resources, and the students in those classes. Suggestions were compiled for curriculum and training materials, some of which were then reviewed and incorporated into a sample curriculum plan. Teachers also indicated perceived differences between typical traditional music students and students in technology-based music classes. Teachers who do not teach technology-based music classes were asked reasons these classes do not exist and ideas that would encourage them to start teaching them. Primary reasons for not offering such classes were lack of funding and perceived lack of knowledge or comfort regarding technology. Teachers indicated they would be more encouraged to start technology-based classes if they had the financial resources, training, and easy-to-follow curriculum resources. Based on information collected from the survey, a review of previous literature, and personal experience, a suggested plan for starting a technology-based music class is developed which includes recommendations for planning, recruiting, and curriculum to target non-traditional music students with a beginning focus on popular music and creativity through writing and producing original electronic music.

CHAPTER I
INTRODUCTION

Purpose of the Study

The purpose of this study is to encourage and support middle school and high school traditional music teachers in the development of a technology-based music class such as Electronic Music, Audio Production, or Music Technology targeted at students who are not currently in traditional music classes. It presents information about various classes being taught, what type of students are taking them, and suggestions for resources to assist in the development of such a class.

Need for the Study

The 1967 Tanglewood Symposium (McAllester, 1967; Choate et al, 1967) and *Vision 2020: The Housewright Symposium on the Future of Music Education* (MENC, 1999) were focused on advancing music education and the professional growth of its members. Both symposia reinforced the arts as an integral part of education and included recommendations to include all students in music, yet today there are still more than 80% of middle and high school students that receive no formal music instruction (Dammers, 2010). That could be on the decline, as it was found that between 1982 and 2004 there was an almost 10% decline in participation in school music ensembles in the United States (Elps & Abril, 2011). Significantly underrepresented groups include males, English language learners, Hispanic, children of parents holding a high school diploma or less, and those in the lowest socioeconomic status quartile (Elps &Abril, 2011). Almost all students consider some type of music an important part of their life and their self-image (McAllester, 1967), so it is necessary to find reasons for this decline in school music participation and solutions to increase enrollment.

Technology for creating music is becoming more pervasive due to software such as *GarageBand,* which is included free with every Apple Macintosh computer, and various similar programs for Windows computers. Many students have developed an interest in using these tools to create music and develop their creativity but do not share an interest in the curriculum or genres included in most traditional school music courses, which in many secondary schools is

limited to ensemble classes such as band, chorus, or orchestra. Albert (2005) found that an effective means of recruiting low socioeconomic students is the use of culturally relevant ensembles. A technology-based music class focusing on creation of culturally relevant music might be a step in the right direction to recruiting the 80% being left out of music education (Edwards, 2006; Dammers, 2010). No previous research was found that focused on recruiting non-traditional music students into technology-based music courses. This study attempts to determine reasons music teachers are ignoring this student interest, and what might encourage teachers to consider starting a class targeted at those students.

Many teachers may feel they do not have the knowledge or resources to teach a technology-based music class, or they may have the perception that it would be too expensive or time-consuming. Webster (2007), in a review of research on computer-based technology and music teaching and learning, concluded that "music technology growth in the period from 1990 to 2000 demonstrated significant growth in the power and availability of hardware and software for music teaching and learning, but in-service teachers lagged behind in their application of these resources. There seems to be no major evidence that this has changed dramatically in the recent years… We still lack real compelling evidence about how committed music teachers are in the integration of technology into music instruction (Webster, 2007, p. 1324-1325)."

While there is previous research on the use of technology in teaching music (Meier, 2007; Bauer, Reeese, & McAllister, 2003; Ho, 2004; Williams & Beirne, 2005), studies on popular music pedagogy (Boespflug, 2004; Green, 2001; Green, 2008; Seifried, 2006), research in music technology (Boehm, 2007; Cain, 2004; Crow, 2006) and the popularity of music technology classes (Dammers, 2009; Dammers, 2010; Edwards, 2006, Williams, 2007), no previous research was found on technology-based music classes that use popular music to target non-traditional music students, and no previous research was found on curriculum resources used by technology-based music classes, especially those that target popular music. The present study will provide knowledge from existing music technology teachers on how to gain the knowledge and resources to teach a technology-based music class that targets non-traditional music students with popular music as the starting point for developing musical creativity, with minimal cost and without distracting the teacher or existing music students from traditional music programs.

Research Questions

1. What technology-based music classes are being offered in middle school and high schools in the United States?
2. What curriculum support materials are being used by teachers of technology-based music classes?
3. Are technology-based music classes targeted at students who are not in traditional music classes?
4. What would encourage teachers to offer a technology-based music class such as Electronic Music or Audio Production?
5. What steps should a teacher take to start a technology-based music class such as Electronic Music or Audio Production?

Operational Definitions

Audio Production Class: a technology-based music class that focuses on the art and technique of recording sound in a recording studio, home project studio and possibly live on-location. This class might target students looking for a career as a recording engineer, producer, or other job in the recording industry, or artists who would like to learn about recording their music in a home or project studio.

Commercial Music: A class or a program of classes that includes a wide range of topics related to the music industry, including Electronic Music Production, Recording, Sound Reinforcement, Artist Management, Music Law, Copyright Law, Music Publishing, or any other aspect of the music business.

Electronic Music Class: a technology-based music class that focuses on composition or songwriting using MIDI sequencing software and electronic instruments such as a MIDI keyboard. Popular music is usually the primary focus. A history of electronic music is usually included as well as basic music theory if the class is targeted at beginning musicians.

GarageBand: a software program published by Apple, Inc. and included with their Macintosh family of computers for creating music through loops, sequencing, and recording MIDI or digital audio. Not to be confused with a "Garage Band," which is typically an amateur rock & roll band that may or may not rehearse in a garage.

Loops: short sections of pre-recorded or pre-sequenced musical material, usually between one and four measures long, included with some sequencing software as building blocks that can be used as part of a larger composition. Loops which are based on recorded digital audio are usually sliced at attack points so the tempo can be adjusted by moving the slices to match the tempo of a project without changing the pitch.

Sound Engineering Class: A class that includes or combines content from Audio Production and Sound Reinforcement.

Sound Reinforcement: Using audio equipment such as microphones and loudspeakers to reinforce live sound, such as a public address system or a live band in concert.

Technology-Based Music Class: a non-traditional music class in which music is created, performed, and/or recorded primarily through the use of electronic instruments and equipment.

CHAPTER II
REVIEW OF LITERATURE

This study examines the curriculum and extra-curricular details associated with secondary general music courses focusing on creating music using technology and the students that find this subject appealing. In order to further understand this subject, related literature is presented that deals with general music education, recruiting non-traditional music students, popular music pedagogy and its role in students' lives, student culture among non-traditional music courses, technology in music learning, composition and songwriting pedagogy that can be transferred to an electronic music or MIDI-based music technology class, and the curriculum and structure of existing electronic music, audio production, or music technology courses.

Secondary General Music Education

In the United States of America, when a student graduates from elementary school into middle school, they are often asked to choose music, art, or other electives. Students who do not choose music at that time are often excluded from music instruction for the rest of their lives. The general music classes that students experience in elementary school often articulate into more specialized traditional music programs such as band, chorus, or orchestra in the secondary schools. As students get older and progress through the traditional music programs, the less talented tend to drop out as if teachers were treating it as a specialized skill reserved for only a select few (Williams, 1987). Many students are not interested or lose interest in traditional classical music participation because of poor repertory and content choices, insufficient connection with local ethnicities and cultures, and a lack of relevance (Hope, 2004). General music classes allow students to improvise, create, and do other creative things not often included in traditional music classes without the pressure of festival ratings or competition. At the high school level, this may be the students' last opportunity to take such a class, yet very few high schools offer general music classes (Block, 2008).

Sloboda (2001) discusses how music education fits into the everyday experience of music, presenting research in the United Kingdom (Ryan, Boulton, O'Niell & Sloboda, 2000) that suggests many school music educators have little respect for or understanding of the musical lives of the students they teach. The musical enthusiasms and aspirations of many young people

are not addressed by the current curriculum. The transition from primary to secondary school is a key 'parting of the ways' between young people and their music teachers, and music retains a key and central part of the lives of most people who see themselves as "not musical." Emotional self-management is at the heart of this role. Cultural trends broaden the styles of music that are valued, so schools and parents must be able to articulate a vision of the value of music which is stronger than the child's own lived experience (Sloboda, 2001).

Research points to many reasons why students drop out of music. Ryan, Boulton, O'Niell & Sloboda (2000) interviewed middle school instrumental music students before and after they dropped out of music. In interviews with students currently playing an instrument, "fun" was found to be a key motivating concept, achievement is valued, and the support of parents and instrumental teachers are important. When they quit playing between elementary and secondary school, they view playing an instrument as "boring," achievements which were previously valued are no longer important, and other activities such as academic lessons, homework, and socializing with friends are valued more highly than music. A lack of the ability to develop autonomy and self-determination is also a factor, because as they get older and parents and teachers no longer force them to practice, the students no longer want to practice (Ryan, et al., 2000; Sloboda, 2001). Solly (1986) studied attrition from instrumental programs in Cherry Hill, New Jersey and found that within a group of students who dropped out of an instrumental music program, 55% reported that they lost interest, and 73% of the students reported that they were never contacted or encouraged by the high school teacher to continue in the program. Brown (1985) found the most reported reasons for students dropping out of an instrumental program include too much time consumption, conflicts with participation in sports, conflicts with other school activities, and fear of failure. Directors reported lack of parental support, class schedule conflicts, conflicts with participation in sports, conflicts with after school jobs, and conflicts with other school activities.

Socioeconomic status (SES) seems to be a significant factor in school music participation. Corenblum & Marshall (1998) found socioeconomic levels to be a proxy variable that highly influenced other variables such as current grades, attributions for performance in band class, extracurricular musical activities, and perceptions of the attitudes of their parents, teachers, and the school toward the band program, all of which played a role in predicting student intentions to continue in a high school band program. Students from advantaged

backgrounds attend schools that support band and other liberal arts programs. Klinedinst (1991) also found socioeconomic status one of the best predictors of retention in instrumental music among fifth-graders, along with self-concept in music, achievement in math and reading, and scholastic ability. Elps & Abril (2011) found a significant association between music ensemble participation and socioeconomic status as well as other variables including gender, race/ethnicity, native language, parental education, standardized test scores, and grade point average, with students in the lowest SES quartile significantly underrepresented in music programs in the United States.

While the socioeconomic status and race/ethnicity are generally outside of the teacher's control, it is information that the teacher can use to make changes in recruiting strategies. In a study on the recruitment of minority students to college music programs, Walker & Hamann (1995) found that recruitment strategies should be designed to attract students who may not plan to major in music but desire to continue music participation during the college years. Teacher/director effectiveness ranked highest among all other factors in across all races (Walker & Hamann, 1995), suggesting it is possible for effective teachers to recruit from groups less likely to participate in music. In a case study of low SES school districts in Michigan, Albert (2005) found that proactive teacher strategies, culturally relevant ensembles, and student ownership of ensemble processes can aid in recruiting and retaining in low SES districts. For example, in a predominantly African-American school district, a southern African-American marching style is a more popular and culturally relevant ensemble than western European music would be, so the marching band and drum line are the foundation to build up the entire music program (Albert, 2005).

The issues of lost interest, achievement, desire to do other activities, and support from parents and teachers can also be addressed in the recruitment and retention of music students. The solution Sloboda (2001) proposes is variety: Music education should be available in a variety of locations, there should be a variety of "entry and exit" points for musical engagement, there should be a wider variety of activities available to young people that more closely mirror the musical activities available in the sub-cultures they value, and there should be varied routes to teacher training—go beyond the traditional 'teacher education' model with continuing professional development opportunities to suitably support young people's music making. For example, he says, "It is probably true that the DJ is the most common 'deliverer' of music within

the community. How many young people get meaningful help in developing the role of DJ (Sloboda, 2001, p.252)?" Watson (2011) promotes the idea that encouraging creativity will develop the self-concept, sense of student achievement, and higher-level thinking that keeps students interested.

Popular Music

One key motivating factor in keeping students in music programs is enjoyment. Sloboda, O'Neill, and Ivaldi (2001) found that students experienced greater enjoyment and showed more positive change when the music they performed was chosen by them. We need to understand what music students enjoy and what role it plays in their everyday lives. Although enjoyment alone does not mean the students are becoming well-educated, when the educationally worthwhile process is enjoyable, learners will be more motivated and therefore apply themselves to a greater degree in the process (Green, 2008). For many young people, traditional music classes which focus on western classical music have no inherent relationship to their activities and goals, even those which might involve music in other ways. Inserting a popular genre into classes that were structured for classical music may make them more enjoyable, but may not be appropriate because musical subcultures are defined by much more than the style of music they use. The context, purposes, inter-personal relationships, and accruing meanings are all important as well (Sloboda, 2001). Lucy Green offers music educators this advice:

> Music educators should examine…the informal learning practices, attitudes, and values…of popular musicians…in relation to the changing position of popular music in education over the last forty years or so. Otherwise, we could be deprived of the means of acquiring the skills and knowledge of some of the very music that is purported to be represented in formal music education; we could continue to bypass those children and young people who are nonetheless highly musically motivated and committed in their lives outside the classroom; and we could ignore a potentially worthwhile, accessible and inspiring repertoire of approaches to music learning. (Green, 2001, p.17)

All music educators should consider how pedagogy in the music classroom could draw upon the world of informal popular music that is being learned outside the school. This will help recognize, foster, and reward a range of musical skills and knowledge that has not previously been emphasized in music education (Green, 2008). Even at the time of the 1967 Tanglewood symposium, music outside the schools was considered the only "real" music for most of America's children so music educators at Tanglewood agreed that "Music of all periods, styles, forms, and cultures belong in the curriculum. The musical repertory should be expanded to involve music of our time in its rich variety, including currently popular teen-age music, American folk music, and the music of other cultures (Choate et al., 1967, p. 51-52)."

Does American society value popular music genres, and if so, why have most of our school music programs not embraced them? A quick glance at the genres of the top-rated radio stations (Arbitron, n.d.), or the sales charts of music download stores (Billboard, n.d.) is evidence of how much we value popular music compared to other genres in America. "When the London symphony orchestra visits the USA, nobody notices or cares. When the Spice Girls visit, it is front-page news (Sloboda, 2001, p. 251)." History shows us that school philosophies changed to include band, chorus, orchestra, and later Jazz because they were *already well established* in American society. Why hasn't this happened yet with popular music? Humphreys (2004) suggests it could be a cultural bias, social class association, or a desire of teachers to "reform" rather than expand their students' musical taste. It could be the fact that popular music is associated with youth culture and sometimes the subject matter could be considered inappropriate or controversial. Popular music ensembles generally mix singers with instrumentalists in a small ensemble setting, and that doesn't fit naturally into the current structure of school music with its large ensembles and segregation between singers and instrumentalists (Humphreys, 2004).

A model for including popular music in schools exists in Finland. Väkevä (2006) found that popular music is largely accepted as part of the music curricula, especially in the upper level comprehensive schools. It comprises one of the key subjects in teacher training courses, and some practical knowledge of popular music in addition to art and folk/world music is required when applying to attend music teacher training. Each teacher is free to choose the genres they use, and most use pop, rock, and its derivatives because that is thought to be the most familiar to the students. Some schools incorporated jazz, and at least one uses Steel Pan music as a central

part of its music curriculum. Not many use hip-hop and rap or techno and electronic but due to the recent popularity of urban and electronic styles and new technology for making and consuming digital music, they recognize that these new styles should be included as well.

Pedagogy of popular music is becoming more extensive than just conventional rock band practices (Väkevä, 2010). Computer-assisted music production and consumption has opened up new aesthetic possibilities, and students' technical savvy and computer literacy allow teachers to simplify the creative process with students (Williams & Beirne, 2005). Older popular musicians often do not share or even understand these new aesthetics. Music teachers who want to keep in touch with the times should take these developments seriously, whether they work in 'professionally directed' or 'general' music education (Väkevä, 2006). Musical online communities (Indaba, n.d.), DJing, Turntablism, remixing, mash-ups, collective songwriting online, music videos, exchanging and comparing videos of live performances of Guitar Hero and Rock Band game songs are all indications of a musical culture that differs substantially from conventional garage rock bands. By examining the ways music is produced and used in digital music culture, we can prepare for new forms of artistry that have yet to emerge from popular music pedagogy (Väkevä, 2010).

Non-Traditional Music Students

"Non-traditional music students" are students who are not in band, chorus, or orchestra but may have a music life completely independent of school music that can include church music, a garage rock band, using a computer to compose electronic dance music or hip-hop "beats" to rap over, or they just enjoy listening to music and singing along with their favorite songs. They may or may not play an instrument or read music notation, and they may be somewhat unmotivated academically or have discipline problems (Williams, 2008). Edwards (2006) compiled data on student participation in performance-based music classes in Florida, New York, California, and Ohio and found that an average of 82% of students in grade 6 through 12 are not in any performance-based traditional music classes, and therefore could potentially become a non-traditional music student if there were music programs in the schools that targeted their interests.

Abril and Gault (2008) surveyed principals of secondary schools in the United States on the music programs in their schools, and only 10% reported that they offered a music technology course (Abril & Gault, 2008). Dammers (2009) conducted a survey of New Jersey high schools regarding music technology programs and non-traditional music students. He found that 28% of New Jersey high schools offer some form of music technology courses. 67% of the students in the music technology courses are not in traditional music classes, and 80% of these classes were designed for non-traditional music students as grassroots efforts by technology-devoted teachers to get more students involved in music. Dammers then conducted a nation-wide survey of high school principals and music teachers in the United States, and found that 14% of comprehensive public high schools offer technology-based music classes. 89% of those classes were designed for non-traditional music students, and 28% of the students are also in band, choir, or orchestra (Dammers, 2010).

One way to see the effect of music programs targeted at non-traditional music students is to study high school guitar classes, which are offered in almost one-fifth of the secondary schools in the United States (Abril & Gault, 2008). Seifried (2006) conducted a case study of the guitar program at Frankstown Secondary School in Frankstown, Virginia. The curriculum is loosely structured and partially student-driven—students bring in songs they want to learn. The Frankstown program attracts many different kinds of students for a variety of reasons. Seifried describes four types of students and what attracts them to the guitar program: The "Easy A" students appreciate the laid-back atmosphere. It is fun, with less work and less pressure than the academic classes. The "Musicians" are students who hope to pursue a career in music, and appreciate that the class is hands-on and meaningful to their future goals. It is likely that this is the only group to also participate in a traditional music class. The "Music Aficionados" are students that simply love music but may not want pursue it as a career. It is a break in their schedule, and a chance to relax and learn something about something they enjoy. The "Success Stories" are students who are eager to talk about their change in attitude and the degree to which they were able to bring up their grades (Seifried, 2006).

Interviews with the students revealed their thoughts about group identity, personal identity, and "bonding" due to the guitar class. They say that you can relate to different types of people when you've heard their music and know the lyrics and the bands and can talk to them about it. Learning about their music is learning about their culture. Many of the students saw

themselves and their lives reflected in the music they liked to play and listen to, and some believe it defines who you are (Seifried, 2006). This is consistent with research by Abril and Flowers (2007) who found a significant positive correlation between identity and music preference and, and Albert (2005) who found culturally relevant ensembles used as a recruiting tool. The guitar students also felt the class opened doors to new musical experiences by broadening their taste in music, developing more respect for good guitarists, and helping them listen to music more critically by figuring out the chords when they hear a song (Seifried, 2006).

Music educators are frequently criticized for focusing on only the most talented students, affecting the access students have to quality music instruction. It is important to broaden the scope of music education if we are to meet the philosophy that music is important for everyone (Kelly, 2009, p. 86; MENC, 1994; MENC, 1999). Many students in the Seifried (2006) case study indicated that they would not be involved in the music program if it were not for the guitar class. Some students wondered why their guitar class grades were so high since their other grades were low. By embracing music the students listened to outside of school, the guitar class opened up a space where guitar students could comfortably function as themselves and operate outside of negative self-concepts (Seifried, 2006). This is consistent with a study that found students who composed music in popular style on instruments such as guitar, drums, and keyboard found it more fun, nonobligatory, self-directed, and more personally meaningful than the music they composed on traditional band instruments (Allsup, 2003). Non-traditional music classes like guitar are a unique 'music scene' which is much different from the band, orchestra, and chorus scenes. This demonstrates the need for music classes like guitar and other music classes geared toward the non-traditional music student (Seifried, 2006).

Technology in Music Learning

Almost every secondary school in America now has at least one computer lab and computers for student use in the media center, with the number of computers per student increasing steadily (Wells & Lewis, 2006; Gray, Thomas, & Lewis, 2010). Many schools are also adding computer labs specifically for the music programs, which usually include midi keyboard controllers and special music software. In 2003, Kuzmitch found that these music labs have existed since at least as early as 1987, the average lab contains 22 computers with MIDI

keyboards, and the most prevalent applications were sequencing and notation. Other features of music labs generally include listening libraries, recording/audio editing, music theory training and drill, notation scanning, smart accompaniment or accompaniment generation, and loop-based sequencing. Most of these labs are used to support the traditional music curriculum through piano or theory instruction, but schools are beginning to offer more options for the non-traditional students through classes that focus on music fundamentals, sequencing, and creation (Kuzmich, 2003).

Encouraging teachers to take advantage of the music lab can be accomplished through professional development. The Technology Institute for Music Education (TI:ME) conducts a series of yearly workshops based on their "areas of competency" in music technology. These areas include performing on electronic musical instruments, music production (MIDI, audio, looping, and sequencing), music notation, technology-assisted learning, multimedia (web, PowerPoint/Keynote, and video), and productivity tools for classroom and lab management (Rudolph, Richmond, Mash, Webster, Bauer, & Walls, 2005). Bauer, Reese, & McAllister (2003) found that teacher knowledge of, comfort with, and frequency of technology use significantly improved with a one-week technology workshop, and even nine or ten months after the workshop knowledge, use, and comfort with technology was still significantly higher than before the training.

In 1993, Magno incorporated computers with MIDI workstations into a study which sought out to improve performance-majors attitude toward contemporary music by motivating them to create their own original contemporary music. This was before computer-based composition and audio editing had become popular but sequencing and notation software was readily available. She points out that as early as 1970 contemporary composers recognized that the computer would be the instrument of the future. Technology was innovating teaching methods used for learning and teaching music at that time through drills in ear training, music theory, music history, performance, and research, but in most instances the program contents and curricula was left unchanged. Using the computer and MIDI workstation for making music, combined with critically listening to recorded contemporary classical music and attending part of a Contemporary Music Festival significantly increased the "creative musical product" for all subjects in the treatment group during the treatment period. There was also a significant positive

change of attitude towards contemporary classical music among the subjects in the treatment group (Mango, 1993).

Meier (2007) demonstrated that computer-based multimedia is a viable instructional tool when used to train music software skills. He found that educators can create their own computer-based multimedia that may produce equal or better learning outcomes than paper-based instructional media when training students on the use of music software.

Creativity: Composition and Song Writing

Music-making should lie at the heart of music education, and music-making should include creating new music (Green, 2008). Many technology-based music classes focus on student song-writing or composition using MIDI sequencing and arranging. Middle school and high school students are actually at a prime age for learning to compose and arrange, which can develop creative skills which are potentially helpful in any future career (Block, 2008). The National Standards for Arts Education recommends composing and arranging in Music Standard number four. It even mentions electronic instruments as part of the criteria for the "proficient" achievement standard: "Students compose and arrange music for voices and various acoustic and electronic instruments, demonstrating knowledge of the ranges and traditional usages of the sound sources (ArtsEdge, n.d.)." Because traditional usage of electronic sound sources includes contemporary and popular music, popular music styles that use electronic instruments, such as contemporary pop, hip-hop, and electronic dance music, should be included in a comprehensive music education.

There are so many ways to approach composition or song-writing, many traditional music teachers are intimidated by the prospect of having to teach it, especially if they have little experience in composition themselves (Kennedy, 2002). A survey of Indiana music teachers on using composition found that only 5.9% use composition tasks often (Strand, 2006). Schmidt, Baker, Hayes, & Kwan (2005) found that composition was given only 6% of instructional time in music classes. It remains an unknown and undeveloped area of music education in our secondary schools, probably because there are no appropriate methods, strategies, or techniques publicly available for helping teachers without a composition background teach composition (Kennedy, 2002). It is even more challenging when the teacher needs to incorporate new

popular music styles and different learning cultures that may be unfamiliar to the classically-trained music teacher (Väkevä, 2006). The current popular beginning band and orchestra method books leave much to be desired in developing creative compositional skills in beginning musicians, although within the last ten years there have been some creative ideas published, mostly targeted at the elementary general music teachers (Koops, 2009).

Williams & Beirne (2005) had success teaching composition to students with no musical background using the loop-based software *Sony Acid Pro*. They found that recent advances in music technology geared towards education allow, encourage, and simplify the creative process with inexperienced students. Williams & Beirne incorporated the educational strategy of *constructivism,* in which the teacher is more of a mentor and the students discover many principles on their own. Structured instruction with defined outcomes balanced with guided exploration time produced the best results. Very little time needed to be spent on how to use the software. Students were shown the basics of the software, then taught a few concepts of form and structure, and basic "ingredients" such as bass, drums, melody, accompaniment, and effects. Students then composed a song on their own within set parameters for length, number of tracks, and what effects and controls to utilize. They concluded that, "the quality of the music created coupled with the students' enthusiasm for the subject matter clearly shows that [a music curriculum geared toward non-traditional music students] would be a valuable and beneficial part of a high school curriculum (Williams & Beirne, 2005, p. 16)."

Two recent dissertations were found regarding teaching composition in school music programs. Bosch (2008) focuses on teaching composition as part of an elementary general music education class, and Koops (2009) incorporates composition into a middle school band program. Both include concepts and ideas that can be adapted for a non-traditional music student with no previous knowledge of music or notation.

Koops (2009) developed and tested a series of 15-minute composition lessons targeted at middle school band students. In his review of resources on teaching composition, some important concepts consistently surfaced throughout many of the books he surveyed. These include not limiting students by requiring notation, focusing on a single compositional tool at a time to allow students to really understand a concept and not be spread too thin, and assessing and encouraging revision through positive feedback and suggestions for further exploration.

Koops chose several compositional tools and developed his 15-minute lessons around them. These included elements such as soundscapes, texture, words or syllables to rhythm, variation form, rondo form, motivic development, notation, harmony, melody improvisation, converting chords to a melody, creating a composition based on the Grand Canyon, ostinatos, and adapting poetry to music. Each lesson included vocabulary words, listening examples, an introduction, and activities for the students to compose and play their music. In the pilot studies, many lessons with traditional notation were dropped based on verbal and non-verbal feedback from the students, and replaced with lessons with more drama and creativity. It is a complete teacher action research plan that was adapted and carried out as the first step in establishing a basic curriculum to begin to fill the gap in the current void of composition education materials (Koops, 2009).

Bosch (2008) shares with us a specific step-by-step method for composition in general music classes where students do not know traditional music notation, and she believes that anyone can do it. Many of the concepts she presents can be transferred to non-music students in an electronic music or songwriting class. "The way that I enable others to hear music clearly is to teach them how to compose, not just a handful of self-selected people who decide that they want to become the next Beethoven, but everyone: kids, grandmas, musicians, plumbers, music-readers and non-readers, equally (p. 2)." She emphasizes the need for a standard method so students learn specific tools that they can apply for the rest of their lives—each step is repeatable in any project and allows for continuous growth in depth and character as a composer. This is similar to ideas from the Suzuki method with its specified order of repertoire and gradual building of technique with the importance of sounding good right from the start so the student falls in love with it (Bosch, 2008).

The first step is to create a beat plan, and then combine the beats into groups of beats. A typical song with a 4/4 time signature is simply groups with four beats each. The next step is to create a rhythm over the beats by inventing a pattern and mapping the pattern to the beats. She recommends using random non-musical patterns you can see in nature as a starting point in order to avoid copying rhythms from the existing songs the students know. Words can also be used to come up with the rhythm, but she recommends waiting until after students have experience composing without them. The third step is to motivate the rhythm by adding contour. This can be done by designating two or three levels of pitch, different timbres, and accents to give the line

shape and make it come alive. The fourth step is to inform the rhythm with pitch. This step is sometimes omitted in the early stages. The teacher gives the student a choice of a limited number of notes to assign to the shaped rhythm. Start with just a few notes to make sure that it sounds good right from the beginning, and solfege syllables might be better than note names at first. She recommends not using more than six notes, so you avoid combinations like mi-fa-ti that might sound odd. Step five is to practice, if necessary, until you can play the rhythm and notes fluently, and step six is to listen carefully to see if you like it. Listening is one of the most important aspects of composition (Bosch, 2008).

Bosch recommends postponing the introduction of complex notation until after the student has some experience writing, listening to, and enjoying the music they write. Once the students have developed the love of their music, learning notation begins with one note value and one rest value, and then gradually introduces ties and other note values. As Green (2001) points out in her research on popular musicians, they rarely use music notation, and whether they do or not, being able to perform on the basis of what has been learned through listening is the primary goal. Notation is always heavily mixed in with aural practices, and used as a supplement rather than a major learning resource for most popular musicians (Green, 2001).

The next step in Bosch's (2008) method is to incorporate harmony. The first few melodies that students compose can be harmonized by the teacher, but then let the student become more involved. They should first find a pedal tone that sounds like it fits with their melody and then create a rhythm for the pedal. The next step is to choose two notes from the melody and sustain them until they don't work, then choose two new notes. The students will eventually realize that the two notes they choose are probably a third apart, which then leads to a discussion of triads. Students can make triads by finding a note either a third above or a third below the two notes in the harmonization.

Bosch (2008) developed worksheets that the student uses throughout all six steps to draw the groups, rhythms, contours, and eventually the notes, and the students keep them in a notebook. With the help of the teacher, students will eventually combine their worksheets into full compositions. This could easily be done on a computer using the "piano-roll" view of a sequencing program, but Bosch recommends you take your time introducing technology because you will get to know your rhythms and melodic lines better when you can feel their weight in

your hand through the pencil and paper before they get to the computer. "You need to feel the weight of the rhythms in your own hands (Bosch, 2008, p. 95)."

Existing Non-Traditional Music Technology Programs as Models

Williams & Dammers (n.d.) maintain a website containing profiles of non-traditional music programs, their teachers, and students. The profiles have been submitted by music educators in the field who use technology-based music classes to reach non-traditional music students. At the time of this writing, there are profiles of nineteen schools from the United States that focus on electronic music production. Twelve of them call their programs "Music Technology," and the others use "Digital Music," "Music Technology & Composition," "Electronic Music," "Entertainment Technology," "Music Through Technology," "Music Theory & Technology," and "Music Composition." Nine of the programs offer semester or half-year courses, eight offer full-year courses, and one offers trimester-long classes.

The equipment used includes computers, keyboards, and audio interfaces. Fifteen teachers reported using computers in Apple's Macintosh family and four use Microsoft Windows-based computers. Brands of MIDI keyboard controllers were counted and four use Yamaha, two use Korg, six use M-audio, and one uses Axiom. Two schools also have an electronic MIDI drum set.

These profiles also list the software used for their technology-based music classes. For sequencing, loops, and/or a digital audio workstation, all fifteen of the teachers who have Apple computers use GarageBand and eight also use Logic or Logic Express. Nine schools use Pro Tools, five use Ableton Live, five use Reason, and three use Acid. LMMS Studio, Cubase, Storm Music Studio, Reaper, Intuem, Digital Performer, Dreamstation, and Master Trax were each mentioned once. For music notation, eight use Sibelius, three use Finale, one uses Finale Notepad, and one uses Noteflight. The free audio editing program Audacity is used by six of the teachers, and Sound Forge is used by one. Music theory software used includes Auralia, Practica Musica, Musition, Music Ace, and Alfred Essentials of Music Theory.

Many of the profiles include advice to teachers starting a non-traditional technology-based music program. Suggestions like "take your time," "start simple," "keep music first and the technology will follow," and "be willing to learn from the students," are some of the most

often made suggestions. Two teachers mentioned they started in existing computer labs with a very low budget. Another teacher said they started with old iMac computers that were going to be sent to the surplus warehouse. Many of the teachers said to keep in mind that it is a music class, so keep music as the top priority, not the technology. Brian Laakso from Canton Ohio says "Music technology is the right choice for the 'other 80%' of your students who are not interested in band or choir, who have performance anxiety, or who are simply more interested in rock, hip hop, or dance music." William Rank at Oak Prarie Junior High School in Lockport Illinois said, "Many students with special needs have been especially successful in this program, as the curriculum and projects are tailored to each individual's understanding of the music around them." A music technology class was a solution to Jazz Band scheduling problems for David Hoffman at Pacific Grove High School in California: "It was not possible for students to take band and jazz band for four years. We moved jazz to after school club status, and created the music technology class." Wayne Splettstoeszer at Torrington High School in Connecticut has a well-established program that has been profiled in many music, technology, and education magazines. He said, "When I started in 1996 I knew nothing about music technology. I had to search online to design and develop the classes. …When starting be patient!... Any student can have success with music technology! It just depends on how it is presented. Teaching with technology should be fun for the students and you the teacher." Barb Keyes at Westlane Middle School in Indianapolis Indiana has taught middle school general music since 1990 and when she brought in computers and keyboards for student use she saw an immediate change in her classes. She says, "Discipline problems were fewer and fewer. This evolved and now I have 27 iMac computers with Korg keyboards and various amounts of software. We are still evolving, but I love teaching this class. One of my students wrote poetry, put it as a rap and created his own album as his special independent project in Music Tech. He is now well known around the rap scene in Indy."

Musical Futures (www.musicalfutures.org) is a project by the Paul Hamlyn Foundation in the United Kingdom. It seeks to develop ways to engage more young people in music education by addressing their diverse musical needs. Their website includes many case studies of successful music programs targeting non-traditional music students through the use of popular music, personalization, world-wide collaboration, and redefining music training. There are many materials such as a teacher resource pack, curriculum ideas, teacher-submitted materials, reports

and articles, and case studies that can act as model programs for designing a program targeting non-traditional music students through technology-based classes and other forms of popular music making.

CHAPTER III
PRELIMINARY STUDY

A preliminary study (Bula, 2010) was conducted in the Spring of 2010 as a pilot for the present study. A questionnaire was completed by a small group of teachers who are active on the Technology Institute for Music Education e-mail listserv, and members of the Florida Bandmasters Association Executive Board. Of the 50 invitations sent, 18 subjects participated in the study. Five subjects (26%) indicated their school offers at least one music technology course. Three of them offer an Electronic Music/MIDI course, two offer a Sound Engineering or Music Production course, one also teaches a "Music Technology" course which combines composition and computer audio production, and one teaches a class that includes songwriting in a jazz harmony and arranging setting.

Subjects were asked about prerequisites for these courses. Two require a prerequisite for Electronic Music and one of them indicated that the Sound Engineering or Music Production course was open to all students. Comments listed under "other" indicated that some courses are open to any student in any other music course, some courses are part of three different levels that students must progress through, such as beginning, intermediate, and advanced, and one person indicated that their "Music Technology" course was designed to reach non-traditional music students.

The curriculum materials reported included web resources, teacher developed materials, and two textbooks. The most popular textbook is *Yamaha Sound Reinforcement Handbook* (Davis & Jones, 1989), which is being used in both the Electronic Music/MIDI and Sound Engineering/Music Production classes. Another popular response was *Experiencing Music Technology* (Williams & Webster, 1996). One subject indicated that they have looked at *FUNdamentals of Music Technology* and found that it offered "something to go off of" even though it was outdated and out-of-print. Another subject indicated they develop their own materials and post to a website.

There was much variability in terms of the type of students who take these courses. The average class size was sixteen, the smallest was eleven and the largest was forty. When asked how many of these students are also in other "traditional" music courses, the answers included "probably a small percentage," "two per section," "five," "about one-third to one half," and "the

majority of them." Subjects were then asked how they would compare the culture of students in these classes compared to students of more traditional music classes. Only two subjects indicated that they were similar, and the others thought students were more collaborative and creative, or these classes had students with a broader range of musical interests, skills, and backgrounds. One teacher wrote, "We are laid back but work hard and have fun. I think the culture is dependent on the instructor. Festival ratings give the traditional classes a much different culture."

The next section of the survey explored reasons these classes exist or do not exist in schools. One teacher indicated that he or she was specifically hired to teach these courses when the school received a grant to start the program. The remaining four teachers indicated that they started or proposed the courses because of student and teacher interest, or to expand the schools' musical offerings in order to reach a greater percentage of the student body.

Teachers who do not have commercial music courses in their schools indicated that the main reason (66.7%) is because teachers already have full course-loads. Many write-in answers were also similar to this, indicating that the traditional classes are full and they would need to hire additional faculty, which administrators are unwilling to do. Budget seems to be an additional concern, not just for additional faculty, but many indicated that equipment and materials are too expensive and will not be provided by the school. 55.6% responded that lack of training or knowledge was an inhibiting reason, which was the second most frequent answer to this question. 72.7% responded on the next question that they might be encouraged to start a commercial music course if they had access to training workshops on equipment and software and 63.6% indicated that an easy-to-follow curriculum resource would help. 54.5% indicated that student interest would encourage them to start such a class. The need for additional faculty was an often-made comment in the write-in comments for this question as well, and one teacher responded "I'm already sold on this!"

The lack of curriculum material and workshop suggestions indicate that this study would benefit from a larger group of subjects and more specific information about materials should be asked. More research should be done on the recruitment of students. Some teachers indicated that the majority of students were also in other traditional music courses, while others specifically designed these courses for the non-traditional music student. The average class size of 16 students is about half the size of traditional academic classes and much smaller than the

minimum class size for most schools. Perhaps requiring prerequisite music classes is limiting the number of students for which these courses are available, or maybe the teacher also teaches a traditional class such as band or chorus and those students are easier to recruit. On the culture and social topic, the teacher that said "Festival ratings give the traditional classes a much different culture" makes a very good point, and one could speculate that festival ratings attract a different kind of student due to that difference in class culture. Some students may be motivated to be in an ensemble that earns Superior ratings every year, while some students just enjoy the creative process of making music themselves without relying on the other students in an ensemble.

Budgetary constraints seem to be the primary problem in starting technology-based music programs. The cost of equipment, software, and additional faculty is no small expense, so further investigation should be done on available funding and low-cost options. Another problem is motivating traditional music teachers to teach such a class. Even if a band, chorus, or orchestra director has an additional class period free to teach something else, they might be uncomfortable teaching a subject they are less familiar with, or uncomfortable around technology in general. More research into specific curriculum materials, workshops, and training courses would be a good resource.

Based on feedback and findings of this preliminary study, many decisions were made regarding the present study. In order to encourage more suggestions regarding curriculum materials, that question should be more specific, asking about textbooks, websites, training workshops, and other materials separately. It was also decided to target specific groups of teachers who would be more likely to make such recommendations by using the TI:ME and Audio Engineering Society membership. The question that asked about the students who are also in traditional classes was re-phrased to ask for a percentage of their students rather than just "how many" in order to get responses in a more consistent format for calculation. The questions asked of the teachers who are not teaching technology-based music courses were converted to free-response rather than multiple choice. In the preliminary survey some subjects simply checked all the options, so using a free-response format will get a more accurate representation of the initial reaction to the questions and allow the teachers to fill in as much additional information as they would like to share.

CHAPTER IV
METHOD

A questionnaire (Appendix A) was developed as an on-line web application. The questionnaire had three parts: Part one asks information about the school and technology-based music courses offered, part two asks questions for teachers of technology-based classes, including curriculum materials, student culture, and non-traditional student enrollment, and part three asks questions for teachers not teaching technology-based courses and asked about the reasons for not offering one of these classes. Teachers in section three were also asked what would encourage them to start a technology-based music class, based on findings of Dammers (2009) that indicated technology-based music courses were generally initiated by the teacher. The questionnaire adapts based on the answers in part (a) to determine if part (b) or (c) should be asked, therefore subjects were only asked questions in the sections that apply to them. A pilot version of the final questionnaire was sent to a small group of teachers and graduate students for testing and feedback, and minor adjustments and bug-fixes were made as a result.

An e-mail (Appendix J) was sent to members of the Technology Institute for Music Education through their Yahoo e-mail discussion group, the Audio Engineering Society's Education division e-mail listserv, and members of the Florida Music Educators' Association who teach middle school and high school music. The e-mails were sent in a staggered fashion throughout May 2011, and reminder e-mails were sent in June 2011. Data was collected until the end of July 2011, allowing at least two months for subjects to complete the survey which was thought to be enough time for teachers who were not checking their e-mail regularly due to summer vacation. It was not possible to calculate a return rate because the number of subscribers to the TI:ME discussion group and the AES listserv is not known.

Results were exported into a Microsoft Excel spreadsheet for calculation. For each of the qualitative free-response questions, first a list of categories was defined based on a first read through of the data, using key words from the responses to that question to develop the list of categories. Each teacher's responses were then copied from the spreadsheet containing the responses into a Microsoft Word file underneath the appropriate category or categories. If a teacher's response included items that fall into different categories, the response was broken up and only the appropriate portions were copied and pasted into their appropriate categories. An

exception was made when the researcher felt that the entire response should be duplicated in multiple categories for clarification purposes. Appendices B through E show how each response was categorized. The categorizations were then given to an assistant researcher who was asked to mark any disagreements on the selection of categories to ensure a reliability computation greater than 80% (Madsen & Madsen, 1998) for each question. For each category, a percentage was calculated using the count of the number of teacher responses that fall into that category compared with the total number of teachers who answered that question. Therefore, for each category we determine the percentage of teachers with a response to the question that falls into that category. This process was used for the question on student culture compared with traditional music students, the question that asked why the teacher's school is not offering any technology-based music classes, and the question that asked what would encourage the teacher to start a music technology class. Because of the wide range of unique responses to the other free-response questions, all responses were reported and discussed.

CHAPTER V
RESULTS

The survey received 307 submissions. 19.21% indicated they teach elementary school, 57.33% teach middle school, 50.81% percent teach high school, 3.58% teach at the college or university level, and 2.93% teach adult or community education.

Fifty-nine, or 19.22% of the respondents indicated that some form of a music technology, popular music, or commercial music course is being taught at their school. Of those, 83.05% offer Electronic Music (including MIDI sequencing or songwriting using a computer), 49.15% offer Sound Engineering (including recording, audio production, or live sound reinforcement), 3.34% offer a Music Industry or Music Business course, and 8.47% offer some other type of music technology, popular music, or commercial music course. Some of the other courses mentioned were History of American Popular Music and Culture, History of Rock & Roll, and Rock or Pop ensembles. It should be noted that many subjects were targeted specifically because they belonged to organizations that support technology-based music education, and therefore we cannot conclude that the percentages above are any indication of nation-wide percentages of technology-based courses actually being offered. Such conclusions are outside the purpose of this project and can be found in other research (Abril & Gault, 2008; Dammers, 2009; Dammers 2010).

Table 1

Technology-Based Music Teacher Course Offerings

Class	*n*	%
Electronic Music	50	83.05%
Sound Engineering	29	49.15%
Music Industry/Business	2	3.34%
Other	5	8.47%

Curriculum Materials

If subjects indicated that they teach or have taught any of the technology-based music courses in the previous questions, they were asked what curriculum materials or training workshops have helped them. There were then four text boxes labeled "Textbooks," "Websites," "Workshops/Clinics," "Self-Made Materials," and "Other" for the respondents to enter their answers.

Because of the relatively small number of subjects that teach a technology-based music class, most textbooks were mentioned by only one or two teachers. The *Apple Pro Training Series: Logic Pro 9 and Logic Express 9* by David Nahmani (2009), the *Yamaha Sound Reinforcement Book*, by Davis & Jones (1989), and *Modern Recording Techniques* by David Miles Huber and Robert Runstein (2010) were all mentioned twice. Other textbooks mentioned were *Pro Tools 101 Official Courseware* (Cook, 2011), *Music Theory for Computer Musicians* (Hewitt, 2008), *Using Pro Tools in Music Education* (Hodson, 2011), *Live Sound Reinforcement* (Stark, 2004), *Using Technology to Unlock Musical Creativity* (Watson, 2011), *The Musician's Guide to Recording Drums* (Beck, 2004), *Technology Strategies for Music Education* (Rudolph et. al, 2005), *Music Technology Workbook* (Middleton & Gurevitz), *Sound and Hearing* (Rusty & McCormick, and *Master Handbook of Acoustics* (Everest & Pohlmann, 2009). The Video series *Alan Parsons Presents Art & Science of Sound Engineering* (Parsons & Colbeck, 2010) was also recommended here, as there was no dedicated space to recommend videos. There were other titles recommended that could not be located for purchase or are out-of-print and therefore excluded from this study.

There were many website recommendations, most of which corresponded to workshops, magazines, or other resources. Six people recommended the Technology Institute for Music Education's website at www.ti-me.org and three indicated they had attended their workshops. Four people recommended Electronic Musician Magazine's website at www.emusician.com, and especially their *Electronic Century* series on the history of electronic music. Three respondents recommended www.MusicTheory.net and the online notation software www.Noteflight.com. Two mentioned www.GMajorMusicTheory.org and www.TweakHeadz.com. Notable resources receiving only one mention were www.Lynda.com, www.LogicProHelp.com, www.EMusicTheory.com, www.thsmusic.net/tech.htm, www.MusTech.net, www.Music-And-

Technology.com, www.SonicAcademy.com, *Music Alive!* magazine at www.MusicAlive.com, www.pbs.com, Keyboard magazine, Mix magazine, and www.JamStudio.com. "Various Discussion Boards" and "Various YouTube Videos" were also mentioned. Other workshops mentioned include Apple Pro Certification courses, Pro Tools certifications, and clinics at conferences of the National Association for Music Education and state music education conferences.

Non-Traditional Students

Subjects were asked what percentage of their students in technology-based music classes are also in a traditional music class or ensemble. Forty-one teachers responded to this question. 73% offer at least one class that is open to all students with no previous musical knowledge required. When asked what percentage of their students were also in a traditional music class or performing ensemble, 54% responded that 30% or less of their students in technology-based classes were also in a traditional music class and 73.17% of the teachers indicated that half or less were in a traditional music class or ensemble. Only 26% indicated more than half of their students were also in traditional music classes, and there were 18% that indicated all of the students were also in a traditional class. The average of all responses to this question indicates that approximately 38.71% of students in technology-based music classes are also in traditional music programs. See Table 2 for a more detailed explanation of the responses.

Table 2

Students in both Technology-Based and Traditional Music Classes

Percentage of Music Technology students also in Traditional Music	Number of teachers	% of teachers
None	5	12.20%
1 to 30%	18	43.9%
31% to 50%	7	17.07%
51% to 95%	3	7.31%
100%	7	17.07%

When asked about the student culture compared to traditional music classes they teach, 32 responded. Of those, 25 (78.13%) indicated some type of difference, and 3 (.09%) indicated it was the same. See Appendix B for the categorization of these responses. Others indicated that they do not teach traditional classes for comparison or made comments that did not specify whether or not the students were different. Some of the comments included the fact that the technology classes are good places for students who are interested in music or who want to participate in a performance medium but do not feel like they fit in the normal traditional ensembles. Reasons for this that were mentioned include the fact that they may not play an instrument, they play an instrument that is not included in any of the traditional ensembles, some students do not like the pressure of performing on an instrument, or they are just trying to "find their place" to fit in. Three teachers mentioned that it is a good recruiting tool for the traditional ensembles, especially if their work is featured and they gain self-confidence as a musician. One teacher said it more closely represented the diversity of the entire school population, another found their students to be more technically minded, but less musically focused when it came to music theory, and another indicated their non-traditional music students were more inquisitive, focused, and less intimidated to be creative than their traditional music students. The collegial and supportive studio environment allows the teacher to tailor the activities to the individual needs of each student.

A frequency analysis on answers to this question that were interpreted as either positive or negative toward the non-traditional students found exactly 50% positive and 50% negative comments when comparing the students in technology-based classes to those in traditional music classes (Appendix C). Negative comments indicated that some students are not as academically minded, less willing to achieve musically, or lack long-term commitment. This is consistent with some of the types of students described in Seifried's (2006) case study, and it is possible that a fun and laid-back or self-pace atmosphere is what attracts the less focused or less academically-minded student. Positive comments included indications that students were inquisitive and more focused, not intimidated to be creative, more technically-minded, out-of-the-box thinkers, and good, solid kids that need something to grasp that is not a traditional core class.

Funding

Most of the funding comes from school budget requests and grants. Of those that have technology-based music classes in their school, 27% receive funding from their school budget, 18% received one or more grants, and 11% received general funding from the district, either as a regular amount or a one-time allocation when the school was first built. 6% use funds specifically earmarked for technology, from either the district or the school. Fundraising is used by 6% of the teachers. Two fundraising ideas mentioned were ticket sales for performances of other ensembles and producing an annual compact disc that is sold to other students and the community. 4% received donations or referendum funds, and 4% indicated that they use only computer labs or laptop carts that the school already owns. One subject indicated the band boosters helped fund the equipment, and one teaches at a technology magnet school and received magnet school funding. 20% of the subjects who teach a technology-based music class left this question blank or indicated that they do not know where their funding came from.

Song-writing or Composition for Beginning Musicians

The questionnaire asked, "Describe your thoughts on teaching songwriting or composition to students with no previous musical experience. For example, is there a method or process you use, method books or web resources, software, or other ideas for developing creativity in the songwriting or compositional process?" Twenty-one of the teachers responded to this question. The most common advice, given by five teachers, was to start with form or structure. Song forms such as verse, chorus, bridge, etc., or a simple Rondo, ABA, or AABA structure were recommended. Five teachers also mentioned that using loops in GarageBand, Sony Acid, or other loop-based software was a good place to start. The loops are pre-composed "building blocks," so they allow the student to get familiar with form and texture, and then begin composing a melody that fits with their loop-based accompaniment. Three people prefer to start with music theory, two recommended starting with improvisation with a limited number of notes, and two recommended starting with a simple chord progression such as I – IV -V. A notation program such as Finale, Sibelius, or Noteflight can be used rather than sequencing software when learning the basics of music theory.

Stewart Schlazer from Perry, Florida said that the best approach he found is modeling the form after a song. He gives them as many specific guidelines as possible: time frame, form, use of original material versus pre-recorded material or loops, and so forth. Students are usually not so comfortable with their original idea, or the keyboard, or limiting themselves. They initially tend to have too many non-connecting elements, just like a young child who palms the piano instead using one finger at a time. Visual maps and analyzing a simple and familiar song helps them get into the right frame of mind.

Another subject who chose to say anonymous recommends starting with the exploration method. Students can choose to complete composition projects with parameters such as a thirty measure minimum, title and composer required, can be an arrangement or an original piece, must have a certain time signature, and they must be able to play it on the keyboard. Composition projects as a class usually start out as theme and variations. After a lesson or two on various types of variations, they compose a theme that is four to eight measures long and then compose three to four variations on that theme.

Melissa Sandusky from Orlando, Florida recomends first teaching basic music theory concepts such as treble and bass clef, notes on the staff and how to find the notes on the midi keyboard. Rhythm, scales, key signatures, chords, and chords progressions follow. Very basic chord progressions are given to students as an accompaniment to write melodies. GarageBand loops tend to interest students the most, so the students import the melody they created from Sibelius into GarageBand so they can use loops in their compositions. Binary, Ternary, and Theme and Variations forms are taught using melody only and in GarageBand. Twelve-Bar Blues and I – vi – IV - V progressions are taught using Sibelius. Final projects involve a large composition of the students' choice accompanied by a music video or slide presentation using iMovie.

Marjorie LoPresti from East Brunswick, New Jersey said that her students are captivated by rhythm. They first listen and discuss popular music that they like, identifying the elements that repeat, layer, and change. Concepts of musical texture and structure begin to form in students' minds. They are then ready to create without just throwing sounds together to see what works. From there, they experiment with different scales and harmonization techniques.

Challenges and Motivation

The purpose of the final two questions on the survey was to understand why these classes are not being taught, and to find possible solutions to overcome those challenges. Teachers who indicated that their school does not offer Electronic Music, Music Technology, Sound Engineering or other Commercial Music Classes were taken directly to this section.

The first question in this section asked "Why do you think your school is not offering any Music Technology, Electronic Music, Sound Engineering, or Commercial Music Classes? Please give as many reasons as possible that you can think of." Of the 210 teachers who answered this question, 92.86% of them mentioned something that relates to a lack of funding for equipment, software, or additional faculty. 36.19% mentioned the words "funding" or "money," or it was indicated in some way that there is no room in the budget to do it. Others were more specific: 34.29% said they do not have the budget for equipment and software, and 22.38% indicated that the school could not afford to pay for an additional teacher or the current teachers are already teaching full course-loads. Other responses that might be considered related to funding include low enrollment, as 8.57% said that their school was too small or was experiencing low enrollment numbers. This could result in less money available and also not enough interested students to fill a class. 3.81% cited a lack of administrative support, which is important for funding, scheduling, and many other factors to make the program successful.

Many teachers feel they and the other teachers at their school are not qualified. 12.86% indicated a lack of knowledge, training, qualifications, or qualified teachers to teach technology-based classes. 3.81% cited the lack of curriculum resources that would be necessary or helpful to teach such a class. General comments that indicated that they or their school does not find it important were made by 5.71 percent of the teachers who responded, and 10.48% indicated a lack of interest which was sometimes specified as lack of student interest, but other times unspecified.

For the respondents from Florida, the recent class-size constitutional amendment seems to be a concern, as 17.14% indicated there is not a room, space, or facilities available for a music lab and some included comments that all classroom space must have a minimum number of students every period due to this amendment. A few teachers also mentioned that using an existing computer lab or the media center was not an option because computer labs are not big

enough to accommodate a full class, or core academic classes and remediation for state standardized tests receive priority to use those labs.

Table 3

Responses to the question, "Why do you think your school is not offering any Music Technology, Electronic Music, Sound Engineering, or Commercial Music Classes?"

	n	%
Total Funding	195	92.86%
General Funding	76	36.19%
Funding for Equipment	72	34.29%
Funding for Additional Teachers	47	22.38%
Scheduling/Amount of Class Periods Available	39	18.57%
Lack of Space/Room/Facilities	36	17.14%
Lack of Training, Qualifications, or Qualified Teacher	27	12.86%
Lack of Interest	22	12.86%
Low Enrollment/School too Small	18	8.57%
Students Too Young (Elementary or Middle School)	15	7.14%
Not Seen As Important	12	5.71%
Lack of Curriculum Guide/Resources	8	3.81%
Lack of Administrative Support	8	3.81%
Could Hurt Enrollment of Traditional Music Classes	4	1.90%
Standardized Test Scores Get Priority	4	1.90%
Not Thought About It/Did Not Know It Was Possible	2	.95%
Would Become a Dumping Ground	2	.95%
Other reasons	11	5.24

Note: See Appendix D for responses in each category.

Scheduling was a concern to 18.57% of the respondents. Many schools are cutting the number of class periods in a day or moving to block scheduling, which cuts the number of electives a student can take. Four teachers, or 1.9% indicated that it might hurt the enrollment in traditional music classes, especially when students can only take one elective or if many other electives are already being offered. Singleton classes, classes in which there is only one section offered, are prevalent in many small schools so adding electives that are also singletons makes scheduling very difficult. Guidance departments often use these electives as "dumping grounds," according to two of the respondents (0.95%), meaning that students would be placed into the class when nothing else would fit into their schedule.

Teachers that thought their students were too young accounted for 7.14% of the responses, most of them middle school teachers and some who teach elementary. One teacher mentioned that they use the media center computers for activities on composition and arranging in existing classes, but that these classes "sound more specific and focused than typical middle school classes."

Other comments that were mentioned only once or twice include the fact that they want to keep the arts program "performance-based," if it's not in the standards it will not get administrative support, it is too new, similar classes are not being taught at other schools in their city, or they had not heard of these classes and did not even realize that they existed in other schools or in the department of education course code directory.

The final question was, "What might encourage you or other teachers to teach such a course at your school?" This question was answered by 232 teachers. Resources such as funding and access to equipment and software were the most popular responses. Responses such as "Funding," "grants" or other comments indicating a general need for money accounted for 19.83%% of the responses, and some commented that extra compensation or a salary supplement would help. One teacher mentioned that finding grants has been impossible since she moved from South Carolina to Florida. 27.16% mentioned funding for, or access to, equipment and software, and 12.07% mentioned a classroom, lab or facilities. Administrative support was mentioned by 7.76%, which generally includes allocating funds in the budgeting process as well as providing facilities and scheduling support. When combining all the responses that relate to funding, we can infer that finding more funds or less expensive resources for technology-based music classes is the most likely thing we can do to encourage teachers to

start such a class, which is consistent with the responses to the previous question which asked why schools are not already offering such classes.

The next most popular responses dealt with training, as 33.19% of those that answered this question included training, professional development, workshops, or in-service in their answers. Comments indicate that some wanted to get paid for the training, they want it offered locally, and if possible one-on-one in the lab at their school. One teacher wrote, "It comes down to it being new and uncomfortable enough that we don't want to look like morons in front of our students. Providing enough training to make it comfortable…is the key." Another wrote, "I was not required to use any form of music technology programs in college. This makes me feel like I am not well trained and not sure where to even begin with a new technology course."

In responses that mentioned curriculum resources, 9.05% indicated that they might be encouraged to start a technology-based music class if they had a pre-planned curriculum guide or curriculum ideas. Comments indicated a desire for pre-written lesson plans or a curriculum packet that would help teachers get started quickly. One subject who indicated that he is proficient in technology and computers said, "I would like an easy to follow textbook, software, and curriculum. I don't want to draw too much of my mental energy away from my band." Another teacher had a different opinion, writing "Anyone could just teach out of a textbook, but that is not truly teaching. …A hands-on approach is much more appropriate for student achievement," in which he was speaking to the importance of training for teachers and providing enough planning time to get comfortable with the software and equipment.

Issues with students and teachers such as interest, student demand, and time in the schedule also seem to be a concern worth looking in to. 12.93% said that more time in the teaching schedule would be necessary, either because they are already teaching a full load and do not want to give up their current classes, or because students are limited in the number of electives they can take. Student interest, student demand, or "overwhelming student demand" was indicated by 8.62%, and it was mentioned that it should be from students not already in a traditional ensemble. Someone commented that they were scared of their traditional ensembles being replaced by "iPad ensembles." Hiring another teacher with the necessary qualifications was mentioned by 6.9% as a way to solve the problem of already full teaching schedules, lack of teacher interest, or lack of technological knowledge of existing teachers.

Table 4

Responses to the question, "What might encourage you or other teachers to start a Music Technology course at your/their school?"

	n	%
Total Funding	109	46.98%
Equipment& Software Access, Availability, or Funding	63	27.16%
Funding/Grants (unspecified)	46	19.83%
Training/Professional Development	77	33.19%
More Class Periods or More Time in Schedule	30	12.93%
Lab, Classroom, or Facilities	28	12.07%
Curriculum Resources, Ideas, Pre-made Lesson Plans	21	9.05%
Student Demand or Interest	20	8.62%
Administrative Support	18	7.76%
Additional Faculty	16	6.90%
Nothing, not likely to be interested	11	4.74%
Already Planning or Would Like To Implement	11	4.74%
Sufficient Planning Time	4	1.72%
Higher Enrollment	3	1.29%
Information for Administration	2	0.86%
Other	17	7.33%

Note. See Appendix E for the responses in each category.

There were other responses that were only made by one or two respondents but thought to be important enough to mention. To gain support, it would be beneficial to have an information document that could be presented to administrators and possible donors or parent groups that outlined the curriculum, its benefits, the target students, cost, and recommended facility specifications along with examples of student work. One teacher wrote "Seeing is

believing… demonstrations would give teachers more confidence." Video or live demonstrations or any other way to see students and teachers in action may help in recruiting and advocating for a music technology program. Among the other suggestions were parent support, feeder programs in the middle schools, and extra planning time. One subject suggested course numbers from the department of education, which actually do exist in the Florida course code directory for classes called "Electronic Music" and "Sound Engineering" (Florida Department of Education, 2011, Section 3). 4.74% of the teachers who responded to this question said they were already interested in teaching a technology-based music class, or are planning to do so in the future, and 4.74% indicated that they were not interested or nothing would encourage them to do so.

While answering this final question, many respondents included general comments regarding the subject of teaching or offering technology-based courses. Angel Colón from Naples, Florida wrote, "There are many students highly interested in a course like this … I know several students that already work with sound engineering equipment and they would be interested in a course like this." Sandra Harwood from Hialeah, Florida wrote, "This is a field that the three music teachers [in my school] definitely support as adding to our curriculum. I know we could fill six classes of music technology, engineering, electronic music and commercial classes immediately." Mark Sanders from Melbourne, Florida said that it is important to offer composition for both performing and non-performing students, and "access to other related music classes designed for non-performance students. It allows for instructional growth for the teacher with minimal background in such subjects." Others spoke about how students are so technologically savvy and these programs are so innovative that they would be very popular for students, it would allow the general school population to support and be involved with the music program, and it is a great way to keep music teachers teaching in their field at schools with smaller music programs.

CHAPTER VI
DISCUSSION

Curriculum Resources

Although traditional music teachers may not usually use a text-book or pre-planned curriculum, those who want to teach a technology-based music class may find themselves out of their comfort zone and searching for as many resources as possible, envious of those classroom teachers with a state-adopted textbook to follow. The purpose of this section is to compile and review the resources that were suggested by the subjects who indicated they teach Electronic Music, including MIDI, sequencing or songwriting on a computer, or Sound Engineering, including Audio Production, recording studio techniques, or live sound reinforcement.

Textbooks for Electronic Music

Just as traditional music teachers focus on both technique and musicality, a music technology curriculum needs to focus on both the tools and musical creativity. Despite the fact that students can generally figure out almost any software package on their own or with very little instruction (Williams & Beirne, 2005), many music technology books focus on how to use a particular software program or hardware device (Propellerhead, 2004; Cook, F. D. et al., 2011), and fail to guide and mentor the students' musical creativity. When choosing textbooks or other curriculum materials, especially if a teacher is going to rely on it for most of the curriculum, there must be a balance of technical instruction and creative musical direction. For this reason, two books are worth noting that were discovered through the responses from this study: *Using Technology to Unlock Musical Creativity* by Dr. Scott Watson (2011), and *Music Technology Workbook* by Paul Middleton and Steven Gurevitz (2008). Both of these books have a good balance between technical information about software and hardware, and musical advice for encouraging and developing creativity and musicality in young students, although neither should be considered a complete pre-written curriculum guide. No comprehensive step-by-step curriculum packages were discovered in this study.

Using Technology to Unlock Musical Creativity (Watson, 2011) is a pedagogical approach to creativity. It contains project ideas, technology tools, and assessment tools that help

foster creativity in any student. The author writes, "on the one hand, the technology is integral to the approach I present. On the other hand, it is not about the technology itself as much as using it to draw out, assemble, and document students' creative ideas (Watson, 2011, p. 4)."

The first part of the book is primarily for the teacher. The first chapter outlines the underpinnings of the book. The author's "eight principles for unlocking musical creativity," developed over his many years as both a composer and K-12 teacher, are aimed at unlocking the creativity inside every student that might be hard to draw out. The eight principles are, 1) Allow students to share themselves, 2) Offer compelling examples to imitate and inspire, 3) Employ parameters and limitations that remove distractions and help students focus, 4) Remove parameters and limitations that stifle creativity and lead to contrived expression, 5) Facilitate improvisation, 6) Engage in coaching interaction, 7) Foster opportunities for feedback and critique, and 8) Employ performance and recital. The second chapter, also targeted at the teacher rather than the students, goes deeper into the concept of creativity. Beginning with chapter three he explains in great detail the eight principles, presents compelling examples, shares audio and video examples through the book's companion website, and ends each chapter with a reflection activity to help the teacher consider how the information might transfer to his or her own teaching (Watson, 2011).

Part two contains the curricular materials. The author recommends books and internet resources, describes a sample activity for creating a song, and offers some suggestions and a template for creating your own lesson plans. Assessment is also discussed, along with guidance on building grading rubrics, task sheets, and comment sheets. The next five chapters present various concepts followed by several example lesson plans and then a reflection activity. Each lesson plan includes an objective, materials needed, duration, prior knowledge required, procedure, adaptations, feedback/evaluation, extension/follow-up, and the National Standards that are addressed. Topics covered in detail include keyboards, recording audio, multi-track music production using MIDI and loops, notation software, and instructional software including reviews and lessons utilizing various software and web-based applications (Watson, 2011).

The book also contains a chapter on using creative music activities with technology as a way to enhance other music courses. It is approached in three different ways: an independent lesson or activity, a creative project, or a creativity-based curriculum. An independent lesson is an add-on to a more conventional learning activity or rehearsal segment that reinforces a concept

being taught. A creative project is a more comprehensive learning activity, such as a composition project or an end-of-semester composer report podcast that students would work on over the course of several days. The creativity-based curriculum is for courses that feature creative music tasks using technology tools as their primary mode of learning. This would include most of the technology-based music classes such as Electronic Music or Audio Production. The author writes, "These sorts of courses can offer positive, meaningful music learning to nontraditional music students. Much of the learning is applied, 'hands-on,' and experiential." A sample creativity-based curriculum for a music production class is then presented, including a course description, preliminary activities, creative activities and projects, and "Meta-projects" that combine their musical projects with other nonmusical creative skills such as lyric writing or visual art, and various applied technologies to achieve higher-level learning. Some examples included are a class holiday CD project, a video production, and a class musical (Watson, 2011).

Music Technology Workbook: Key Concepts and Practical Projects (Middleton & Gurevitz, 2008) is another music technology book that contains good information on creating music and developing musical and creative skills in addition to the technical aspects of using the tools. The book starts with a great overview of the history of music technology beginning with early recording techniques. After a brief one-chapter explanation of some software packages available, they immediately jump into an approach to creating music which includes listening skills, inspiration, music theory, song structure, and rhythm.

Throughout the book, there are reminders to students of the importance of keeping the focus on music. Teachers are encouraged to have the students thinking about their listening and improvisation skills right from the beginning, with hints on what to listen for and how to start creating a tune based on various sources of inspiration and collaboration. From there, they move into a very clear explanation of music theory beginning with the piano keyboard to teach note names, intervals, chords, inversions, chord progressions, melody, and form. The importance of good piano keyboarding skills and steady rhythm are mentioned, but not as much detail is provided as you might find in a piano methods book (Middleton & Gurevitz, 2008).

After a chapter on the historical background and technical information about MIDI, they introduce some of the most basic sequencing concepts, including examples and screenshots from many different software products. Those concepts are then reinforced in a series of exercises

designed with musical creativity in mind. They start by building a simple drum beat and recording various tracks into the sequencer with the keyboard. Then skills like editing, duplicating, and arranging are introduced with the material that the student recorded. Optionally, students can use media or midi files from the DVD that comes with the book (Middleton & Gurevitz, 2008).

Now that the students have learned and practiced the basics, they move into larger projects, in which the students will compose an entire piece of music. They take the student though a step-by-step process which includes creating a bass line, drum track, a background pad, and a melody, then arranging the song, mixing for good balance, and adding effects. At each step they encourage the student to be as creative as possible while still offering guidance on what might work and what to avoid while creating the various parts of the song. After the first "Ground Bass" project, they take you through projects in Blues, Dance, and Reggae genres, explaining the unique elements of each of these styles (Middleton & Gurevitz, 2008). If time permits, the teacher might want to transfer this concept to other styles of popular music such as Hip-Hop, House, Trance, Dubstep, or R&B for other projects.

In addition to sequencing and composing, the workbook also covers Audio & Digital Recording, making it appropriate for a general music technology class that includes both Electronic Music and Sound Engineering. They give a detailed explanation of the complete recording process from preparation, recording, overdubbing, editing, mixing, mastering, and burning to CD, including great detail about equipment, software, and typical recording studio personnel. Again, the book goes beyond just the technical explanations and gives good musical advice such as making sure the ensemble is prepared before going into the recording studio and microphone placement to get the best sonority from a variety of different instruments (Middleton & Gurevitz, 2008).

The pacing that would result if the teacher just went through the *Music Technology Workbook* (Middleton & Gurevitz, 2008) from beginning to end may not result in enough practice and assessment along the way. It starts off by covering a great deal of information about MIDI and sequencers before actually reinforcing it with exercises and projects. When it goes into the Audio Production and Recording section, again it presents almost all of the information you need to know about recording before any reinforcement through hands-on exercises or projects take place. In order to keep the students interested and to reinforce each concept, I

would recommend the teacher develop mini-exercises or demonstrations throughout the first few chapters of each section for daily evaluation and reinforcement. The book covers a great amount of information on a wide variety of topics, so it does not go into as much detail as more targeted books might. For example, there are a few paragraphs that explain microphones and uses for condenser microphones and dynamic microphones, but fail to go into detail about how they work or why they are suited for different purposes. Overall this book provides a good reference and curriculum guide that could be followed throughout a general music technology class, as long as supplemental detailed materials and extra opportunities for hands-on practice and evaluation were provided by the teacher.

The *Apple Pro Training Series* (Nahmani, 2009) was recommended for teachers who are using the Logic software, available on the Apple Macintosh platform, but most of the concepts can also be transferred to other digital audio workstation software. It is the official curriculum of the Apple Pro Training and Certification program in Apple's training centers worldwide, so it is geared toward both classroom and self-paced learning. The books feature step-by-step lessons that teach basic and advanced music production using software synthesizers, sequencing, samplers, and digital signal processors. An included DVD-ROM includes media files that can be used for the included lessons or for students' original projects. The author, David Nahmani, is a professional veteran composer and producer with experience in TV & film scoring, popular and classical music composition, production, and recording engineering, so the lessons he includes in this series focus on musical concepts and real-world projects, while still spending a significant amount of each chapter on how to use the *Logic* software.

The author begins by having the students make music by arranging right from the start. The students start with pre-made loops rather than composing their own melody and accompaniments, but it is a good way to get them familiar with the software and learn concepts for arranging, editing, balance, and texture right from the beginning. The next two chapters deal with recording and editing audio, but they do not go into recording studio techniques, equipment, or many of the other details that the *Music Technology Workbook* included. The rest of the book has lessons on recording, programming, and editing MIDI, then mixing, equalization, effects, and mastering (Nahmani, 2009).

Each lesson includes well-defined goals and outcomes and an estimate of how much time should be allocated for the project, but not many assessment opportunities such as big projects.

The teacher might consider assigning a bigger project after every two or three chapters, just to give the students more opportunity for creativity and application of the skills rather than just following directions in a book. Although it covers some recording and production techniques, the main focus is on creating music using the software, so it would be better for class dedicated to Electronic Music or a general music technology class rather than a sound engineering or audio production course (Nahmani, 2009). There is also a *GarageBand* book in the *Apple Training Series*, but it is written by a different author and was not recommended by any of the subjects in this study. Many of the concepts taught in the *Logic Pro* series can be easily transferred to *GarageBand* if a teacher does not have the budget to purchase the *Logic Pro* or *Logic Express* software.

Textbooks for Sound Engineering

In the area of Audio Production and Recording, *Modern Recording Techniques* (Huber & Runstein, 2010) was the most recommended. This is a definitive guide to everything you need to know about audio recording, and is a great textbook for any class focused on audio recording and production. The authors are working musicians and producers, and have experience in almost all aspects of the recording industry.

The introduction is a general overview of the recording industry and recording process which gives the student a good perspective on what will be learned throughout the rest of the book. It begins in the professional recording studio and control room and also discusses home project studios and portable studios. It then describes different types of professional studios that are appropriate for different needs, such as larger or smaller ensembles, live on-location recording, video and film soundtracks, and multimedia such as video games. Job descriptions for the people who contribute to the recording industry are described, including artists, studio musicians, arrangers, producers, engineers, assistant engineers, maintenance engineers, mastering engineers, disk jockeys, video jockeys, lawyers, and studio managers. The introduction concludes with an overview of the entire recording process, from preparation to recording, overdubbing, mix-down, and mastering, and then manufacturing and marketing your recording (Huber & Runstein, 2010).

Because the art of recording uses the medium of sound which relies on hearing, an entire chapter is dedicated to the basics of sound and hearing. It begins with basic wave theory, including characteristics of waveforms, harmonics, phasing, and measuring loudness. Great detail is spent on hearing, including the physiology of the ear, protecting your hearing, psychoacoustics, and perception of direction and space. Those concepts are then transferred to concepts of studio design and room acoustics (Huber & Runstein, 2010).

The book includes several chapters on studio equipment, beginning with microphones. The design and characteristics of dynamic, ribbon, and condenser microphones are explained and compared in terms of directional response, frequency response, and suggested usage and placement techniques. There is also a chapter dedicated to Amplifiers, how they work, and their various applications. A chapter on the analog tape recorder leads into digital audio, where they start from the very basics of the digital language including a very good explanation of sampling and quantization and what happens during the conversion from analog to digital and back to analog upon playback. A short history of digital recording and playback devices is also included (Huber & Runstein, 2010).

The digital audio workstation (DAW) is the heart of most modern recording studios today, so an extensive chapter is spent on DAW hardware and software. They discuss choosing the right computer, software, peripherals, audio interfaces, and controllers. File formats, editing techniques, networking, effects plugins, and common concepts with the leading software are all explained in great detail. The importance of project preparation, documentation of session and track information, and backup or archive strategies are also included (Huber & Runstein, 2010).

One of the most artistic aspects of the recording process is the art of getting the exact sound desired from every microphone, and mixing every microphone for the exact overall sound desired. A chapter is devoted to all the concepts and parts of the mixing surface, whether that is an actual mixing console, or the DAW software mixer. The channel input strips, grouping and auxiliary sends, equalization and spatial positioning, metering, monitoring, and gain level optimization are all described in context of both a software mixer and various analog and digital mixing consoles. The last few chapters discuss the mastering process and the manufacturing process of compact discs and vinyl records, studio tips and tricks, and a brief history of music and sound technology (Huber & Runstein, 2010).

Because Huber & Runstein focus on recording rather than live sound reinforcement or public address systems, you might want to also look at the *Yamaha Sound Reinforcement Handbook* (Davis & Jones, 1989). This book covers all aspects of designing and using sound reinforcement systems for public address or musical performance. Like the Huber & Runstein book, it contains extensive information on sound, waveform characteristics, and equipment. However, the *Yamaha Sound Reinforcement Handbook* goes into greater technical detail about the equipment and includes more of the practical knowledge and challenges specific to live sound reinforcement, such as indoor verses outdoor acoustic factors, running cables, test equipment, and loudspeakers.

The Yamaha book was published earlier than some of the more recent innovations such as digital mixing consoles and line-array loudspeakers, so you might prefer *Live Sound Reinforcement, Bestseller Edition* (Stark, 2004). It is more modern, includes an instructional DVD, and although it does not include as much technical information as the Yamaha book it is still very detailed. It was not recommended by as many subjects in this study, but it seems like it would be very appropriate for a high school class that includes sound reinforcement.

Pro Tools 101Official Courseware (Cook et al., 2011) is the official courseware for Avid Pro Tools authorized training centers. Pro Tools is the industry standard in digital audio workstation (DAW) software, and is found in almost every professional recording studio. This makes it a good resource for an Audio Production or Recording Studio class, but because this book targets the absolute beginner and focuses only on using the Pro Tools software, it is not ideal as a comprehensive course textbook. As an expanded version of the Pro Tools users' manual written with the absolute beginning potential recording engineer in mind, it lacks musical concepts or creative project ideas. It covers MIDI sequencing, software instruments, and other tools for creating music, but it does it in the context of step-by-step instructions to learn the software, assuming that the reader already has the musical and creative skills necessary for good songwriting or composing. Because the Pro Tools software is so powerful and subsequently very complicated, this book is a good reference and learning resource for the teacher, but it would then be up to the teacher to develop creative lessons and projects that would develop students' creativity and musicality.

Using Pro Tools in Music Education (Hodson, 2011) is a Pro Tools book that is more targeted to the middle or high school Electronic Music or Music Technology class. This may be

especially useful for schools that choose the new Avid M-Box audio interfaces for their computer labs, because they now come with the Pro Tools software at no additional cost. The book includes six learning "modules" related to tasks you can accomplish with Pro Tools, but the author even admits that the book focuses on the software and not the basics of music, recommending that students should learn the basics of harmony, melody, intervals, scales, and form, either before or during the time they spend learning Pro Tools. This book might seem easier for a traditional music teacher to follow than the official Pro Tools courseware books because it is targeted to teachers and school music classes rather than future recording engineers.

Publications for General Music Technology Reference

Technology Strategies for Music Education (Rudolph et al., 2005) contains an overview of the areas of competency in music technology developed by the Technology Institute for Music Education (TI:ME) along with strategies for integrating those technology competencies into the music curriculum. It is not meant to be a course of study or a textbook, but rather a recommendation of what music teachers should know about technology in context with the National Standards for Arts Education and the Standards of the International Society for Technology in Education. The areas of competency are organized into six categories: electronic musical instruments, music production, music notation software, technology-assisted learning, multimedia, and productivity tools which include classroom and lab management.

A primary goal of TI:ME is to link technology to the National Standards for Arts Education, so this book includes excerpts from the Music Educators National Conference (MENC) publication about the standards, *The School Music Program: A New Vision* (MENC, 2004), and the National Educational Technology Standards (NETS) developed by the International Society for Technology in Education. The TI:ME competency areas contribute to students and teachers meeting the NETS performance indicators so strategies and activities are presented that address the TI:ME, NETS, and MENC National Standards. For each of the national standards, suggestions are given for "student use of technology" and "student activities" as well as "teacher use of technology" and "teacher strategies" that can be used to meet the national standards. There is also an entire chapter devoted to assessment of student achievement and adapting teaching and learning strategies to meet student needs. Non-musical technology is

also discussed, including organizational tools for music teachers, general computer system information, and management of the computer lab (Rudolph et al., 2005).

Several magazine subscriptions were recommended in the current study for their tutorials, new product and software announcements, and interviews with artists, producers, and engineers. *Electronic Musician* and *Keyboard* M*agazine,* free with a membership to TI:ME, focus on Electronic and Popular music performance and production. *Mix Magazine*'s focus is on Audio Production and Recording. *Music Alive!* is a monthly magazine and listening program targeted at middle and high school music students, and focuses on teaching musical concepts with "today's" music. The magazine and web site include resources for teachers such as handouts, music industry news, interviews with popular artists, articles, sheet music, and lesson suggestions, all using current popular music. Subscription plans include a teacher's guide & CD with each monthly issue as well as up to sixty student copies of the magazine each month.

Internet Resources

The internet is growing so fast and has so much information on electronic music production and recording that it may be possible to develop an entire course curriculum from freely-available internet resources. Because the web is constantly changing with new sites and new content being posted as fast as old sites and content is removed, it is important to use search engines to look for more than just the sites that were submitted to this study. If by the time you are reading this some of the sites reviewed no longer exist, search on various key words from the topic to find similar sites.

The most recommended website is the Technology Institute for Music Education (TI:ME) at www.ti-me.org, likely because an invitation to participate in this study was sent to the TI:ME e-mail discussion group. If you become a member of TI:ME, you will have access to the members only section of their website, which includes access to a growing archive of columns, articles, free subscriptions to Electronic Musician Magazine and Keyboard Magazine, a discussion group, a research database, and a large searchable database of lesson plans.

The lesson plan database consists of hundreds of lesson plans submitted by other TI:ME members. They are organized and searchable based on level, type of class, type of equipment and software, and the National Standards. Each lesson plan follows a standard template that

includes the TI:ME technology areas addressed, required equipment, length of time the lesson will take, prior knowledge and skills the students should have, the specific National Standards covered, objectives, procedures, evaluation, and follow-up.

TI:ME also has a micro-site dedicated to Grants. They regularly post grant opportunities along with details about the grants, deadlines, and application procedures. There is a page with tips on writing grants, but it is very concise and not a complete grant writing guide.

The second most popular website recommendation was for Electronic Musician Magazine at www.emusician.com. Their "tutorials" section has an archive of their "Square One" column which is an extensive collection of articles covering basic concepts in synthesis and sound design, recording technology, audio basics, and general computing. Search the site for "Electronic Century" and you will find a four-part series on the history of electronic musical instruments that would be a great introduction to an Electronic Music or Music Technology course.

Teaching beginning music theory is necessary if you are teaching non-traditional music students with no previous music education. Ricci Adams' www.MusicTheory.net (Adams, n.d.) came highly recommended. Its self-paced lessons include animations and sound which make it perfect for an introduction to music theory in a technology-based music class. Teachers can use their computer and projection screen with this website to introduce and explain the basic concepts, and then students can go through the lessons and exercises individually for review. The lessons are very clear and the interface is very easy-to-use. You can begin with the very basics of the staff, clefs, and ledger lines, and progress through rhythm and meter, scales and key signatures, intervals, chords, and chord progressions throughout the first few weeks of the class. It does not go in depth as much as a music theory textbook would, and the lessons are not integrated with the exercises but rather in a separate section of the website. The exercises reinforce the knowledge in the lessons, but also include ear training for practice in recognizing intervals, scales, and chords by ear. The teacher would have to plan for the students to go into the exercise section and do the appropriate exercises after they go through each of the lessons as a class. In an electronic music class, the teacher should also have students open up the "graphic note editor" or "piano-roll" or graphic view in their sequencing software and do some exercises to make sure students understand the connection between the piano-roll view, the piano keyboard, and notes on the staff.

Another music theory reference recommended was Gilbert DeBenedetti's (n.d.) www.GMajorMusicTheory.org. This website contains sections on music fundamentals, harmonic dictation, and contextual listening. In the music fundamentals section, DeBenedetti has posted his entire nineteen-chapter workbook entitled *Pathways to Harmony*. Each chapter is a separate printable file and is accompanied by many online virtual flash cards for practice, evaluation, and reinforcement. As the workbook introduces keys and scales, the author makes "circle-of-fifths" charts available. These circular charts start out with just the name of the key and a piano keyboard with dots on the notes of the major scale, so students can see clearly that with each position around the circle, the scale includes a new black key on the keyboard as you go through the keys of, C, G, D, A, E, B F#/Gb, and C#/Db, and then takes away one black key through the rest of the flat keys. This is then transferred to key signatures, so the next chart adds the key signature to each position on the circle so the student can see how one sharp is added or one flat is taken away as you go around the circle. The circular charts get bigger and bigger as the major and minor scales are added to the outside circumference, culminating in an assignment for the student to fill in a blank circle of fifths with the major and relative minor key names, key signatures, major scales on a piano keyboard, major scales in notation, natural minor scales on the piano keyboard and in notation, and then the harmonic and melodic scale notation (Figure 1). The emphasis on minor keys and scales is especially important to a class focused on popular music because much of today's popular music is written in minor keys. The Harmonic Dictation section of www.GMajorMusicTheory.org includes 89 audio recordings along with printable worksheets to write in the notation as it plays. Teachers or students are instructed to download and print the worksheets, click each audio file to play it, and then write the soprano and bass parts along with the Roman numeral and Arabic notation on the answer worksheet. Solution sheets are also available to check your answers (DeBenedetti, n.d.). Because this was written for an Advanced Placement Music Theory course at a performing arts high school, it gets very advanced and detailed. From the perspective of an electronic music or songwriting course, a teacher may choose to only use the beginning-level resources to get their students familiar with basic music notation, keys, and scales.

The "Contextual Listening" section has students identify musical elements in real music played by professional musicians. The worksheets and instructions are similar to the harmonic dictation section but also include meter, rhythms, and form (DeBenedetti, n.d.). For an

electronic music class the teacher can transfer this idea to popular music examples by having students listen and figure out bass lines, rhythms, meter, melody, chord progressions, and the form to some of their favorite songs.

As a general introduction to MIDI, equipment, and recording from a home-studio perspective, refer to www.tweakheadz.com and click on "The Guide." The first two sections, "MIDI Basics," and "How to setup Digital Audio" would be a perfect reading assignment for students just getting started with electronic music or recording. This web site is not very modern or visually appealing, but the content is updated regularly and the writing style is very easy for high school students to understand and relate to. It starts by explaining the very basics of the musical instrument digital interface (MIDI) and the data that MIDI sends and receives. There is a good explanation of the difference between MIDI data and digital audio and how they are both used for unique purposes. Different types of hardware and software are explained along with concepts that apply to them, including photos and diagrams demonstrating how the devices can be connected in various ways to accomplish various tasks. Signal flow is an important concept when connecting MIDI and audio equipment, so the wiring diagrams are very effective in explaining how everything should be connected (Tweakheadz, n.d.).

For the teacher, "21 Ways to Assemble a Home Recording Rig," explains different ways you might set up the workstations in a computer lab or recording studio control room, however in the context of a school music program only the first two or three would be economical. Because many current software packages work with a computer's built-in sound hardware, headphones can be plugged into the computer for monitoring. Many software sequencers include an on-screen "soft" keyboard that maps the piano keys to the regular computer keyboard making it possible to start teaching an electronic music class in any existing computer lab and only add USB midi keyboard controllers if you get additional funding. Synthesizers, sound modules, drum machines, and mixers are all included in software now, so it is no longer necessary to purchase these devices if you choose the right software and controller (Tweakheadz, n.d.).

Video websites with user-submitted multi-media content such as YouTube.com and TeacherTube.com contain multimedia instructional material on many music software packages. As previously demonstrated by Meier (2007), multimedia video demonstration is a viable instructional tool when used to train music software skills. YouTube can be a valuable resource

if the teacher knows what to search for and spends the time to weed through all the bad content (Rudolph & Frankel, 2009). The publishers of most music software are likely have a YouTube channel full of professionally-produced instructional videos. For example, Ableton Live has a channel at http://www.youtube.com/user/AbletonInc with seven "Getting Started" videos and over 127 videos overall. Avid has a whole playlist of videos on using Pro Tools at http://www.youtube.com/user/avid, including some interviews with the top producers and recording engineers as well as tips and hints for using Pro Tools. Cakewalk software's channel at http://www.youtube.com/user/CakewalkSoftware has "getting started" videos for their Sonar software. In addition to the publishers' channels, a search on YouTube for the name of a software program will return hundreds of amateur videos and professionally-produced videos as well. Many private electronic music production schools or DJ schools post videos on YouTube as sample material promoting their on-line classes.

Use caution when using YouTube in the classroom because it is not filtered for profanity or poor quality (Rudolph & Frankel, 2009). When using YouTube, pre-screen any videos before playing for the class and make sure only the full-screen video makes it onto the projection screen, because search results or other areas of the site may contain inappropriate words or material. If YouTube is blocked on a school's network there are on-line tools and browser extensions that the teacher can use at home to save YouTube videos as files on a drive that can then be brought to school or imported into a PowerPoint presentation (Rudolph & Frankel, 2009). TeacherTube.com is a much safer place to find video tutorials because videos submitted are pre-screened, moderated, and rated by the user community (http://teachertube.com/staticPage.php?pg=about). The selection is not nearly as vast as YouTube, but tutorial videos for *GarageBand* and other music software do exist.

Workshops and Professional Development

For the teachers who indicated they would need training before feeling comfortable teaching a technology-based music class, it has been shown that a one-week technology workshop significantly increases the level of comfort with technology among music teachers (Bauer, Reese, & McAllister, 2003). Many of the music technology teachers in the current study recommended workshops sanctioned by the Technology Institute for Music Education (TI:ME),

which offers an extensive program of professional development certification in technology for music education. They offer two levels of certification that teachers can achieve: Level one is achieved after completion of two "Basic Skills" workshops, and Level Two is achieved after completing five Level-Two courses. Workshops are held at educational institutions all over the country, covering a wide range of competency areas including Electronic Music Instruments, Music Production, Music Notation Software, Technology-Assisted Learning, Multimedia, and Productivity Tools. Other workshops recommended were the Apple Pro Certification course in Logic Pro, and the Pro Tools certification course for Avid's *Pro Tools* software. These courses usually tend to be targeted at professional musicians or aspiring engineers, and therefore go into great detail with these software packages but offer little in terms of strategies or curriculum to use in a high school or middle school classroom to teach musical and creative concepts.

In addition to workshops and reference books, a teacher who is uncomfortable with the equipment or technical aspects of the hardware and software can recruit student help. In a study by Williams & Beirne (2005), one of the findings was that very little time needed to be spent on how to use software, even though their subjects were students with no previous musical background. Many students are very good at naturally learning how to use software, so just as some traditional ensembles have section leaders or some form of student leadership in place, the music technology teacher may want to appoint some of these more technologically savvy students as "student technicians" to help set up equipment, troubleshoot software, and give one-on-one help to their fellow students having trouble.

Non-Traditional Students

One of the questions this project sought to answer was "Are technology-based music classes targeted at students not in traditional music classes?" Overall, most of the teachers with some kind of music technology program said they do offer at least one class that is open to all students, and the majority indicated that students also in a traditional music class or ensemble made up 30% or less of their technology-based music classes. This is part of the "other 80%" that Dammers (2009, 2010) and others say we need to reach in order to push music education forward and embrace the push for "music for all."

Many of the teachers without a music technology program indicated that they are worried it will take away from their traditional ensembles, or they have the perception that there is not enough student interest. However, it is possible that the only students these teachers are interacting with are the students in their traditional music classes and ensembles. If those are the students that are not showing interest, it is fair to speculate that it will not take students away from the traditional ensembles. In the Dammers (2009) survey of schools in New Jersey, music technology teachers indicated that these classes were generally taken by non-traditional music students, so there may be student interest in the rest of the student population if teachers reached out to those students or recruited and advertised to them in a way that would appeal to a non-traditional music enthusiast. One teacher said it was not a student interest based on a survey of what classes they would like to see offered, so perhaps further research should be done in this area. If it was not mentioned as a specific choice on the survey, it is possible that students and teachers never thought about the fact that this subject is something that could be offered as a class.

When asked about the student culture compared to traditional music classes they teach, 78.13% indicated that there was a difference. This supports the feeling that technology-based music classes appeal to different students than traditional music classes or ensembles. The fact that over half of the teachers have 30% or fewer traditional music students in their music technology classes might suggest that many students would not be involved in the music program if it were not for these classes. This is similar to findings by Seifried (2006) about a guitar class targeted at non-traditional students, and Dammers' (2010) findings that 28% of students in technology-based music classes are also in band, choir, or orchestra. The suggestion that technology-based music classes appeal to a different type of student may indicate that they will most likely not have a dramatically adverse effect on the enrollment of band, chorus, orchestra, or other traditional music classes. However, more research should be done in this area because it is possible that some students are in a traditional music ensemble because that is the only current music option, even though their musical interest might align more closely with that of the non-traditional music student. With approximately 80% of students not in any performance-based traditional music classes (Edwards, 2006; Dammers, 2010; Williams, 2007) there are plenty of students that can be recruited who are not in traditional ensembles.

The discussion of losing traditional music students should not be without a discussion of gaining students into traditional programs as well. Three of the teachers who teach technology-based music classes commented that their technology class has been a good recruiting tool for the traditional ensembles, and perhaps more would have indicated this if it were specifically asked in the survey. If students have an enjoyable experience and gain self-confidence as musicians, they might change their previously-held perceptions of the traditional music ensembles and decide it might be something they are interested in. The teacher can encourage the non-traditional music students to take their new-found musical skills to the "next level" by joining band, chorus, or orchestra. At the very least, they are likely to grow up with a greater appreciation for music and support keeping it in the schools.

Another benefit of targeting non-traditional music students is the ability to advocate to your administration, the community, parents, and other sources of funding and support by showing them the benefits of music education. Music and other arts teachers are always advocating for their programs by citing studies showing an academic benefit to students enrolled in music classes. For example, a direct correlation was found in Florida between the number of music & arts classes taken and student achievement, regardless of socio-economic background and ethnicity (Kelly, 2008). The advocacy website of the National Association for Music Education at http://advocacy.nafme.org has a database of a wide variety of research on the benefits of music education. This can be used when trying to convince donors or administration to support a music technology class targeted toward students who are not already taking a music class.

Subjects mentioned a fear that the guidance department would use these classes as a "dumping ground" for students who cannot find anything else that fits in their schedule. While this might present an initial challenge due to the fact that the students might not have originally wanted to sign up for the class, music teachers should remember that many of the teachers at their school deal with this issue in all of their classes. Part of being a good teacher is motivating students, so music teachers should enjoy the opportunity to motivate these students into a great appreciation for music education. It is possible that an Electronic Music class would appeal to these "dumped" students more than an academic class or a performing ensemble. Therefore, in the process of convincing the administration to start a technology-based music class, teachers might want to offer it as a great place to "dump" students with no other elective options.

Challenges and Motivation

Funding

There are many inexpensive ways to get an Electronic Music or music technology class started. While it is possible to spend as much as $30,000.00 or more for a lab full of workstations that include a computer, MIDI keyboard controller, audio interface, software, and furniture, teachers might be able to use an existing computer lab and free software to get started. Almost every school has existing computer labs and/or laptop carts. It may be a challenge to find a class period where the computer lab is not being used, but look past just the general labs that all teachers can reserve. For example, there might be specialty labs such as a business-education room or a graphic design class where the teacher has a planning period. Another option might be to go back-and-forth between a regular rehearsal room and the media center, using the regular room for teaching the concepts and then moving to the media center to use the computers. If a school has an optional period, you might have greater success asking to teach the technology-based music class during that optional period because other classes are less likely to need time in the lab. It may be possible to add it as an after-school program if there is no free time in any of the labs during the school day. Many schools refresh their computers on a regular basis, so it might be possible to find some computers that are old and ready for the surplus warehouse but still able to run basic music software and web-based music programs. If there is no available classroom to put them, it may be possible to set them up along the outside walls or in the back of an existing music room or rehearsal space. The first Electronic Music class at Leon High School in Tallahassee, Florida was in a lab of old surplus computers that were being re-purposed to run a web-based credit retrieval program for students who were in danger of dropping out. It was taught by one of the baseball coaches, and the Electronic Music class was in that lab during his planning period. The total investment was only $500 for a classroom lab-pack of the *Reason* software and the *Teaching Music with Reason* curriculum (Propellerhead, 2004), which was purchased through district-allocated textbook funds. As a program becomes successful and administrators see the positive benefits to the students, especially those at-risk students, administrators might be willing to help find additional funding for inexpensive MIDI

keyboard controllers. Many manufacturers now make two-octave keyboards small enough to fit in any computer lab or laptop cart and only cost between $35.00 and $99.00 each.

Free and open source software makes it possible to start an Electronic Music program with virtually no software costs. If your existing lab has Apple Macintosh computers, they already have *GarageBand,* which has become a very powerful tool for creating and arranging electronic music as well as learning basic music theory, guitar, and piano skills in its most recent versions. For Windows-based computers, *Linux Multimedia Studio (LMMS)* is a free alternative to commercial sequencing software such as Cubase or Cakewalk Sonar. It has an arrangement view, piano-roll note editor, step-sequencer for building drum beats and bass lines, and if you don't have external MIDI keyboards it allows you to use the regular computer keyboard as a MIDI keyboard. It comes with a wide variety of software instruments, samples, effects, and presets to start making music right away. It is not as easy to use and setup as its commercial counterparts, but for a free program it is worth a look if you have no budget. *Mixcraft* (Acoustica, n.d.) is a similar program with more features, virtual instruments, and effects. A free trial version is available, and the purchase price is about one-fourth of the cost of similar programs such as Cubase, Sonar, or Acid Pro.

Web applications are becoming popular free alternatives to installed software. Music theory tutoring and practice websites have already been mentioned, but there are also a growing number of websites for music notation, production, and many other tasks. Noteflight is a free on-line music notation program that was recommended by some of the survey respondents and mentioned in the Watson (2011) book. Teachers can create accounts for their students and keep track of their usernames and passwords to access the students' assignments. Myna (http://aviary.com/tools/audio-editor) is an online multi-track recording and looping application that allows students to record audio from the computer, import audio clips, or select from a built-in loop library. Audiotool (http://audiotool.com) is an on-line virtual music studio with several drum machines, a pattern sequencer, bass line generator, effects, a mixer, and an amplifier. Much like Propellerhead's *Reason* software, you can drag-and-drop the devices and interconnect them with virtual cables (Watson, 2011). These free web-based tools and programs, in addition to the websites already mentioned as curriculum resources, can greatly reduce the cost of starting a technology-based music class.

If using an existing computer lab is not possible, or using free software does not seem to be the best option, raising funds is a priority. Many organizations and companies that specialize in designing and installing music technology labs often have resources available to help find funding. For example, the Soundtree company maintains a web page at http://soundtree.com/finding-funds that links to an e-mail grant alert newsletter subscription, a podcast on finding funds, downloadable sample letters and funding proposals, and links to a variety of federal and state grants, foundations, and corporations that offer grant opportunities. Additionally, they publish a book entitled *Finding Funds for Music Technology* (Rudoph, 1999) that walks you through the entire grant process from finding the right grant opportunity to writing a successful grant proposal. The National Association for Music Education (formerly MENC) also maintains a list of grants and grant writing tips at http://nafme.org/resources/view/grants-information.

Another great resource for finding funding is www.GrantStation.com. This is a paid service, but many school districts have a district-wide subscription. GrantStation maintains a funding database which includes a charitable giving database of independent, family, community, and corporate foundations and giving programs, as well as State, Federal, International, and Canadian grants. They are searchable by geographic focus, areas of interest, and types of support. GrantStation also has a section with several tutorials to assist grant seekers in the grant writing process including letters of inquiry, the Full Grant Proposal's structural elements, cover, and attachments, along with practical grammar-based advice on the tone and style of your writing. Plenty of sample winning proposals are available as examples.

Training

In-service or training was one of the top responses to the question asking what would encourage teachers to start a music technology class, and lack of knowledge or training was often mentioned in the question asking why a music technology course is not offered. This is consistent with the findings of Webster (2007) that teachers lagged behind in their use of music technology. Many great training workshop resources have already been mentioned and research by Bauer, Reese, & McAllister, (2003) shows that workshops increase comfort and knowledge with music technology. The many curriculum resources reviewed above may also increase

knowledge and comfort with the technology and subject matter required to teach a technology-based music class.

Curriculum

As was mentioned in the discussion of in-service and training, teachers want to be absolutely comfortable before standing in front of a class. Part of that comfort is having a good lesson plan, and for teachers whose primary responsibility is an entire band, chorus, or orchestra program, coming up with those lesson plans needs to be as easy as possible. This study has shown that there are many books, websites, and workshops at the disposal of a teacher who is motivated to search for them. For the teacher who just wants a textbook to work through step-by-step throughout the year, no perfect solutions were found but the best options are *Using Technology to Unlock Musical Creativity* (Watson, 2011) and *Music Technology Workbook* (Middleton & Gurevitz, 2008). While these books offer a great place to start and a good way to calm the anxiety caused by teaching something outside of his or her comfort zone, the teacher will most likely find their own sense of musicality and good teaching eventually taking over resulting in ideas for enhancing and modifying the lessons in those books. As teachers get to know their students they will develop ways to tailor the projects to the students' interests and favorite genres of music.

Scheduling

The need for more teachers or more class periods infers that a technology-based music class might appeal to only a limited number of teachers depending on their situation. Some music teachers teach at least one class out-of-field or a class that they do not want to offer any more. This is especially common at small schools where the entire band or chorus programs are in one or two class periods. To fill the band or chorus director's schedule, they may end up teaching a study hall, TV Production, a remediation class, or they might have hallway, lunch, or bus duty to make up for it. These teachers might want to discuss an electronic music or music technology class with their administration as an option to keep them teaching in their field. At larger schools, a traditional program's enrollment might be almost large enough to justify hiring an assistant director, and recruiting enough students from outside the traditional music program

to register for an electronic music class might push the music enrollment high enough to justify hiring that additional teacher.

Finding students with time in their schedule is a growing challenge because many schools are reducing the number of class periods in a day due to budget reduction. When this happens, sometimes a school will offer an "optional" period either before or after the regular school day to allow students to take more electives. This generally only happens at the high-school level, but it is a good way to allow students to take more electives. Choosing to offer the course during this optional period should be done carefully because sometimes transportation is not provided to students. If the school district only offers optional periods to students who can provide their own transportation, you are leaving out a large number of younger and lower-income students who might benefit the most from taking a non-traditional music class.

CHAPTER VII
SAMPLE IMPLEMENTATION PLAN

Based on the data from the present study, related literature, and the author's personal experience and opinion, the following is a plan for one approach to implementing a high school "Electronic Music" class targeted at non-traditional music students and focusing on popular music and creative activities such as technology-based song-writing, arranging, and composing. Although it was found that "Music Technology" was used more often as the name of existing classes of this nature, the name "Electronic Music" was chosen because it implies more importance on music than on the technology by making "music" the noun rather than the adjective. "Electronic Music" is also the name used in the Florida Department of Education high school course code directory. Suggestions are made for a time-line of planning, implementation, and curriculum development.

Preparation

Beginning early in the school year prior to starting your first Electronic Music class, start preparing a proposal document that contains a detailed course description, justification, and plan for funding and implementation (Appendix F). Focus on the population of students the class will appeal to, who currently have no desire to join a traditional music class. Include learning outcomes and creative activities that are not common in traditional music classes. *Using Technology to Unlock Musical Creativity* (Watson, 2011) has great information on the benefits of creativity and higher-level thinking in chapter two that would be beneficial to include in this document. Also include advocacy information and data that shows benefits of music and arts classes to academic achievement and drop-out prevention.

The course description should emphasize creative activities and projects along with specific learning outcomes. Explain how the course will develop creativity and higher-level thinking through activities such as the learning and application of basic music theory and analysis through individual projects focusing on improvisation, song writing, arranging, and producing original music through multi-track MIDI and digital audio software in a comfortable environment that cultivates student success.

The proposal document should also include a funding plan. You might want to present several different options, starting small with an existing computer lab and purchasing only software, eventually purchasing small MIDI keyboards and more software, and ultimately a full dedicated music technology lab within a certain number of years. Include ideas for fundraising through grants, foundations, businesses, and parent associations. If you will be using this document as part of a grant application, tailor it to the specifications outlined in the specific grant requirements.

School recognition is important to administrators, so include ways that this program will help improve the school image. Several state music education associations have music enrollment awards for which your school may qualify if you increase the number of music students. Many schools have music technology programs that are a model for other schools and school districts to emulate. Teachers and administrators from other schools visit to see examples of true creativity in the classroom and effective use of technology. Emphasize the fact that your school can become one of those model programs that other schools will seek to emulate as the field of technology-based music classes targeted at non-traditional students gains popularity in your state.

No later than October, you should begin gaining support from the other music teachers at your school. Present the proposal document to them, and discuss ways to recruit students that are not already in traditional music classes. Other music teachers will be most supportive if you come up with strategies to recruit students in a way that will not cause them to lose students from existing programs. If the administration can see that the entire music faculty is supportive of this, they are more likely to support it themselves.

Approval

The next step is to meet with administration. The principal or assistant principal for curriculum will ultimately need to approve adding the class to the schedule, and they will need to approve funding, classroom allocation, and teaching load first. Discuss all the details you prepared on the proposal document so they know exact learning outcomes and student benefits.

Also discuss how it will fit into your teaching schedule. If there is a class you are currently teaching that you want to replace, talk to them about why the electronic music class

will better benefit students or have the potential for a larger enrollment than the existing class. For example, if a band director is having problems getting students to sign up for both band and jazz band resulting in a small jazz class, moving the jazz band to after school and replacing it with a music technology class will allow the band director to teach more students and potentially allow up to twenty-five or thirty non-traditional-music students a music education while at the same time allowing the jazz students to take additional electives. If you are currently teaching a Music Appreciation class, the approach you might want to take is to just change the name and "enhance" that existing class with technology that allows students to engage creatively through creating their own music.

The administration might be concerned about what room, if any, will be available for the class to meet. Present several options for existing computer labs, media center, traditional rehearsal rooms, or large practice rooms. If using an existing lab, have a plan that will not limit other teachers' use of the lab, such as meeting in the band room two days a week and the computer lab three days a week. If you plan to use a lab that is another teachers' classroom such as a business teacher or graphic design teacher, talk to that teacher first. They are more likely to be supportive if you approach them and ask first rather than having the principal tell them that they will need to give up the lab during their planning period.

Funding is most likely one of the greatest concerns for the administration, so clearly describe how you will try to raise funds, what those funds will be used for, and how you can get by without funds. If you choose the option to teach in an existing lab, show them the free or low-cost software and web applications that you can utilize in the early stages of the class. There may be enough money in the regular classroom supplies and textbook budget to purchase inexpensive software. If the school has a budget for technology, software, or upgrades, you might convince them to use a portion of that for music software. Any other funding such as corporate sponsorships, parent donations, or grants will most likely need the approval of the administration, so make sure you outline exactly how money will be used as it comes in while reinforcing the fact that you can still teach an effective electronic music class with only free software and existing computers if you need to.

The sample proposal (Appendix F) includes a three-phase funding plan. Phase one is for an existing computer lab and only free software. Phase-two is still an existing computer lab, but with the purchase of additional sequencing software and small MIDI keyboard controllers that

will easily fit in front of the existing computer keyboards without the need for additional space. Always look into the bundled software that comes with keyboard controllers, because it can be used as a good sequencing, looping, audio editing, or notation software. At the time of this writing, the M-Audio Keystation Mini 32 keyboards come with *Sibelius First*, a notation software package which normally has a retail cost that is more than the cost of just the keyboards. A "lite" version of *Ableton Live*, which is becoming one of the most popular sequencing, looping, audio, and live performance software programs, is also included with many keyboard controllers and audio interfaces. Phase three outlines the cost for a dedicated computer lab, including computers, MIDI keyboard controllers with semi-weighted full-size keys, audio interfaces that include Pro Tools software, headphones, and furniture.

Recruiting

As soon as the Electronic Music class is approved and added to the schedule, start recruiting students to sign up for it. Other teachers might be able to help recruit students who are not currently taking a music class but have shown interest in music. For example, many English or Language Arts teachers can recognize student interest in music through their writing or their interaction with other students. History teachers might have some students who have chosen to do reports or history projects on a style of popular music, a band, or a popular musician. A dean of students or other administrator might be able to help you target "at-risk" students who might be interested.

Keep your recruiting as focused as possible on the potential non-traditional music students, but do not discourage traditional music students from signing up if they have room for an extra elective. Some of them may have a genuine interest in electronic music, and they can assist you in tutoring the students with no previous music experience. Because electronic music will be only a one-semester or one-year course at first, students may be less likely to drop out of a four-year traditional music program to take it.

Training and In-service

During the year before you start the Electronic Music class, some learning and planning during your down-time. For example, during spring break or the week after your final

performance when your traditional program may not need your full attention, that might be a good time to start looking through books and materials and getting familiar with software. Buy and start reading *Using Technology to Unlock Musical Creativity* (Watson, 2011) and the *Music Technology Workbook* (Middleton & Gurevitz, 2008). If you can afford it, join TI:ME and look through their summer workshop offerings. Start with one of their level-one workshops that include electronic musical instruments and music production. Check with your school district to make sure you will get in-service credit and possible compensation for attending the workshop.

Lesson Planning

A sample curriculum plan for a one-semester (half year) course entitled "Electronic Music" is presented here using mostly curriculum materials and web resources recommended by the teachers who participated in this study. Some lessons and concepts will come from Scott Watson's (2011) *Using Technology to Unlock Musical Creativity* (the Watson Book) and *Music Technology Workbook* (Middleton & Gurevitz, 2008). This curriculum can be taught in any standard computer lab with small MIDI keyboard controllers and any popular digital audio workstation or sequencing and looping software installed. Popular software at the time of this writing includes GarageBand, Cubase, Logic Express, Pro Tools, Ableton Live, or the free LMMS Studio. The focus is primarily on music and creativity so topics that are overly technical are deliberately avoided. It is recommended that the teacher refer to the documentation or various internet resources for specific technical instructions for the chosen software.

Because this is a class that will target students who may have no previous music experience, the focus is on popular music at first. This allows us to start where the students' interests are and then once they have a good understanding of the basic musical concepts, we can introduce other genres such as classical, jazz, and world music, and encourage them to use these other genres in their projects. Each teacher will want to tailor the activities, pacing, and projects based on their experience and student interests and abilities. Lesson plans should remain flexible, because all students are different and you will find that each class will have varying tastes, interests, and levels of insecurity.

The first day is typically spent with introductions and discussion of the course syllabus (Appendix G) and the course calendar (Appendix H). After doing this quickly, including

expectations for behavior and care for the equipment in the lab, use the "Favorite Sounds" lesson in the Watson book (Watson, 2011) to get students making music right away. If you do not have actual synthesizers with built-in-sounds, show students how to open up the sequencing software, create one track with a software instrument on it, put it into record or monitor mode, change the sounds, and play the keyboard. If you do not have MIDI keyboards, show the students the "musical typing" feature in the software that lets them use the computer keyboard as a midi keyboard. Have them improvise a short motive or try to figure out the hook from one of their favorite songs using the keyboard, and then experiment with different sounds available to them. Remember, structured instruction with defined outcomes balanced with guided exploration time produce the best results (Williams & Beirne, 2005) so assigning a limited number of notes to use might help them be more successful in their exploration of the various sounds available to them.

The rest of week one and week two should be spent on a brief history of electronic music and basic music theory. These are combined to lend variety to each class, while at the same time covering basic skills and concepts that will be important to the remainder of the course. See the sample course calendar (Appendix H) for a possible way to pace these lessons, but vary that based on how quickly your students are learning. Students can use the keyboards or sequencing software to reinforce the theory concepts you teach, and find instrument patches that sound like the early instruments in the history lessons. If your software has a "note view" or "staff notation view" have the students use that to create scales and rhythms then switch to the piano-roll or graphic note view so see how it transfers to that graphic display and the piano keyboard along the side of the graph. If you prefer, you can use a separate notation program such as Finale or Sibelius, or the free on-line notation software Noteflight.com. As the students learn note duration, time signatures, and other rhythmic concepts, reinforce them by putting rhythms on the board or projector and have them sing, clap, or play the rhythms together as a class. Using the piano-roll view can help explain and reinforce note lengths. The measures are graphed out and subdivided right on the screen, and they can easily see how a whole note takes up the whole measure, a half note takes up half the measure, and so on.

To enhance the history reading and discussion, look for multi-media online. YouTube and Wikipedia have audio, video, and images that demonstrate the early electro-acoustic and electronic instruments such as the Teleharmonium and Theremin. You can find explanations of how they work and how they were played. Many of the works cited in the *Electronic Century*

series on emusician.com can be found online to play for the class. Begin the third week with a quick history review and the "Percussion Sounds Improvisation" lesson in the Watson book to practice reading rhythms and start getting a feel for typical drum rhythms in popular music.

We will then focus on critical listening skills. Using the *Music Technology Workbook* (Middleton & Gurevitz, 2008) chapter 2, "Listening and Creative Skills," students will start to develop listening skills to distinguish the commonly used instruments and drum sounds. Play examples of bass, chords, melody, counter-melody, guitar, strings, kick-drum, snare drum, hi-hat, toms, and cymbals. Help the students find these sounds in their sequencing software and have them try to imitate some simple one-measure melodies by playing back what you play for them. Play some loops for the class and have the students figure out the "tonic" note, then see if they can figure out how to play what they hear on their keyboards. Keep the tempo slow and the melody simple at first so students do not get frustrated. Next, transfer this to some clips from actual popular music. Isolate and loop just the hook from several songs and see if the students can figure out what instruments they hear. See if they can listen carefully enough play back the individual parts.

Now is a good time to spend some time on the basics of MIDI, and how to use the sequencing software and virtual instruments to record onto a MIDI or soft-instrument track. Chapter four of the *Music Technology Workbook* (Middleton & Gurevits, 2008) has a good explanation of all the important concepts for recording and editing in a sequencer, and chapter 5 puts those concepts into practice. If you have a book or tutorial that is specific to the software you use, you might want to use that in place of chapter 5. In the exercises at the end of chapter 5, students will practice setting up a working environment in their sequencing software. The important things students will need to know are how to create tracks, setup the MIDI keyboard to play that track (or set up the track to take input from the MIDI keyboard), and add a virtual software instrument to the track. Students will then make their first recording by locating a drum sound, setting up the metronome, and recording to a track. Cycle recording is introduced in this exercise as well, which will be covered in greater detail in a future lesson with the Watson book. Copy-and-paste, cutting and gluing, and using the graphic editor or piano roll editor are also practiced with these exercises.

Project 1: Improvising over Loops

The creative process will start with the student improvising a melody over an accompaniment. The "Blues Keyboard Improvisation" lesson in the Watson book is a great place to start improvising using a limited number of notes. Limiting it to just some of the black keys on the keyboard makes the student almost immediately successful and comfortable (Watson, 2011). Expand on this lesson by having students load a loop into one track of their software and add a virtual instrument track above it. The loop should have some harmonic material in a key that is easy to improvise over. The teacher should pick the key and a limited number of notes to use for the improvisation, or review the scale that fits with the key of the loop and have students practice that scale using proper fingering and hand position. Encourage students to pick an instrument sound that fits the timbre of the loop for the melody track. Next, they will record an improvised melody while listening to the loop, recording for several measures while keeping in time with the loop that they hear in the background. Have them save their work to a network location or their own USB drive so they can continue to add to this project throughout the next few lessons.

Next, the students will practice editing skills by editing the MIDI notes that they have improvised. Have them pick measures that sound good to them and measures that do not. Review the concepts of copy and paste, as well as grouping, slicing, and gluing the objects or groups in the tracks. This will allow them to isolate and arrange the things that sound good and either delete or use the graphic editor or piano-roll view to fix the parts that do not quite fit with the loop. Teach them how to use the quantize function to get everything lined up with the project's master tempo.

Form and Song Structure

Now is a good time to introduce form and structure. Students should now be familiar with the various instruments, scales, and rhythms, so we can now listen for how all of those elements change throughout various types of music. Go to the Billboard Hot 100 chart at www.billboard.com. These are the most popular current songs so it is likely that your students will know most of them. Many of these songs have a "Play" button that you can use to play the song for free, or you can use one of the many services that allow you to stream unlimited music

for a small monthly fee. You can pause after each section and use the slider to go back and listen to a section. Make a time-line on the white-board that outlines each section. Start by just calling attention to places where many elements change, then ask specifically what changed. Once you have all the changes organized into sections, start naming the sections. Some section names you might want to use include Intro, Chorus, Verse, Bridge, Pre-Chorus, Chorus Extension, and transition. Talk about definitions of those section names during the activity. The "Song Structure" section of the *Music Technology Workbook* (Middleton & Gurevitz, 2008) has information and definitions related to form and structure.

For each section, ask students what they hear and write it down within that section of the timeline. Every time the section changes, ask them what changed and write that into the timeline. After doing a few songs together as a class, have them make their own timelines for a couple songs, but still guide them through the listening process. Once the students feel comfortable, you might want to assign them to do a timeline on their own at home for homework.

Next, apply the concept of "form" to their improvisation loop project. At first, keep the form simple, such as A-B-A or Chorus – Verse – Chorus. Using what they improvised and recorded previously, ask if they think it sounds more like a chorus or a verse. Create a second section based on the existing section by changing the melody and finding different loops for the accompaniment. Perhaps start with a different accompaniment loop then improvise over that new loop to create the new section. Copy and paste the original section for the recapitulation, but have them change it in some way, perhaps by adding another improvised counter-melody or adding a supporting loop.

Layering and Balance

We will take a break from the "Improvisation over Loops" project to learn about balance and layering and then apply these concepts to the project. The lesson entitled "Loops and Layering" on page 198 of the Watson book introduces the composition principle of layering. It also introduces the "100%" rule, which is a concept concerned with over-using an ensemble's performing forces and teaches the students to be careful about having too many things going on at the same time. Guiding your students through this lesson will give them several examples of

songs and compositions composed using layering, and then students will create a short song using layered loops (Watson, 2011).

As the students work on this short Loops and Layering project, you should call their attention to balance throughout the project. Show them how to open the "mixer" window, and explain that there is a vertical mixer channel for each track they add. The main slider on each channel is the loudness control, but they can also control the levels of high, mid, and bass frequencies in the equalization section, and the "pan" control adjusts the virtual placement of the sound to make it sound like its coming from the left or the right rather than center.

Remind students that good balance can be achieved by making things softer as well as louder. Often when students want a line to be louder, their initial instinct is to increase that channel on the mixer rather than decreasing the things that are covering it up. This might cause clipping and distort the sound. Students should pay close attention to the master level meter. It is usually numbered from the bottom with negative numbers going up to zero, and then positive numbers above zero that go into the "red" area. It is best to keep it right around the "zero" indication or slightly below. If the meter indication goes into the red area while the music is playing, clipping may occur and there might be a clipping indicator that lights up. When this happens students should bring several of the channel level controls down until the meter is peaking at just around "zero," and then adjust for balance from there.

We will now apply the concept of layering to the Improvisation over Loops project, which we were working on earlier. Many of the songs from the time-line activity probably had increased layering throughout the song, so have students think of ways to apply more layers to their songs. This will make it easy to create an introduction, ending, and bridge by adding and changing layers to change the texture.

Students should then start thinking about how they will begin and end their song. Listen to several popular songs to see how they create the introductions and endings. It could be a thin-textured piece of the hook, just the accompaniment without any melody or drums, just drums with other instruments layering in over time, or something completely different.

After a few days of guided individual work polishing these projects with an introduction, chorus, verses, bridge, and ending, they are ready to present to the class. This is generally done by sending the completed project files to the teacher, or saving them on a network location that is accessible by the teacher. The teacher then loads them on the computer that is connected to a

sound system in the classroom for the students to listen. If a projector is available, it will be good for the class to see everyone's project as it plays. Students should be encouraged to ask questions when they hear something they want to learn how to do. You can also hand out rubric-based comment sheets for the students to give feedback on each other's work. This will help keep them focused and on-task while listening to the other students' work.

Project 2: Building Your First Original Song

Now that students have successfully created a song with their own melody and arrangement, we start to take away the loops and get them to compose their own "loops" for the drums and accompaniment. Let's begin with a basic drum groove. In the Watson book, read the activity on page 112, "Creating a Song Part 1: Recording a Rock Drum Beat (groove) using Loop Record." This will walk the students through exactly how to load a sample MIDI file that you download from the book's website, enable loop recording in your sequencing software, and use the midi keyboard to record a drum groove one instrument at a time. It then has a good explanation of quantization and steps to use quantization to line up the rhythms in the track (Watson, 2011).

Next we will have students start building their own drum groove. Have the students solo the drum track in their sequencing software from the Rock Drum Groove activity, turn on loop mode and set the markers so it will loop one measure. Open the piano-roll note editor for that measure, so they can see the four quarter notes for the kick drum, a snare on count two and count four, and straight eight-notes for the high hat that they recorded in the Watson lesson. Take the opportunity to teach the concept "syncopation" by demonstrating how the groove changes when you move the various drum notes from "on" the beat to "off" the beat, or from the "down" beats to the "up" beats. For example, moving the kick drum notes that are on count two and four just one sixteenth-note earlier has a dramatic effect on the feel of the overall drum rhythm. Give students time to experiment with moving the notes and adding new syncopated notes.

As a listening exercise, go back to the Billboard chart and use some songs as material for analyzing the drum rhythms. Students will notice that in most popular music, the basic drum groove loops throughout the song, and sometimes changes for different sections of the form. Play a song, ask students to focus on just the kick drum, and try to notate that one measure that is

repeating. At first, the teacher can demonstrate by writing notation on the white-board or projected computer screen. Once the kick-drum has been transcribed, have them listen for the snare, hi-hats, toms, or any other percussion instruments. The goal is to duplicate as closely as possible the basic drum pattern that is the foundation for this song. If the drums change at the chorus or bridge, have the students create a separate one-measure loop for the chorus or bridge. After doing this together as a class for a few songs, have the students pick some songs to transcribe on their own. Once they are comfortable on their own, ask them to start a new project and create their own drum loop and a variation on it for the chorus or bridge. Remind them that the chorus is usually a section with more texture and energy, so using a ride cymbal instead of hi-hats or adding other percussion instruments to the texture will give it that increased energy.

A *drum fill* is usually used to give a section variety and to transition from one section to another. Listen to several types of music and ask students to pay attention to what the drummer is doing to break up the repetition of the drum beat between phrases and to transition into a new section of the song. Sometimes it is just simple sixteenth notes across the snare and toms, and sometimes it is longer and more elaborate. Several sample drum fills can be found at www.soundsnap.com/tags/drum_fill or by searching the internet for "drum fills audio examples." Have students transcribe and then create some of their own drum fills, and then arrange their drum rhythms into a simple song form with the fills as transitions between the sections.

Harmony and Bass Line

The students are now ready to learn how to create their own bass line and harmony. Chapter two of the *Music Technology Workbook* (Middleton & Gurevitz, 2008) has an excellent review of the music theory concepts taught earlier as well as good advice for inspiration and creativity. Chords may be a new concept, so as you approach that section reinforce with the lessons and exercises from MusicTheory.net and GMajorMusicTheory.org. Have students practice playing chords on their keyboards and also entering them into their sequencing software or notation software as you explain how to build chords based on the scale degrees. Make sure all students are familiar with naming the chords using Roman Numerals in addition to chord symbols.

Use chord progressions of popular songs for examples and practice. For beginning musicians, it will be easier to understand the concept of chords progressing through musical phrases if there are only two or three chords that repeat and lead back to the tonic. I recommend saving the voice-leading rules and types of cadences typically taught in classical theory for later in the year or a more advanced class. If you have trouble analyzing chord progressions by ear, you can find a chord analysis for many popular songs by doing an internet search on the song title along with the phrase "guitar tabs." Many popular songs only have three chords in the chorus or verse, so have students learn those chords on the keyboard and then play along with a recording of the song. This will help them understand how chords create motion through the musical phrase and also further develop their keyboarding skills. You can introduce inversions and good voice leading when you encourage them to keep their fingers on common notes between the chords and move the other notes as little as possible. For example, a common chord progression found in popular music is I – V – IV. Between I and V, they can keep their finger on the top note and just move the bottom two notes down a step.

The *Music Technology Workbook* (Middleton & Gurevitz, 2008) has a process for creating a bass line starting with the root of each chord. From there, the student can experiment with using other notes of the chord to see how they sound and what kind of shape they give the bass line. Another approach recommended by Bosch (2008) would be to start with the root as the bass and keep it there until you reach a chord that sounds dissonant, then change the bass note to one that fits within that chord. A listening and transcription exercise using popular music, similar to what was done with rhythms and form earlier, will help the students become familiar with what various bass lines and chord progressions sound like in the context of actual music they are familiar with. Rather than playing the music from a CD or website for this listening exercise, you might want to load audio files into your editing or sequencing software so you can loop one measure at a time to allow students to try to recognize and play one chord at a time.

Students should now apply this to their second project. Have them create tracks for chord progression and bass line above the drum grooves they created earlier. Encourage them to be creative with their chords, inversions, tessitura, doubling, and the instrument sounds they choose for each track. Sustained chords are good for warm legato sounds, but if they choose sounds that have an articulation, they might want to add a rhythmic element to them. You might want to

assign them to do both a legato sustained track and a rhythmic track using the same chords. This would be a good time to introduce the arpeggio by saying that the notes of the chord do not necessarily need to sound all at the same time. If your software has an "arpeggiator" effect (under the "MIDI Effects" menu in most programs), you might demonstrate that and explain how it is breaking up the chords into various rhythmic patterns to add more variety and energy to the sound.

Throughout the arranging of the bass and chords into this song, stress the importance of variety and variation. Every track does not need to have something playing during every measure. Even though you are asking them to create several tracks, they should all be playing at the same time only during the most intense moments in the song. Transposition is another great way to add variety. Some songs transpose upwards for the final chorus and ending to achieve a higher level of energy and excitement for the final chorus. The bridge section is typically the most varied section, so students might change the key, chord progression, instrument sounds or rhythms during the bridge. Refer back to the listening exercises on form and remind them of all the musical elements that were changed during the bridge section of the music they listened to.

Melody

For the first project, students improvised and then created a melody from their improvisation. We will continue along this path, but eventually lead students to thinking more critically about every note they write, how it fits with the chords, and how the musical line moves away from and towards the phrasing endings. The lesson entitled "Composing a Melody in Period Form" on page 238 of the Watson book is a great activity to get students thinking about the melodies they compose. This lesson teaches students about writing in parallel and contrasting periods, similar to antecedent and consequent phrases. Students will have the opportunity to manipulate an existing melody in a notation program, and add their own contrasting material to complete the phrase. They will then compose their own melodic motive either by improvising or manipulating the notes in the sequencing software and playing them back. Once they have a motive, they will create a two-phrase period based on that motive with a contrasting period. There are many examples in popular music of this "Period Form" concept, so

feel free to substitute a chorus from a more familiar song rather than the examples in the book (Watson, 2011).

To begin the transfer of this concept, have the students create a new document in the notation software with a grand staff and an instrument staff above it. On the grand staff, they should enter the chord progression they created for one of the sections of their project 2 song, and copy-and-paste so that it is eight measures long. Using the notes in the chords and their corresponding scales, have the students generate a melodic motive by either improvising short melodic motives on the keyboard or experiment and audition short melodic ideas by entering them into the first measure of the notation software, playing it back, and revising as desired. A phrase based on that motive should then be created, transposing the notes as the chords change, and copy-and-paste it into the second phrase. Adjust the notes of the second phrase to create a "satisfying" ending. Students can be creative with their placement of the contrasting phrase. It does not need to be the last phrase of the second period like it was in the previous activity. Depending on the shape of the melody it might make more sense for the first phrase of the second period to be the contrasting phrase, leading to a return of the original phrase to close out the section.

Give the students plenty of guided exploration time to transfer this concept to each of the parts of their song for Project 2. The verse, chorus, and bridge sections should have different and contrasting melodies, each composed by taking a motive and expanding it into a phrase, then repeating and varying the phrases within each period. Each section should have between two and four repetitions of the period, with at least one contrasting phrase. They can stay in the notation program to do this and export a midi file that can be imported into the sequencing software, or just go back to the sequencing program and use either the notation view or the piano-roll view.

Musicality through Velocity and Automation

When you record notes from a keyboard in real-time the sequencer also records how hard you played each key, provided your MIDI keyboard is capable of sensing this. This is called velocity. The greater the velocity values, the louder the sound will play. Many sound modules also adjust the timbre of the sound to make it a little brighter as the velocity increases. Because

we entered notes one-at-a-time rather than performing the melody in real-time, there is probably no change in the velocity of the notes as the software plays them back. This will cause the song to have a monotonous sound and very little feeling or emotion. The velocity of each note must be edited to give the melody a human feel. In most sequencing software, this is done in something called a "Controller Lane," or "Automation Lane," which is usually found at the bottom of the piano-roll or graphic note editor window. A vertical line sticks up at the entrance of every note, and you can use the editing tools to make those lines longer or shorter depending on the desired velocity. Have your students use this to create accents and shape phrases throughout the entire song.

In addition to velocity, the controller/automation lane in most sequencing software also has the capability to automate a variety of parameters on a track and the virtual instruments connected to them. Volume, equalization, and filters are among the most common, but it is possible that every control that can be adjusted using the mouse can also be automated. Therefore, this is where students can create a full crescendo or diminuendo by automating the loudness control on the mixer. They can create interesting effects on a track by slowly turning down the bass to brighten the sound, add reverb as it gets softer to make it sound like it is getting further away, or a variety of other creative effects. Automating the volume will allow them to adjust the balance continuously throughout the song so if the main melody goes between two different tracks, they can make sure the most important melody is always in the foreground. Remind them to check the level meters and make sure the master level is never too high.

There are many things the students can adjust through automation to make sure everything is heard clearly. If there are several sounds in the same register or tessitura, spatial positioning will help separate them. Using the "pan" control on the mixer channel will adjust the level so it is louder in the left or right channel. This makes the virtual instrument sound as if it is further to the left or right of the center, so panning one instrument slightly to the right and another similar instrument slightly to the left will allow both instruments to be heard more clearly. Adding a small amount of reverb and lowering the level will give the effect of the instrument being further back. Equalization can be used to make one of the instruments brighter by increasing the highs and lowering the lows or warmer by lowering the highs or increasing the lows. On some software the reverb and equalization are separate effects "devices" that need to

be inserted into the track's "insert" channel. This is usually found in the mixer window, but can also be found on the track view or a dedicated bus window in some software.

Optional Layers & Finishing Touches

In a project-based class like this where students are mostly working at their own pace, some students will work faster than others. As they complete the requirements or guidelines early, refer them back to the layering concept and the 100% rule to add more layers to various parts of their project. Have them add a track and then audition new sounds to find textures that would make good counter melodies or background layers. Sustained pedal tones, arpeggios, chords with MIDI effects, or additional percussion instruments are all possibilities for additional layers. Stress that their song is never "done" just because they completed the required parameters of the assignments. Always stay on-task, doing something to make it better. On the due date you select, have everyone present their project to the class and fill out comment sheets like we did for Project 1.

Working with Digital Audio

A good general overview of digital audio is in chapter thirteen of the Watson book (2011). Chapter eight of the *Music Technology Workbook* (Middleton & Gurevitz, 2008) is a more detailed and technical unit on digital audio, including sound theory, how it is recorded, the difference between analog and digital, digital file formats, and more. Because this is a one-semester class that focuses more on creating music than recording, you may choose to only teach some of the info in the Watson book. Students should be comfortable with the concept that sound is vibration of the air molecules that subsequently cause our eardrums to vibrate. A microphone has a diaphragm similar to our eardrums, and it turns those vibrations into electrical energy where the voltage goes up and down corresponding to the compression and rarefaction of the vibration. Recording digital audio measures the voltage thousands of times every second. The recording software's waveform display is a graphical representation of those measurements, and therefore a graphical representation of the original vibrations.

Students should practice audio editing operations such as select, cut, delete, trim, crop, fade in, and fade out. A good procedure for doing this is the lesson in the Watson book entitled

"Creating a Sound Clip to Share." In this lesson, students will practice importing a sound file from CD or their computer, editing it to make it shorter, add a fade in and fade out, and export it as a new file. The sequencing software you use will probably allow the students to edit the audio file by importing into an audio track. If your software does not handle audio files, you can download and install Audacity for free. The next lesson in the Watson book, "Do-Re-Me (or 1-2-3) Editing," reinforces the concepts of slicing and rearranging parts of an audio file. An audio file that comes with the book contains someone singing the solfège syllables of a major scale. Students will import this file and slice, copy, and paste to rearrange the pieces into a song melody. In the extensions/follow up activities to the "Do-Re-Mi" project, Watson recommends to extend the project with loops (Watson, 2011). Adding a drum-based loop or two would be a good idea for this short project, and can probably be completed in just one or two class periods.

A good video demonstration to show a more advanced application of slicing and manipulating parts of audio files can be found on Jim Pavloff's YouTube channel. Search YouTube.com for "making of prodigy voodoo people." It is a ten-minute video showing how short sound clips from a variety of old songs can be sliced, cropped, and manipulated with time stretch, pitch change, and effects to create an entirely new song.

Project 3: Original Song from Existing Audio

In the recommendations for extending the "Do-Re-Mi" project, Watson suggests using spoken-word audio. This is a good idea for an entirely new full-length project with original melody, chord progressions, and drum grooves all inspired by the spoken word audio file that the students choose. Students can create a unique composition with sliced up spoken word audio along with other layers of loops, drum grooves, a melodic line, harmony, and sound effects. Encourage the students to use the spoken words as inspiration for the mood and feeling of the music, and have at least two contrasting sections in the song form such as A-B-A or Verse-Chorus-Verse-Chorus-Bridge-Chorus.

In the previous full-song project we started with the drums, however because this project will be based on an existing audio file the logical first step is for the students is to find audio that appeals to them. Watson recommends www.archive.org, which contains many public-domain audio books, poetry, podcasts, presidential speeches, and radio programs that can be easily

downloaded. Students may want to use audio from YouTube videos, but you should be concerned with copyright and appropriateness. Depending on how mature your students are, you might download several clips that you find appropriate and then give the students the choice of which one of those to use, rather than turning them loose on the internet to find their own audio clips.

Once the students have chosen an audio file to use, the next step is to import it and listen to the entire thing while taking notes about phrases that could be spliced to make a good song. Remember, this is not about using an entire poem or existing work, but rather a new creation using the words as part of the material and texture. Students can create a second audio track, and as they find phrases or words that are appealing they can be spliced out of the original file and pasted into the new track, which will eventually become the working vocal track. Because the spoken word will eventually inspire the melody, encourage students to think musically as they choose what phrases to use.

After the student decides what splices of the spoken word audio to use, they should begin the process of modifying and rearranging those splices into parts of the song form. Adjust the tempo of the project so that it is similar to the speaking pace of the audio. Add a basic drum groove to help in synchronizing the cadence and rhythm of the spoken words to the tempo of the project. Arrange the audio so that the words line up with the tempo, splicing and time-stretching where necessary. Encourage as much creativity as possible: the slices do not need to stay in the original order, effects and transformations can be added to the slices, and they can occasionally be reversed. Experiment with all the tools that your software has for manipulating digital audio, and then choose a few of those tools to demonstrate for the students. Encourage them to use these tools carefully and sparingly, because sometimes too many layered effects can have an unmusical result.

Review the concepts of composing a melody with the students using parallel and contrasting periods or antecedent and consequent phrases. Also review some of the major and minor scales. Review the process used to create a melody starting with a single motive, which should be rhythmically and melodically inspired by the spoken word audio they are using but not necessarily followed note-for-note. It should be an additional layer to the spoken word, not just a melodic doubling of it. After adding a new virtual instrument track, they should play through and find portions of the spoken-word audio that have a melodic shape and try to “transcribe” that

shape which will lead to creating a motive. They might also choose phrases which are emphasized or have the most importance in their spoken-word audio as inspiration for their motives. Build those motives into phrases and periods that make sense musically. They should have a beginning, transition, and ending that all make sense, and their rhythm, mood, and overall shape should make sense when played with the spoken word audio.

Students will then harmonize the melody starting with the bass. You can have the students analyze their melody to determine what scale it is based on and determine what chords fit based on the stronger notes in the melody, or you can take a more explorative approach. Based on the melody they composed, they should find tonic as a starting point, then improvise one phrase or one period at a time. Start with whole notes only changing once per measure, and then add notes when the melody no longer fits or calls for a passing tone or chord change in the middle of a measure. The goal at first is to create a repeating pattern containing three or four notes that lead back to the tonic for each phrase, similar to what they did for Project 2 and the chord progressions in other songs they have heard. This will serve as the root notes of the chords in the chord progression. Students should then add a harmony track and start experimenting with other notes that fit with the melody and the bass note. Looping just one measure at a time is a good idea to allow the students to experiment with what notes sound the best together. They will most likely build major and minor triads that fit within the melody and bass. Now would be a good time to introduce seventh-chords as well, using the lessons on www.MusicTheory.net as visual reinforcement. Once the chord progressions have been composed for each section, change the rhythm of the chords from simple whole or half notes to rhythms that compliment or reinforce the rhythm of the motives in the melody.

As time permits, students should continually add finishing touches to their projects. Layering, additional harmonic or melodic instruments, and additional percussion can be added to reinforce the natural rhythm of the spoken word audio. Make sure that the full harmonic spectrum from bass to soprano is used in both the pitched instruments and percussion. Review the concepts of balance, spatial positioning, and equalization to make sure all the elements of the song are clearly audible and complement each other rather than interfere with one-another.

On the due date, students should present their projects to the class. Allow extra time so the students can talk about the spoken-word audio that they chose, why it appealed to them, how it influenced the sound of their project, and various techniques they used to incorporate it into the

final song. Have each student fill out a listening comment sheet and encourage questions from the students after each performance.

Student Portfolio Compact Disc

A good project to wrap up the semester will be a student portfolio compact disc or "Demo CD" project. Students should understand that a demo CD is very much like a resume for an artist and it should be a portfolio of the highest quality in both appearance and content. They should go back and revisit the first two large projects and apply concepts learned later in the semester to polish and improve on them. If they have not already done so, they should give their songs creative and clever titles. Teach the students how to mix down or export their songs to single stereo audio tracks. In most software, you should set the end-point marker several measures past the end of the song to allow instruments and effects to completely decay without getting cut off. Have them export to a WAV or AIFF file for best quality.

An important characteristic of a good demo CD is a professional visual appearance. Download a CD label template for Microsoft Word or buy CD labels that come with their own design software. Some inkjet printers allow you to print directly to special ink-printable blank CDs and they also come with CD and DVD design software that can be used. Teach the students to create a professional-looking label and case insert for their portfolio CD, showing examples of professional CD artwork and call attention to various characteristics that make it look professional. The fonts should be easy to read, the pictures should not interfere with the text, the text should not be too big or too small, and the colors should match and complement each other. If possible, maybe have an art teacher or someone who teaches graphic design at your school come in and talk about some good design characteristics. The students can then import their mixed-down audio files into the CD burning software, burn a CD, and apply their label to the CD. You may want to have them burn three copies of the disc: one for you, one for their parents or guardians, and one to keep for themselves. If time permits, a class compilation CD could also be produced following some of the suggestions that begin on page 289 of the Watson book (2011).

SUMMARY

This study sought out to learn more about technology-based music classes targeted to non-traditional music students. A review of related literature presented previous knowledge about general music education in secondary schools, popular music, non-traditional music students, existing technology use in music learning, teaching and inspiring creativity, and existing technology-based music classes. A survey was then conducted to gain advice from teachers of technology-based music classes, and from teachers who do not teach a technology-based music class to discover what would encourage more teachers to include such a class in their schools music program. Curriculum material recommendations from the survey were explained and reviewed. Concerns such as funding, training, and the effect on existing programs were compiled and solutions recommended.

Using survey results and related literature, a plan was developed for implementing a technology-based music class. Suggestions were made for early preparations, gaining support and approval, and finding resources for training and curriculum. A curriculum plan for a semester-long technology-based music class was then presented that targets students with no previous musical experience. Students learn the basics of music theory, a history of electronic music, listening and analysis skills, rhythm, melody, harmony, improvisation, musicality, song-writing skills, and a wide variety of practical and technical knowledge relating to the music industry. Three large projects and several small lessons and activities develop creativity and high-level thinking while instilling a sense of self-esteem and pride for their work. While teachers may agree and disagree with many of the suggestions made, I hope we can all agree that this type of music curriculum is unique, beneficial, culturally relevant in our society, and should be included in the evolution of music education in our schools.

APPENDIX A:

QUESTIONNAIRE

1. What grade levels do you teach? (Check all that apply)

- ❑ Elementary
- ❑ Middle/Junior High
- ❑ High School
- ❑ College/University
- ❑ Adult/Community Education

2. Which of the following courses are currently offered to students at your school? (Check all that apply)

- ❑ Electronic Music / MIDI
- ❑ Sound Engineering (Recording, Sound Reinforcement, or Audio Production)
- ❑ Music Industry
- ❑ Other Music Technology, Popular music, or Commercial music courses (Please Specify):_____
_____

(If subject does not check anything on the above question, the survey will jump to question #10)

3. If you are teaching any courses listed in question 4, what textbook(s), other curriculum materials, or training classes/workshops have helped you teach these classes?

Textbooks:

Websites (please list as many as possible—titles , keywords, or phrases to "Google" are ok if you don't know exact URL addresses.)

Workshops/Clinics:

Self-Made Materials:

Other:

4. Describe your thoughts on teaching songwriting or composition to students with no previous musical experience. For example, is there a method or process you use, method books or web resources, or other ideas for developing creativity.

5. Are the students in these classes required to have any previous musical knowledge, or be previously enrolled in another music class?

	Musical Knowledge Required	Prerequisite Music Class Required	Open to All Students
Electronic Music	❑	❑	❑
Sound Engineering	❑	❑	❑
Music Industry	❑	❑	❑

Please describe any other prerequisites:

6. What percentage of students in these classes are also enrolled in band, chorus, or orchestra at your school?_____%

7. How would you describe the culture of students in these classes compared with students in traditional music classes or ensembles?

8. If you were not hired specifically to teach these classes, what is your primary subject area? (ex. Band, guitar, etc.)_____.

9. How did you receive funding for the equipment, staff, and/or materials for these courses?

(If the subject DID check any of the answers on Question #3, the remaining questions are skipped.)

10. Why do you think your school is not offering any Music Technology, Electronic Music, Sound Engineering, or Commercial Music Classes? (Please give as many reasons as possible that you can think of.)

11. What might encourage you or other teachers to start a Music Technology course at your/their school? (Please give as many reasons as possible that you can think of.)

Displayed if their school does not offer any classes:
Teachers who DO teach music technology or commercial music courses answered questions about resources and materials that may be of interest to you or your colleagues that may help if you eventually teach such a class.

Displayed to everyone:
If you would like to receive an electronic copy and acknowledgement for your contribution to this project, please fill out the information below:

Full Name: _____(optional)

School: _____(optional)

City: _____(optional)

E-mail*: _____(optional)

*The researcher will not share your e-mail address with anyone. E-mail addresses will not be included in the dissertation and will only be used to send a copy of the finished paper to you. All information is stored exclusively on a secure server and transmitted securely via SSL encryption.

APPENDIX B

CATEGORIZATION OF RESPONSES TO QUESTION 7

Responses were copied and pasted verbatim from the data into this document and were not modified in anyway, except for the correction of spelling.

Indications the two groups of students are different

- mixed - diversified cultural family backgrounds, and living standards.
- As the Band Director, I've actually recruited a lot of my students from the Music Tech classes. The students involved are often "under-achievers" or are from low socio-economic backgrounds.
- better family life. more support.
- Discipline is lacking: they stop working on it too early or look for shortcuts instead of working on the details. Lack comfortably expressing themselves in music they create. They are often timid initially when it comes to presenting their creation. The band students put more effort in the details and look for more out of it. They often have more intent and ideas before they start.
- generally not as academically minded
- I have some success of gaining band students after they have been in my keyboard class.
- inner city
- Inquisitive, more focused. Not intimidated to be creative
- Its a good mix of students, and a wonderful way to teach music to students who don't tall into the "traditional" mold of band, chorus, orchestra.
- It's definitely a mix of attitudes-- some kids are interested in music but not in an ensemble, some are guitar or piano players, and others are there because they have to be and don't find much in the curriculum that interests them. The Pop Music Elective is the only one in which I have ensemble students enrolled, and those classes are more rigorous and involve more analysis and discussion.
- Less long term commitment
- Many students in these classes opted to take this class as an alternative to a performance-based ensemble. We do encourage all students in the digital music program to take applied music (chorus, band, guitar, or keyboarding), but it is not required.
- mixed grades, mixed levels, esol students and an average class size of over 40 students.
- More lazy, less willing to achieve musicality.
- My classes are unique as every student through all the grades experience playing up to 8 instruments, all inclusive program.
- Our students are more technically minded than trad. music students. We find that they are also less musically focussed (i.e. they have limited theory knowledge). Some students have an interest in music but do not necessarly play an instrument.
- Out of the box thinkers. More creative. Sensitive A passion for what they want to do in life.
- Rough. Exploring different possibilities of things to do while keeping their interests. Something that they think they think anyone can do so why can't they.
- Students tended to be those interested in rock music.
- The class attracts both music education grad students and also other students who are interested in music technology and education, but are not music education majors. The class culture is definitely more diverse than in other music education courses I have taught. For example, last semester, one student was a native of South Africa, and brought a wonderful, international perspective to the class, which was both interesting and refreshing to students and instructor alike.
- The student population is typically quite diverse and from all ends of the spectrum.
- These classes are collegial, studio environments, not classes with a central focus. Though most students will be working in the same software on the same assigned project most days, student activities are differentiated to match students' individual musical levels and preferred performance instruments.
- This is a more diverse and represents more of the schools general population.
- Trying to find a place, loners usually. Good solid kids that need something to grasp that is not a traditional core class
- They understand the changes in music and that today's musician must have knowledge in this field.

Indications the two groups of students are similar

- no difference

- No real difference when the students are in these classes. Sometimes they provide some information (regarding specific music events) that the other students might find useful, but these classes have created a culture of their own.
- The students are a basic cross reference of the student body in the music dep.

Other comments

- I teach the entire music class. I teach at a small private school.
- primarily graduate students due to the 5xxx-level registration; also, I do not teach the "traditional" music courses myself, so would be hesitant to offer a direct comparison
- Crooms AoiT is a Tech Magnet. Students who are serious about band do not attend this public magnet school. We do not have a standard music program. Our only performance ensemble is a percussion ensemble
- Tech classes are places for students to participate in a performance medium outside the norm of "choir" or "band"... actually, it is also a good medium to recruit in the traditional, especially if their work is featured.... these techniques are mostly taught through the keyboard classes...

APPENDIX C

COMPARISON OF POSITIVE AND NEGATIVE RESPONSES TO QUESTION 7

Interpreted as Positive

- better family life. more support
- Inquisitive, more focused. Not intimidated to be creative
- wonderful way to teach music to students who don't tall into the "traditional" mold of band, chorus, orchestra.
- Our students are more technically minded than trad. music students
- Out of the box thinkers. More creative. Sensitive A passion for what they want to do in life.
- collegial, studio environments,
- Good solid kids that need something to grasp that is not a traditional core class
- They understand the changes in music and that today's musician must have knowledge in this field

Interpreted as Negative

- "under-achievers" or are from low socio-economic backgrounds
- Discipline is lacking: they stop working on it too early or look for shortcuts instead of working on the details.
- Lack comfortably expressing themselves in music they create. They are often timid initially when it comes to presenting their creation.
- generally not as academically minded
- Less long term commitment
- More lazy, less willing to achieve musicality
- We find that they are also less musically focused (i.e. they have limited theory knowledge).
- Rough. Exploring different possibilities of things to do while keeping their interests. Something that they think they think anyone can do so why can't they.

APPENDIX D

CATEGORIZATION OF RESPONSES TO QUESTION 10

Expense/Lack of Funding

- $ is the biggest issue
- Financial start-up money
- Expense
- Funding for the supplies to start the class.
- Lack of funds.
- Money
- County is currently experiencing a budget shortfall just under 60 million dollars.
- Overall cost of implementing
- We do not have the financial support
- Because of budgetary concerns,
- Budget
- Budget.
- Budget.
- Budget constraints
- Budget cuts,
- Budget is the reason for everything
- Budget issues.
- Budgetary reasons,
- Budgetary Constraints
- Cost- we are cutting elective offerings
- Financial
- Financial resources
- no funding
- Funding
- Funding
- Funding for equipment
- Finances
- I think the above courses would be expensive offerings
- There is no funding for my programs, let alone beginning a new music tech class.
- Money is the main reason.
- I'm sure expense would be a factor.
- But the big thing would be funding.
- Lack of funding
- Lack of funding
- Lack of funding and resources and budget restrictions could be keeping us from offering these classes
- Lack of funding
- Lack of funding
- Lack of funding
- Lack of funding
- Lack of funding
- Lack of funds
- Lack of funds
- Lack of funds.
- Lack of funds.
- Lack of funds.
- Lack of state funding for such courses and education in general.
- Low Budget
- MONEY
- Money

- Money
- No budget for it.
- No financial resources to build that type of class
- No funding available for anything outside of gen music
- Not enough funding.
- Money.
- Perceived lack of funds
- Private school- no funding
- Resources - the arts are under appreciated and underfunded in our district
- School budget
- lack of resources/funding
- With recent budget cuts and statewide stipulations.
- The resources and funds are not available to start the program.
- There is no budget for such a course.
- They do not want to invest the money
- Budgetary limitations.
- Too costly
- Too expensive to fund these type of offerings.
- The technology classes require a great deal of money to start up
- the funds to offer such programs
- Money.
- We do not have the finances for it. We barely have enough funds to keep our teachers and keep the music programs we currently have running
- We do not have the funding or the resources.
- we do not have the funds
- funds are tight,

Personnel/Teacher Availability (Subcategory of Funding)

- Additional music personnel to add courses to curriculum
- there are not enough teacher units to do so
- and personnel issues
- Staffing
- Considering the current faculty, there is not a place to fit it in the current curriculum.
- we don't have the personnel.
- Cost of staffing
- not able to hire additional staff
- Staffing
- there is only one music teacher here.
- I'm the only teacher of Chorus and piano lab for 6-12th grade. My classes are full already.
- Teachers
- no one to teach the classes.
- Lack of faculty
- and faculty. Many on our staff are qualified to teach music technology, but their primary music programs are so large that it would require hiring another person, and that will not happen in this economy.
- Lack of funds, staff
- I am the only music teacher in the school.
- Teacher load is full with choral/instrumental performance classes
- Music teachers are already overwhelmed with the large numbers they teach
- Lack of teachers vs. requirements/electives
- We would need to hire additional staff.
- Staffing
- Music budget/staffing plan doesn't allow extra music classes beyond chorus, piano, band and guitar
- teacher's schedule is full (just me teaching music classes)
- lack of teachers since I'm the only music teacher in the building and I teach every period.

- No dedicated personnel
- No funding for additional music classes. Only one music teacher at school with over 300 students.
- No money to pay for teacher to teach such courses.
- would have to hire another faculty member to teach with no present budget.
- No available teacher.
- Not enough funds to hire someone to teach it. The current teachers are already teaching a 6 of 7 schedule and we are not able to offer other staples such as jazz band, keyboards, AP music theory, etc.
- not enough music teachers,
- Not enough teachers.
- Right now, the "music" teachers are teaching full courses in instrumental/choral music, music theory(both AP and other), guitar, and piano courses.
- Size of student body and faculty limits number of classes that can be offered (researcher note: also added to “Enrollment” category)
- teaching another course means extra planning for already over-worked teachers
- Teacher allocation
- I already teach two concert bands jazz band, two guitar classes, and AP Music Theory
- We do not have the faculty to teach such a class;
- There is ONE music teacher, teaching band, chorus, orchestra and piano.
- Too expensive to hire qualified teachers
- Until this year, we did not have an assistant band director. With the chorus teacher doubling as the drama teacher, one director was only enough to cover band classes and AP music theory
- We already have several music courses offered and we don't have the staff
- We do not have enough music teachers to offer any other music course including those in the area of music technology. Between the three music teachers at my school, we offer a variety of performance-based classes, AP Music Theory, and IB Music.
- We don't have enough time and (or faculty) in a day to offer these classes
- We currently have performance based courses including band, orchestra, chorus, piano & guitar. There are only 2 music teachers on staff & our rooms are stuffed full with the equipment to run the above courses.
- Only one chorus and one band teacher for K-12.

Lack of Equipment/Software (Subcategory of Funding)

- lack of equipment/hardware, or money to purchase such equipment
- Do not possess the proper technology.
- Not enough computers and software available.
- Equipment
- Not enough equipment to be effective in this area.
- not enough computers
- Cost for labs is prohibitive.
- Cost of equipment
- Cost of the equipment
- Cost of equipment
- Cost of teacher
- Do not have technology to teach currently available
- don't have the equipment
- Funding for equipment
- Funding, equipment.
- Funding for the equipment.
- I think the hardware and software will be too expensive.
- Lack of availability of technology resources.
- Lack of funds for equipment.
- Lack of equipment and funding. We have a small keyboard lab that we have assembled with available funds.
- Lack of equipment
- Lack of equipment
- Lack of equipment/funds
- Lack of equipment
- We don’t even have enough computers to complete a computer lab.

- does not possess the required technology
- Lack of funds to purchase computers and software,
- Lack of funds, equipment,
- Lack of supplies/computers/programs
- No funding to supply the equipment needed to teach it.
- Budget will not allow purchasing technology equipment to support such classes
- Lack of resources for software, keyboards, computers
- Cost of equipment
- Equipment
- Money for technology
- lack of equipment, no budget to begin new studio
- We do not have the money to purchase music programs. We do not have have money to purchase midi equipment or other technological accessories.
- no budget for equipment
- No computers in classrooms No sound equipment necessary to teach these classes
- no software or hard ware
- No funds to purchase equipment
- No equipment
- no funding available for technology
- No funds to purchase equipment.
- not enough money for software
- No money to pay for equipment.
- Equipment
- not enough equipment
- Not enough equipment.
- lack of equipment
- Our school does not have the resources. We have some computers within the music department that are used for theory and ear training purposes, but unfortunately, there are no funds to expand what we have for use in a stand-alone class like music technology.
- lack of equipment
- Small school budget for required equipment music and arts programs are in the fledgling stages
- technology is not available
- The cost of equipment to use in the classroom
- The cost of the equipment is the number one reason. There is not funding for new equipment.
- No money to buy the technology
- we do not have the equipment to support this type of class
- Equipment limitations.
- Too Expensive...costs of implementing with technology
- We are a small charter school with limited resources. Although we have computers, there is no money in the budget for music software.
- We are on the brink of offering a music technology class, but it has not yet gotten off the ground, because there were 34 students and only three computers given.
- We are thinking of adding music tech next year. The main hold up is equipment
- We do not have a music tech lab, so we use the library's Mac computer room to use GarageBand to compose songs in different forms (ABA, Theme and Variations, etc.)
- We do not have the equipment
- We do not have the money or resources to purchase the necessary equipment to be able to teach these classes.
- We don't have the computers or programs that we need.
- We do not have the technology available
- We don't have the equipment
- we dont have the resources to fund getting the equipment
- With budget cuts and the FCAT push, computer labs are scarce and those that exist have FCAT subject priority. (researcher note: also added to the “Standardized Tests” category)

Scheduling/Class Periods in the Day for Electives

- Scheduling. They have a difficult enough time putting my high school band into one class.

- Time in the school day
- 4x4 block schedule
- Scheduling.
- Curriculum is already very full.
- Do not have room in the schedule.
- Time constraints
- Our school offers a lot of singleton classes. Adding another would make scheduling extremely difficult.
- Less options for electives.
- Lack of class periods in the schedule for the elective.
- Lack of time in my schedule to teach another class.
- Scheduling
- minimal scheduling availability for arts classes
- scheduling
- No room in schedule
- No space in the schedule
- No time for additional classes
- No time in the curriculum.
- No time to teach it, not time in school day for students to take another course
- Not enough time in schedule for additional elective classes
- complex scheduling
- Scheduling
- lack of time in any student's very busy schedule
- Too many elective choices.
- Students do not have enough space in their schedule
- No room in the schedule
- The lack of electives due to a 6 period day with 5 academic courses required.
- there is no time in the schedule to support a music technology class;
- There is no place in the schedule for and additional class.
- There isn't any room in the schedule for me or anyone to teach this.
- They barely have room in the schedule for band. All 6th and 7th graders have to take reading and PE so there is very little room for other electives.
- Time limitations.
- There isn't enough time in the day.
- We are a dropout prevention school and scheduling is tight for electives. I incorporate as much tech and sound as possible in the short 6 week courses I teach, though.
- We are a private school with limited electives at present, although we are adding new electives each year. This year for the first time we offer digital media and marketing. Also, students have a limited amount of elective hours because all of our students are required to take math, science, history, English, and Bible all four years of high school.
- There is limited room in the schedule for more electives.
- We are currently on block scheduling, and there is no more room in the master schedule for any other music classes.
- We don't have enough time and (or faculty) in a day to offer these classes
- We don't have room in the course schedule.

Low enrollment numbers/Small School

- School is only in 5th year of existence. I believe the student enrollment fluctuation coupled with rezoning have made adding new fine arts classes difficult with the current Pasco County requirements.
- school enrollment issues (we're a private school and rely on school enrollment for revenue)
- Low Enrollment numbers
- classes must have a min. of 25 students in each class
- Student numbers to fill classes
- low enrollments.
- enrollment numbers
- low enrollment. School will not open any class without a minimum number of students willing to enroll in it
- Not enough students to have the class
- too small a pool of students

- Not enough students
- Size of student body and faculty limits number of classes that can be offered (researcher note: also added to “Teachers” category)
- Small enrollment,
- Small school
- We are too small.
- We barely have the student enrollment to support even basic intro to music, history, theory, and chorus, so anything that would be considered a music elective is not an option.
- our enrollment of students in the Music Department is not very high
- We have a small school and music program

Lack of Space/Room/Facility

- Lack of dedicated space
- Space limitations of the classroom
- Not enough usable space for class
- the physical space to have such as class.
- because we do not a have a classroom available for this
- Facility concerns
- No facilities.
- classroom space
- Space
- Physical space
- don't have the space
- We do not have the space
- Lack of space
- Lack of Space.
- lack of space to set up a technology lab.
- space,
- Lack of Space/Room/Facility
- lack of lab big enough to have minimum of 25 ina class
- Lack of computer lab time for non-core curriculum
- Lack of space
- Facilities
- we don’t have the space or money to dedicate a highly functioning keyboard lab.
- No room available in the school building.
- No space available to house equipment
- No facility
- No lab space,
- Lack of secure space to set up class
- Limited space in the building
- Space
- Space for electronic equipment not granted by administration.
- Space
- The computer lab is used by all academic teachers, and they do not allow time for specials. I have one computer in my room and use it for several lessons.
- Space we do not have a room set up for a music technology class.
- No place to store the technology
- We now have a second person, but have not had the facility to incorporate new classes.
- Facilities.

Lack of Training/Qualifications/Qualified Teacher

- Limited knowledge and training on how to conduct a class of that nature.
- lack of teacher training in these fields

- Unqualified teachers.
- Because no one is trained to teach those classes.
- teachers have no clue how to teach this
- Do not have qualified teachers.
- Preference of teachers.
- qualified instructor to teach the class
- I think that most traditional music educators are not well versed enough in these areas to teach them at a high enough level.
- Lack of understanding
- No teacher trained to teach it.
- No one is trained
- Lack of training
- No Qualifing teachers
- Need more teacher training in the content
- Limited qualified staff
- lack of properly trained instructor
- the keyboard teacher who would be the logical choice to teach it is not interested in taking this on as a new subject area;
- Possibly lack of knowledge of the array of technology and it's relationship to student learning and engagement in music
- knowledge base
- That is not my area of expertise. Band is my primary class with trumpet being my personal primary instrument.
- availability of qualified teachers
- Proper training.
- It takes someone that is trained in the computer programs to teach them. None of our music faculty feels adequately trained at this point in time.
- we don't have the staff or training right now
- a knowledgeable teacher in the subject.
- We also do not have anyone comfortable with teaching it.

Lack of Interest

- Think most students are interested in performing.
- not enough interest at our school.
- all of our serious music students go to a magnet school
- I have not identified a student interest in these areas and provided administration with the information
- Students have not shown interest when surveyed classes they would like to see offered.
- not much interest,
- lack of awareness/interest,
- It has not been requested.
- no perceived need for such classes
- Lack of interest
- Lack of interest (or knowledge of availability)
- Lack of interest
- Lack of interest,
- No interest in a music technology elective at the middle school level.
- Request
- Not enough students will enroll in the class. Not in high demand.
- We also have looking into our students' interest level in music tech classes, and there really doesn't seem to be any
- lack of need/interest for middle school students,
- Students show no interest in the topic.
- We are a private school and do not have the demand
- We are limited to basic elective music classes - Band, orchestra, and chorus.
- It has not been brought up to our principal as a class to offer.

Lack of curriculum guide/resources

- Lack of curriculum guide and resources offered for teachers who need it.
- Lack of resources
- No resources Need more teacher training in the content *(researcher note: wasn't sure if this teacher was talking about curriculum resources or financial resources, but since "content" was mentioned, I put it here*)
- No resources available
- Not enough resources
- and also resources
- resources
- We do not have the resources to teach it. (researcher note: "resources" was assumed to mean curriculum resources because the teacher mentioned in a separate sentence that they also don't have the computers and software required)

Administrative Support

- Administrative support from school site through Region Office and Central Administrative Offices to make this a priority.
- Because the school level administration does not value music education enough to invest the physical space necessary to maintain an appropriate lab environment for me to do so. I have spoken with them at length, advocating for just such classes. (researcher note: this teacher also mentioned "Overall cost of implementing" which was added to the Funding category)
- Lack of understanding by administration
- Lack of education on importance as far as administration is concerned
- My principal wants to do away with the music program entirely - an ongoing battle.
- Administration only cares about core subjects.
- Poor administration support
- lack of administrative or guidance support

Could hurt enrollment in other music electives

- Extra music elective could possibly hurt enrollment in existing music electives
- Since students are limited in how many electives they can take, it could take away from band, chorus, and orchestra programs.
- We are a very small school (450 students grades 6-8) and students have only one elective. If music technology were offered I would lose students out of my band class which would affect the program greatly.
- we have a lot of electives already offered. if we offered more, there would be less students in each, thus making some of them obsolete

Wasn't Aware of Such Classes

- Haven't given it any thought
- I am not sure. It is High Tech magnet school. We use Smart Music in our band program, and find it to be very helpful.

Low Standardized Test Scores

- Low FCAT Scores
- Not enough students can actually take an elective, due to FCAT scores, so we offer very few electives
- Do not see music as beneficial in helping students pass the standardized tests.
- With budget cuts and the FCAT push, computer labs are scarce and those that exist have FCAT subject priority. (researcher note: also added to the "Equipment" category)

Not seen as important

- If it's not in the standards, it won't be on the docket for classes.
- focus on music education
- It was not a main focus of past band directors.
- The arts program is performance oriented.
- Not seen as an important part of the school's curriculum.
- a course such as this has not been suggested by the music teacher (me)
- School focus' on sports and academics mostly
- Still struggling to build the performing Ensembles first.
- We only have concert bands.
- The priority has been shifted to performance based classes and ensembles with recent budget cuts and statewide stipulations. We find our ensemble classes are even on the chopping block - so the addition of an extra guitar course or music appreciation is more likely than the addition of a technology course at this time. (researcher note: also added to Funding category)
- Music is not a priority, currently there is only an after school choral ensemble for middle and High, 8-9 students, small string ensemble 8-9, students. Band is 5th-12th.
- We're a smaller "choice" school, with a proportionally larger focus on academics (students here often take numerous A.P. classes, and almost 10% this past year graduated with their A.A. degree!)

Would become dumping ground

- My school also has allocation issues in which they would like to make classes such as these dumping ground electives especially with the class size amendment. A good example is how I had 32 keyboards and they put 42-45 students in each class. I had to borrow keyboards from another school and even then I have 40 keyboards.
- Not enough students to fill up the class...with the class size amendment, general/classroom music electives are seen as a dumping ground by the administration. They would not want a class of 15 students in a computer lab when they can put 40 in a band room.

Students too young

- I teach at a middle school.
- I teach pre-school classes and these technology courses do not apply.
- I teach younger grade levels and it does not apply as much to their age and maturity.
- In my opinion, middle school is not the place to offer such classes. The students have not yet developed musical skills to fully benefit from the experience. They could take these classes later and get a great deal from them, but in middle school they are still learning basic skills.
- It is a middle school
- It's a middle school.
- It's a middle school.
- It's an private elementary school.
- My school is "only a middle school."
- Not standard in middle school curriculum
- The kids are too young
- This is a middle school
- Students are not at the level to which they would find these classes desirable.
- WE are primarily an elementary school.
- The classes listed in the question sound more specific and focused than typical middle school classes. In fact, our high school does offer Music Tech and Electronic Music.

Other

- i teach full time general music at elementary level. i teach flute master class or workshops at middle/high school level.
- It's too new to them

- Lack of similar classes being taught in Jacksonville area.
- Music program slowly rebuilding
- no course code –
- Does our student body want to make music? probably.
- Students must complete AP music theory before they are ready for electronic music class. Theatre tech teacher not interested in teaching anything related to sound technology.
- Only just starting to incorporate this type of course. I believe that these sorts of courses are in our near future.
- our keyboard class could be considered an intro to music tech or electronic music; the performing arts high school our school feeds offers some of the courses above
- we will be next hear
- right now we are not allowed, by county rule, to have classroom Ipads

APPENDIX E

CATEGORIZATION OF RESPONSES TO QUESTION 11

Training/Professional Development

- Training to understand the equipment.
- professional development and training regarding how the technology could move student musicianship forward and impact student achievement
- Proper training
- Training
- Professional development
- support on how to teach it
- training in those areas.
- being fluent in the technology
- teacher training
- Education for myself and other music teachers in the field
- Training
- teacher training
- training
- Teacher training.
- training and compensation for taking the training
- training
- More in-service training.
- Training
- little training to refresh from college
- more knowledge of subject matter
- I am the assistant director, and only in about to enter my 3rd year of teaching. I would love to teach a technology course, but feel intimidated by the subject matter. Outside of using finale for orchestration class, I was not required to use any form of music technology programs in college. This makes me feel like I am not well trained and not sure where to even begin with a new technology course.
- I could, with some additional training, teach a basic Music Technology course
- I'd love to teach a music technology course, but I would need more training. Currently I don't feel competent enough to teach the subject. I took one course in college, but that wasn't enough. More professional development workshops on the subject would be great.
- I was a performance major, so I never really got into that aspect of music while I was in school. To teach such courses, I would need to have some training or extra coursework so I felt confident to teach the students. Anyone could just teach out of a textbook, but that is not truly teaching. The students do not learn anything from that style of teaching. A hands-on approach is much more appropriate for student achievement.
- I would love to, but I need the training.
- I would need more training in music technology to teach the courses
- I, personally, do not have the knowledge or hands-on training that would be required to teach this matter to students. So, I guess, knowledge of equipment is one factor, but past that, I would need hands-on training to learn how to work the equipment in order to teach this subject.
- I'd be happy to teach it, with training in the area. I'm not a tehchno-native, but I would be glad to learn.
- If there were more training
- If they felt comfortable with the information they had to present.
- If we were offered training.
- Training
- trainings at FMEA
- Intensive paid training on how to teach such a course
- knowledge
- Knowledge and proficiency of subject matter
- Knowledge of the subject area and technology.
- Lack of knowledge about the subject matter

- Training
- Training
- training
- More in service or training in the area
- More personal training with technology
- Training
- more training for teachers.
- More training (I am already Technology in Music Education Level 1 certified)
- More training
- More training in music technology options offered locally
- More training in the field.
- One on one training, on campus, in the actual lab we have.
- Also, there is a need for professional development in this area.
- Paid training(s) could provide an excellent incentive for us to offer the class in the future.
- PD
- Practical application
- Professional Development
- Professional Development in those areas
- knowledge base (training course on software)
- Training offered by FBA/FMEA.
- Survey/Intro presentation at conferences.
- Being more well versed in this technology.
- Teacher training would be necessary,
- technology support
- free training offered, or a stipend for attending such training;
- In-service.
- Training
- Training
- Training
- Training for ourselves
- Training in midi, pro-tools, etc.
- Training in the subject in order to offer a viable curriculum.
- Training in service
- Training
- Trainings on how to teach the class.
- We would need training, training, and more training! It comes down to it being new and uncomfortable enough that we don't want to look like morons in front of our students. Providing enough training to make it comfortable. That is the key.
- Workshops that are affordable to educate teachers
- Training in the area
- Hands on training, peer training

Funding/Grant

- Financial resources
- Funding for supplies
- electives offered due to funding
- A grant to cover the cost of the computers and music technology software
- A sum of money granted to the school to make the necessary resources stated in the previous section available.
- Funding
- Change in funding climate.
- Cheap and easy ways to implement this
- Financial incentive
- Funding
- Funding
- Funding

- Funding.
- Funding.
- Funding
- Funding.
- Funds.
- Grant money
- Grant money for equipment.
- Grants are a good source
- grants,
- Having the resources to do so (researcher note: did not specify curriculum resources or financial resources, so putting it in both)
- having the resources(researcher note: did not specify curriculum resources or financial resources, so putting it in both)
- additional funding
- Resources (researcher note: did not specify curriculum resources or financial resources, so putting it in both)
- I would love to teach a course in music technology, but currently the school lacks the resources for such a course and is unlikely to gain those resources in the current legislative climate.
- I would LOVE to teach some music technology courses, provided there was adequate funding for such a class.
- My administration would be willing to offer these courses to students, but cost is the overwhelming factor.
- If the resources were available I would love to teach these courses
- encouragement from the county to fund these courses
- funding
- funds
- money
- Money
- Money
- Money would definitely help
- money
- Resources
- Resources
- Funding
- A grant would be needed to set up the program(s).
- funding
- The appropriate funding and compensation.
- the funds
- resources
- funds
- We have discussed offering these classes but have always been told no due to funding. I have written grants when I taught in South Carolina to be able to teach MIDI composition classes but have not had the same luck here in Florida.
- We would have to be sure we had the resources necessary to teach the course. (researcher note: didn't specify curriculum resources or financial resources, so adding to both)
- Grants that support students and teachers in education and the technology

Equipment & Software Access/Availability/Funding

- Funding for the computers and/or other technology
- Make enough computers and software available I only have 2 computers. I use Alfreds and Smartmusic as much as possible
- availability of equipment/hardware
- access to equipment,
- Adequate access to relevant music technology.
- Adequate funding for equipment,
- Availability of equipment
- Available equipment.
- Composition applications for performing and non performing students Access to other related music classes designed for non-performance students Allows for instructional growth for the teacher with minimal background in such subjects
- Equipment

- Ease of access to technology,
- Availability of hard ware and software
- Equipment
- Equipment to teach such a course!
- Equipment.
- Funding for equipment.
- Equipment
- free equipment
- equipment
- Funds to buy the technology (or a grant)
- resources for software, keyboards, computers
- Have the money or the resources to get the technology
- Having access to the technology to teach it. A sound recording studio is an expensive proposition in these times
- Having all the necessary equipment and technology to be able to teach these courses.
- having equipment
- having the software and hardware
- Having the technology
- I would love to do it. I just need the supplies
- I would love to teach it, we need access to a computer lab or mobile cart which could include the needed programs.
- I would teach a course like this provided the equipment and facilities match the enrollment. There would be interest in a course such as this, but I fear equipment and scheduling across the music department would hinder it. (Researcher note: also added to Scheduling)
- I would teach more courses with a better setup. We don't have enough equipment.
- I'd be willing but would need access to the technology.
- If the technology was adequately provided, then I think we would be more likely to offer such a course
- If we received a grant to provide the necessary equipment, that would motivate us to learn what we need to teach these classes.
- If we were supplied the proper equipment
- Increased technology at their schools
- Sufficient equipment
- Just to have the lab to use would be enough.
- equipment
- Lack of funds for equipment
- Materials...computers
- Money for technology
- Money for the technology needed
- Equipment
- access to the computer lab
- more technology supplied to teachers
- equipment (such as a Mac or iPad lab with software) provided
- updated equipment
- Access to the most current software for teaching the technology
- Equipment and software
- Purchase of technology software, and systems to support it.
- Technology
- The availability of computer software.
- The obtaining of the equipment needed.
- the promise of new equipment to allow us to do so;
- The software and tools necessary.
- Equipment
- Supplies
- Equipment
- no money for midi labs, software, etc.
- equipment
- We would need more equipment geared towards teaching technology.
- Funding for equipment

Lab/Classroom/Facilities

- Allow adequate facility availability
- A classroom with the technology.
- A dedicated space and 40 Apple computers to each station with appropriate software would highly encourage me to teach a course like this. There are many students highly interested in a course like this and I know several students that already work with sound engineering equipment and they would be interested in a course like this.
- Appropriate facilities for the class
- complete lab - I have a soft lab for 15 but my admin won't let a course fly with those number - won't even let a jazz band with 17-18 fly
- Computer labs for students to use and all the required equipment and textbooks
- Facilities
- Space
- space
- classroom space
- A classroom devoted to music technology/more space for the equipment.
- Classroom
- Having an actual lab or space to teach it.
- space available
- If I had more space to put computers, that would help. I have a moderately sized band room at best with NO practice rooms.
- Facilities
- For it to work there would have to be a fully stocked music tech lab, with up to date software so the students can learn from the best that's out there. I'm already familiar with a handful of music technologies, but I know that other teachers would appreciate a crash course on the software so they can better teach their students.
- facilities to teach such a course
- facilities
- Money for materials and a dedicated lab that is not shared by outside departments.
- Create Facility space
- Facilities
- Provision of music tech facilities
- finding a suitable room and outfitting it with the required equipment
- space
- We haven't the correct facilities or equipment

More Periods/More time in schedule

- A better school schedule. We are on 4x4 which does not allow very many electives. Choir, band, art and drama are the main electives, with my Mus. Apprec. class and ROTC as well.
- A longer school day with more periods.
- Availability of time in the schedule
- Available time to teach the class.
- having time
- Freeing up the schedule.
- Having an abundance of students with room in their schedules for electives beyond the major performing ensembles.
- Time to do so.
- Allowing time in the school day for students to take another music course.
- I think we all want to teach classes like these but only one person can do so much in a single day. My main core classes come first which are my large ensembles.
- a free class period
- I would LOVE to teach a Music Tech class. The interest is there, but our scheduling barely leaves enough room for the core classes. Until we leave "The Block" this would never fly!
- I would love to teach a music technology course if students were allowed to have more than one elective. I teach music technology every summer in a middle school summer band camp and it benefits students greatly!

- I would teach a course like this provided the equipment and facilities match the enrollment. There would be interest in a course such as this, but I fear equipment and scheduling across the music department would hinder it. (researcher note: also added to equipment)
- I'd have to give up another course to teach music technology.
- flexible scheduling
- Less classes to teach.
- more class periods in the school day
- time in the school day
- Opening more options to students
- time in the schedule during which we could teach such subjects
- As far as scheduling...I don't have a solution, unless the courses were offered in a before or after-school program.
- The availability within the schedule,....most of us are confined to a master schedule with no flexibility.
- schedule not being so full of my own content area courses
- Time in my schedule, I currently teach 248 students no time.
- Time is the biggest obsticle - the schedule full as it is more time in te student day would be required
- Too many electives already.
- We are interested, but are all teaching full loads
- Stipend for teaching after school workshops if there isn't time during the day (researcher note: this teacher also made a separate comment about funding, so it was assumed that the point of this comment was the scheduling)
- Would like to teach music tech classes but already have full schedule.

Additional Faculty with Expertise

- available faculty to fill required curriculum
- Hire another teacher with expertise in the area.
- Hiring someone to teach it
- I teach general music to elementary age students, and I don't think that our high school teacher is qualified in any of the areas listed. I guess that we would need to hire another music teacher who could specialize in those particular areas. We are a private boarding school with grades PreK3 - 12. Students can begin boarding here in 7th grade. Our Fine Arts program is sort of a work in progress, but maybe we could look at this in the future!
- I would love to teach a tech ed course. Unfortunately I am currently the only music teacher in our Senior High School.
- If our school would hire a fourth music teacher, we would be able to offer courses in General Music Theory, Electtronic Music Techniques (Garage Band, Keynote, etc.), and Guitar classes.
- If we had a dynamic teacher who was interested in teaching such a course, I'm fairly certain the school would find a way to make it happen.
- Increase staffing
- More music teachers
- more teachers
- Our district only employs band and choral teachers at the middle and high school level. All carry full loads, so hiring additional music faculty would help.
- They would have to hire another teacher to do this.
- Money to hire additional music teachers
- Hiring another teacher to teach sound engineering, because currently we only have one who is knowlegeable and he has a full load.
- District would have to hire more music teachers,
- Wrong personnel to teach

Student Demand/interest

- bigger demand from the students
- overwhelming student interest
- Enough interest in the subject shown by students.
- student interest
- interest
- I would definitely be willing to teach it, were there the interest
- Interest

- More interest that does NOT remove students from other music courses
- Significant student interest.
- Student desire
- student interest
- Student interest
- Student interest, possibility of college credit.
- Student interest.
- Student interest.
- Students expressing a desire to take these courses.
- Student interest
- student interest
- Demand in students wanting to take this course
- Student/parent demand

Administrative Support

- A more open minded school board... one that permits teachers to have greater internet access, as well as more technology that is readily available in all classrooms.
- administrative support for devoting time to arts classes
- Administrative approval
- Administrative support
- Administrator Support and adequate budget would need to be in place before these kinds of courses are offered.
- All that would be necessary for me to do so would be a school who would support/allow me to implement the program.
- Approve the above reasons that program is absent in our school. This is a field that the 3 music teachers definitely support as adding to our curriculum. I know we could fill 6 classes of music technology, engineering, electronic music and commercial classes immediately
- administrative support to do so
- New leadership at the State level.
- commitment from the county to staff music classes
- along with administrative encouragement
- administrative support
- if my administration was willing to offer it.
- I would teach the course here, but we just started the music program. The administration wants an orchestra in five years, so my priorities are in performance. Once the program is established, then the expansion into music tech can be further looked at.
- More support from administration
- Ready and willing.....just don't have district or state support.
- support from admin
- Also, the county awareness. They do not realize the market potential for beginning Music Business instruction in early education.

Nothing/not likely to be interested

- Given that I am at a middle school where the majority of students have no prior music experience, I am very happy to offer and to teach beginning band / chorus / orchestra. I believe that the courses listed above are better suited to a high school program.
- I would not likely be interested.
- None
- none my classes are too big now, so I'd opt for smaller instrumental classes
- Not interested in teaching classes of that nature.
- nothing
- nothing
- To offer these courses would mean dropping basic courses like music theory. Doesn't seem feasible to me.
- I have no desire to offer a course like that, but would consider it as a component of a class currently offered.
- Kids are too young in middle school for this.
- Upcoming retirement. A lack of growth at directing ensembles.

Higher Enrollment

- Higher enrollments,
- If we had more students
- If we had the enrollment size to support it.

Curriculum Resources

- 1. A preplanned curriculum with lesson plans
- I would enjoy teaching a class like that but would want advice on curriculum
- Curriculum ideas
- A developed curriculum and text book support would be great.
- A suggested curriculum or syllabi of what to teach within that course
- and have a curriculum
- Curriculum packet that would help me get started quickly
- Curriculum
- Give students a 21st century curriculum. Be able to apply what they learn in the traditional music theory class to today's technology.
- Variety of music programs to teach and learn from.
- Having the resources to do so (researcher note: did not specify curriculum resources or financial resources, so putting it in both)
- having the resources (researcher note: did not specify curriculum resources or financial resources, so included it in both)
- Resources (researcher note: did not specify curriculum resources or financial resources, so included it in both)
- I would like an easy to follow textbook, software, and curriculum. I don't want to draw too much of my mental energy away from my band.
- Materials
- Resources available to teachers. Without a specified curriculum/book/etc., it would be a large teaching load to take on and create from scratch. Right now, "Music Appreciation" is offered and I teach a unit on music technology, but students don't have the chance to ever actually apply the concepts that they're learning.
- Textbooks that explain sound and sound engineering to a middle school or young high school student. The textbooks that I have looked at are geared more to college students and are too "dictionary" type reading to interest middle/high school students.
- and the resources
- Standard curriculum explaining the class with specific set outcomes.
- we would be more than willing with appropriate teaching materials
- We would have to be sure we had the resources necessary to teach the course. (researcher note: didn’t specify curriculum resources or financial resources, so adding to both)
-

Planning Time to prepare lessons and material

- I am proficient in my use of technology and am comfortable with computers. I am very well versed at using Pyware and Finale. My AP students use MacGamut in the classroom. The biggest thing holding me back is I don't want another class to worry about.
- Not seen as an added class or burden
- Extra time to prepare lessons and materials for said course
- more planning time

Info for Administration

- A clear outline to provide to school leadership committee illustrating the costs and space needed to create a music technology lab
- information from your study to share with administration

Already Planning To, or Would Like To Do it

- I am currently planning to incorporate most of these courses at our school, whether it be during school, or after school clubs.
- I would gladly teach a technology course.
- it is innovative and students are so techno savvy these days. it would be very natural
- It is popular with students. It keeps music teachers teaching in their field
- it would be a popular elective for students to take
- If my school needed a teacher for the aforementioned courses, I'm sure that I would be the teacher approached.
- if the classes were offered, one of us would teach the class
- Many students would be interested in taking a course. Especially students already involved in the music programs.
- Many students would be interested in taking the course. Creative outlet. Allow general school population to support and be involved in the music program.
- To recruit students that wouldn't normally be interested in school music programs.
- We will be teaching electronic music next year since more students are taking AP music theory as juniors.

Other

- course numbers and descriptions through the Florida Department of Education
- Drama might like to have as part of their sound tech.
- I think students would enjoy it if offered. But right now we have to have large numbers in each class because they've cut teacher units. It seems to me that this type of class would be most successful with smaller numbers - 6-10? I have between 25 and 50 in each class. I don't know how it would affect the whole schedule to have one class with lower numbers.
- Have parent support of the program being valid
- If this course were co-curricular with technology, then administration and students alike might see more value in supporting it.
- If we had older students, I would wish we could have this type of program.
- need to meet fine arts requirements
- My students are not cognitively able. They participate in music through sonar switches, regular switches, a program that translates their body movement via a webcam into sound, computer, MIDI, software....
- Seeing is believing. Demonstrations would give teachers more confidence.
- Similar/preliminary courses taught at middle school level.
- Local venues where students can receive practical application of such classes even through a volunteer program
- There would have to justification as to how it would help band students.
- To do a demonstration of how the music technology can benefit other core subjects.
- We do have a computer class in the Middle school wheel, It would be great to have someone come demonstrate what could be done. There may be a way to integrated into the "computer" area. Technology is a priority. Offer a pilot program, may be able to get grant funding.
- We do use audio/visual technology at our weekly chapel services and having students as sound assistants would be a huge attraction-for present and future students.
- We host a commercial music academy school of choice and the courses are required as part of the completer points. It is tyhe reality of music in today’s world.
- The other thing is that we are concerned about keeping our traditional programs in our schools. We really don't want to be replaced by technology and the idea of starting up an iPod ensemble is scary.

APPENDIX F

SAMPLE COURSE PROPOSAL

Course Proposal: Electronic Music

In most school districts all students receive general music in elementary school, and as they graduate to middle school and high school music education becomes more specific and performance-focused, usually asking students to choose between band, orchestra, and chorus. Many students are not interested or lose interest as they progress through these programs, either due to the pressure of festival ratings or competition, a lack of interest in the repertory and content, a lack of opportunities improvisation and individual creativity, or a general perception of "not fitting in."

Creativity is the difference…

Traditional ensembles are usually focused on everyone emulating a performance standard with exact precision, emulating the teacher or other models. Technology-based music classes allow students to improvise, create music, and do other creative things that are not often included in traditional ensembles. At the high school level, this may be students' last opportunity to learn and develop these skills in musical creativity and higher-level thinking.

Music remains a key and central part of the lives of all students even if they are not in a music class. With the proliferation of music software and websites devoted to creating music, it has never been easier or more fun for young people to compose, improvise, arrange, and produce music. A new generation of students are expressing themselves through music **outside** of school. This "non-traditional music student" may not play an instrument or read music, they might be academically unmotivated, and they might have discipline problems, but their talents can be shaped in a way to increase their musical success and improve their self-image. They might be generally good musicians who are just trying to express themselves but don't feel comfortable in a performance setting where they have to "fit in" with an entire ensemble. So, they are turning to their computers.

Now is the perfect time for schools to recognize and take advantage of this new student interest. Many studies suggest that student achievement is increased for students who study music; therefore an Electronic Music class could help the academic achievement of some of our lower-performing students. A Florida study found a direct correlation between the number of fine arts classes students take and their academic achievement[1]. A Texas study found that schools with the highest number of students in fine arts classes have the lowest drop-out rates[2]. The College Board found that students in music appreciation scored 63 points higher on verbal and 44 points higher on math than students with no arts participation[3]. A University of Kansas study found that students in high-quality music programs scored higher on standardized tests than students in deficient music programs, but even the students in lower quality music programs outperformed students with no music at all[4]. Despite these benefits,

---

[1] http://flmusiced.org/dnn/Advocacy/12GradeCohortFineArtsEnrollmentComparison.aspx
[2] http://www.nafme.org/supportmusic_cases/view/364
[3] http://www.collegeboard.com/prod_downloads/about/news_info/cbsenior/yr2001/NJ.pdf
[4] Johnson, C. M. & Memmott, J. E., (2006). Examination of relationship between participation in school music programs of differing quality and standardized test results. *Journal of Research in Music Education, 54*(4).

approximately 80% of American high school students are in no music classes[5]. An electronic music program would be the perfect way to recruit some of those students into music education who are not interested in current offerings.

State of the ART…

Technology is growing at an exponential rate and schools are struggling to keep up. Most school improvement plans and teacher professional development plans have a technology component. Students are increasingly provided digital opportunities for individual creative expression in their core academic classes, and technology now enables students to be individually musically creative as well. Students will be encouraged and rewarded for individual musicianship, thinking outside the box, and taking risks with their creative musical expression in a safe and supportive classroom environment.

Building a technology-based music course also has the potential for school recognition. The Florida Music Educators Association annually awards innovative programs and increased music enrollment. Many other schools with these innovative programs have been featured in national magazines and journals as models for using technology to get students excited about learning and creating. Our program could become a model that other schools will seek to emulate as technology-based music classes gain popularity in our state.

Course Description…

Students will gain experience and a basic understanding of the use of electronic music equipment, software, skills, and techniques used to create popular music. This course is designed to develop creativity and higher-level thinking through the learning and application of basic music theory and analysis with directed individual projects focusing on improvisation, song writing, arranging, and producing original music through multi-track MIDI and digital audio software in a comfortable environment that cultivates student success.

Funding Plan…

With the availability of free open source software and web applications, the class can start out in an existing computer lab or media center with very little or no funding. As funding is obtained additional equipment and software can be purchased to enhance the creative experience.

PHASE ONE: Using Existing Computer Lab and Free Software

Teacher Textbook: *Using Technology to Unlock Creativity*	$35.00
Teacher Textbook: *Music Technology Workbook*	$36.59
Headphones	Students Provide
Sequencing Software: LMMS Studio	Free
Audio Editing Software: Audacity	Free
Notation Software: Noteflight	Free Web-Based
	Subtotal $71.59

[5] http://www.musiccreativity.org

PHASE TWO: Existing Computer Lab, small keyboards, upgraded software

20 M-Audio Keystation Mini 32 MIDI Keyboard Controllers	$1,500.00
20 *Sibelius First* notation software	Included with Keyboards
20 *Ableton Live Intro* sequencing/audio/loop software	$1,980.00
1 locking cabinet for keyboard controllers	$99.00
	Subtotal $3,579.00

PHASE THREE: Dedicated Lab

20 Dell Optiplex Desktop computers	$9,980.00
20 M-Audio Keystation 61es Keyboard Controllers	$3,399.80
20 Quik-Lok Z250 Workstation Tables	$4,980.00
20 Avid MBox Mini Audio Interface and *Pro-Tools 9* Software	$4,280.00
20 Senheiser HD 203 Headphones	$999.80
1 LCD Projector	$399.00
Various cables, connectors, and supplies	$200.00
	Subtotal $24,238.60*

***Based on 2011 retail prices. Many music stores offer volume and educational discounts, as well as free setup and training.*

APPENDIX G

SAMPLE COURSE SYLLABUS

Electronic Music
Example High School, Fall 2011
Mr. Josh Bula

Required Materials:

- Textbook: none
- Web Access: The course has a significant web component. Internet parental agreement forms must be signed by your parents and submitted to the media center. Communication may also take place via email.
- USB Drive to save your files. You must save your files on a USB drive in addition to your shared network folder.

Course Objectives:

This course is designed to develop creativity, higher level thinking, and knowledge of basic music theory and creation. Students will gain a basic understanding of the use of electronic music equipment and software. Emphasis will be placed on composing and creating original musical projects.

- To understand basic music theory, such as notes, scales, basic chords & progressions, rhythm, & form.
- To understand the history of electronic instruments, electronic music, and MIDI.
- To learn how to use software for sequencing, arranging, loops, and editing audio.
- To develop skills to create inspired musical ideas and put them together to form a composition
- To extend your knowledge and exposure to various styles and genres of music that is composed and performed electronically.
- To increase music listening and analysis skill and enjoyment.

Grading:

Grades will be based on the percentage of points earned vs. the points available: 90%-100%=A, 80%-89.9%=B, 70%-79.9%=C, etc. The amount of points available for each assignment will be indicated on the class web site. Students are expected to follow their progress throughout the semester in the class website's Grading Center. The following will all contribute to your grade:

- Quizzes or Assignments on assigned reading and class discussions
- Participation in class discussions
- Projects:
    - Each project has a set of requirements that your composition must follow. These requirements are not meant to limit your creativity, but rather encourage creativity and focus on specific concepts in a sequential manner.
    - Each project will receive credit for creativity, musicality, and aesthetics. However,
- Attendance
- Final Exam

In order to get an A in this class, you must:

- Submit all assignments and present them to the class on the due dates.
- Meet the requirements of the attendance policy described in this document
- Manage your work-time on projects efficiently and effectively

How assignments are to be submitted:
All assignments will be submitted through the class website, and will not be accepted after the date and time indicated on the assignment link.

All files are to be named in the following manner: Your first and last name--the name of the assignment. For example, *JoshBula-LoopsImprovise.cpr*.

Care for the Lab and Equipment:

Most work will be completed in class, but you can also have access by appointment before or after school and during lunch by appointment. Students are not allowed in the lab without supervision. Here are some expectations for anyone using the lab:

- No food or drink in the lab at any time. Food or drink should be thrown away in a trash can outside the lab
- Do not leave trash in the lab.
- Do not bring guests with you into the lab, unless pre-approved by the instructor to perform for one of your recording projects.
- Make sure that the door closes and latches behind you when you enter or leave.

Course Policies:

Students are expected to demonstrate professional appropriate behaviors at all times. For example, stay on-task in the lab, plan ahead and submit assignments on time, treat equipment and other people with respect, etc…

Attendance:

Students are required to attend every class meeting listed on the class website calendar. In the case of Illness, emergency, or pre-arranged absences, you must follow school attendance policy. Points may be deducted from the student's final grade if documentation is not provided, or if the instructor feels like you have missed **or were tardy to** too many class meetings, regardless of the reason, unless extra time was spent in the lab outside school to make up for missed in-class time on projects. Plan ahead—students are responsible for all material covered during absences. Deadlines will not be extended because of an absence.

APPENDIX H

SAMPLE COURSE OUTLINE

Electronic Music

Sample planning calendar for a semester long class that meets daily for approximately 50 minutes

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Week 1	Intro, syllabus, lab care, listening. Watson: Favorite Sounds	Electronic Century 1 p. 1 Additive Synthesis MusicTheory.net Staff, Clefs	Electronic Century 1 p. 2 Clara Rockmore MusicTheory.net Exercise: Note Identification	Electronic Century 2 p.1 MusicTheory.net Steps & Accidentals	Electronic Century 2 p. 2 -Music Theory.net Major Scales -Major scales on GMajor Musictheory.net
Week 2	Electronic Century 3 p.1 Minor Scales Circle of Fifths	Electronic Century 3 p.2 MusicTheory.net Note Duration	Electronic Century 4 p.1 MusicTheory.net Measures & Time signature	Electronic Century 4 p.2 MusicTheory.net Rest Duration	History of MIDI MusicTheory.net Dots & Ties
Week 3	Labor day – No School.	History Review Rhythm Flashcards for Rhythm Review	Watson: Percussion Sounds Improvisation For rhythm review	**TEST 1:** History, Notes & Rhythm	Review Tests Listening: Music Technology Workbook chapter 2
Week 4	*Music Technology Workbook* chapter 4: MIDI Basics	*Music Technology Workbook* Ch. 5: Sequencing Basics	*Music Technology Workbook* Ch. 5: Exercises 5.1-5.5	Listening: Watson Book: Blues Keyboard Improvisation	Recording MIDI tracks: Begin *Improvisation with Loops* Project
Week 5	Edit recorded improvisation: Editing notes with cut, copy, paste, etc.	FORM: Listening and timelines	FORM: Listening and timelines-share homework timelines.	Begin Project 1: *Improv w/Loops* Project: A-B-A form	*Improv w/Loops* Project: A-B-A continued
Week 6	*Improv w/Loops* Project: Intoduction and Ending	*Improv w/Loops* Project: Continued	*Improv w/Loops* Project: Continued	Watson Book: Loops & Layering Lesson: the 100% rule	Watson Book: Loops & Layering Lesson: the 100% rule
Week 7	*Improv w/Loops* Project: Apply 100% rule, Mixer & Balance, Finishing touches	*Improv w/Loops* **Project DUE**: Class Presentations	DRUMS Building a beat Watson, p. 112	DRUMS Listening Exercise: Transcription	Begin Project 2: *Your First Original Song* Build your own drum parts.
Week 8	Project 2: DRUMS Create drum loops for verse, chorus, bridge	DRUMS Listening Exercise: Fills Sample Drum Fills	Project 2: DRUMS Arrange beats into simple song form, with fills	Creating a Tune: *Music Technology Workbook* Ch. 2 Chords Triads	Chords: Practice Inversions
Week 9	Bass Lines: *Music Technology Workbook* p.18	Bass Lines: Listening Exercises	Project 2: Add Bass/Chords	Project 2: Bass/Chords Continued 2 chord tracks: legato and rhythmic	Project 2: Bass/Chords Continued: Variety-texture
Week 10	Project 2: Bass/Chords Continued: Variety-layering	Project 2: Bridge section: What changes?	Project 2: Bridge Section	MELODY Watson: Period Form	MELODY Transfer: Period Form lesson to Project 2

Week 11	Project 2: Composing Melody for Verse	Project 2: Composing Melody for Chorus	Project 2: Composing Melody for Bridge	Project 2: Velocity and Balance	Project 2: Velocity and Balance Finishing touches
Week 12	**Project 2 Due**: Present to Class	Project 2 Presentations continued. Discussion/ Feedback.	Digital Audio: discuss Watson book chapter 13	Basic Audio Editing: Watson Book p.163: Creating a Sound Clip to Share.	Veteran's Day: No School
Week 13	Watson Lesson: "Do-Re-Me" audio splicing and arranging	"Do-Re-Me" continued. Add two loop tracks	Present "Do-Re-Mi" project to class.	Introduce *Spoken Word Remix* project, choose audio to use.	*Spoken word* project: Edit audio file
Week 14	*Spoken word* project: Edit/splice audio file	*Spoken word* project: Tempo & Drums	Thanksgiving	Thanksgiving	Thanksgiving
Week 15	*Spoken word project*: Arrange splices to form of song	*Spoken word project*: Arrange splices	*Spoken word project*: Melody Improv/Compose short motives	*Spoken word project*: Melody Phrases based on motives	*Spoken word project*: Melody continued
Week 16	*Spoken word project*: Harmony Seventh Chords	*Spoken word project*: Harmony	*Spoken word project*: Layering	*Spoken word project*: finishing touches	*Spoken word project*: balance, positioning, eq.
Week 17	**Spoken Word Remix Project Due**. Present to class.	Present spoken word projects to class, continued.	Revisit Loops/Improv project, prepare for CD	Revisit Original Song project, prepare for CD	Mix-Down & Master all previous projects into audio files
Week 18	CD Graphics Burn CD's	Burn CD's Review for Final Exam	Finals	Finals	Finals

Internet addresses linked above:

Music Theory Lessons and Exercises:

- http://MusicTheory.net
- http://GMajorMusicTheory.org

Electronic Century:

- http://www.emusician.com/tutorials/electronic_century1/
- http://www.emusician.com/tutorials/electronic_century2/
- http://www.emusician.com/tutorials/electronic_century3/
- http://www.emusician.com/tutorials/electronic_century4/

History of MIDI: http://www.midi.org/aboutmidi/tut_history.php

Rhythm Flashcards: http://www.iflipr.com/deck/practice/178921

Sample Drum Fills: http://www.soundsnap.com/tags/drum_fill

APPENDIX I

IRB APPROVAL & PARTICIPATION CONSENT FORM

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

RE-APPROVAL MEMORANDUM

Date: 5/4/2011

To: Josh Bula

Address:
Dept.: MUSIC SCHOOL

From: Thomas L. Jacobson, Chair

Re: Re-approval of Use of Human subjects in Research
A study of Music Technology and Commercial Music courses in secondary schools

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by 5/2/2012, you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the committee.

If you submitted a proposed consent form with your renewal request, the approved stamped consent form is attached to this re-approval notice. Only the stamped version of the consent form may be used in recruiting of research subjects. You are reminded that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are advised to review the protocols as often as necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

Cc: Steven Kelly, Advisor
HSC No. 2011.6270

MUSIC TECHNOLOGY COURSE SURVEY

Josh Bula, Ph.D. candidate in Music Education, Florida State University School of Music

Thank you for agreeing to participate in this study, which part of my dissertation for the completion of the Ph.D. in music education at Florida State University.

It will take anywhere from 2 minutes to approximately 10 or 15 minutes, depending on what questions apply to you. *You will receive acknowledgement* for your responses if you fill out the **optional** identifying information at the end of the survey. If you prefer to remain anonymous, simply leave those fields blank.

BEHAVIORAL INFORMED CONSENT:

You are invited to participate in a research study of Music Technology courses in secondary schools. You were selected as a possible participant because you are or were a music teacher in secondary schools. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Josh Bula, a Ph.D. candidate in music education at Florida State University.

Background Information:

The purposes of this study is to determine attitudes about offering music technology courses at the middle and high school level and the types of students currently taking these courses, and to collect curriculum resources, advice, and assistance for teachers who might like to start music technology classes.

Procedures:

If you agree to be in this study, we would ask you to do the following things: Take a short online survey that will take approximately 10 to 15 minutes of your time if you teach music-technology-related classes, and approximately 5 minutes or less if you do not teach music-technology-related classes.

Risks and benefits of being in the Study:

The study has no known risks.

The possible benefits to participation include assisting and encouraging teachers in developing modern music courses, which can possibly recruit students into music education programs who

FSU Human Subjects Committee Approved on 5/4/11. Void after 5/2/12. HSC# 2011.6270

may not be interested in the traditional music courses and ensembles.

Compensation:

You will not receive compensation for participation in this study. The researcher will also not receive compensation for conducting this study.

Confidentiality:

The records of this study will be kept private and confidential to the extent permitted by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject, unless the subject indicates that he or she would like acknowledgement by supplying optional identifying and contact information. Research records will be stored securely and only researchers will have access to the records.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current of future relations with the University or the researcher. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions

The researcher conducting this study is Josh Bula. You may ask any question you have by contacting him at The researcher's major professor is Brian Gaber, .

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the FSU IRB at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306-2742, or 850-644- 8633, or by email at humansubjects@magnet.fsu.edu.

You may use your browser's "Print" function to retain a copy of this consent form for your reference.

Statement of Consent:

By clicking the "Yes" button below, you agree that you have read the above information, you have printed a copy for your records, you have received answers to any questions asked, and you consent to participate in the study.

Yes, I consent to participate | No, I do not wish to participate

FSU Human Subjects Committee Approved on 5/4/11. Void after 5/2/12. HSC# 2011.6270

APPENDIX J

E-MAIL INVITATION TO PARTICIPATE

Dear Colleagues,

I am conducting a study on attitudes and resources for Music Technology courses in secondary schools. Although the project focuses on secondary schools, your input will be valued no matter what level you teach. I would appreciate it if you could also forward this to any middle or high school teachers that you know who may be teaching any Music Technology courses.

The informed consent and information form is available at this link:
https://flmusiced.org/JoshEMSurvey

The consent form linked above includes a link to begin the survey if you would like to participate.

Thank you very much for taking the time to help with this project.

Sincerely,
Josh Bula,
Ph.D. Candidate in Music Education, Commercial Music, & Contemporary Media
Florida State University

REFERENCES

Abeles, H. Fox, D.B., Holloway, A., Kember, G., Moore, B. (1999). How will societal and technological changes affect the teaching of music? *Vision 2020: The Housewright Symposium on the Future of Music Education*. Retrieved from http://www.menc.org/documents/onlinepublications/vision2020/HowWillSocietaland.pdf

Abril, C. R. & Flowers, P. J. (2007). Attention, preference and identity in music listening by middle school students of different linguistic backgrounds. *Journal of Research in Music Education, 55*(3), 204-219.

Abril, C. R. & Gault, B. M. (2008). The state of music in secondary schools: The principal's perpective. *Journal of Research in Music Education, 56*(1), 68-81.

Acoustica. (n.d.). *Mixcraft 5: Affordable multi-track audio and MIDI recording studio* [Web site]. Retrieved from http://acoustica.com/mixcraft.

Adams, R. (n.d). *MusicTheory.net* (Website). Retrieved from http://www.musictheory.net.

Albert, D. J. (2005). *Instrumental Music Teachers' Strategies to Recruit and Retain Band Students in Low Socioeconomic School Districts.* (Thesis). Retrieved from ProQuest (1429750).

Allsup, R. A. (2003). Mutual learning and democratic action in instrumental music education. *Journal of Research in Music Education, 51*(1), 24-37.

Arbitron, (n.d.). *Arbitron Ratings Data* [Web site]. Retrieved from https://tlr.arbitron.com/tlr/public/market.do?method=loadAllMarket.

ArtsEdge. (n.d.). Music Grade 9-12, Music Standard 4. *National Standards for Arts Education.* Consortium of National Arts Education Associations. Retrieved from: http://artsedge.kennedy-center.org/educators/standards/national/arts-standards/9-12/music/music-4.aspx.

Baskerville, D. (2006). *Music business handbook*. Thousand Oaks, CA: Sage Publications.

Bauer, W., Reese, S., & McAllister, P. A. (2003). Transforming music teaching via technology: The role of professional development. *Journal of Research in Music Education, 51*(4), 289-301.

Beck, D. (2004). *The musician's guide to recording drums.* Milwaukee, WI: Hal Leonard.

Billboard, (n.d.). *Digital songs: The week's top-downloaded songs across all genres, ranked by sales data as compiled by Nielsen SoundScan* [Web site]. Retrieved from http://www.billboard.com/#/charts/digital-songs?tag=chdrawer.

Block, D. G. (2008) Teaching composition skills in the general music classroom. *Teaching Music, 16*(4), 74.

Block, D. G., (2008). General music classes have value at all education levels. *Teaching Music*, 16(2), 66.

Boehm, C. (2007). The discipline that never was: Current developments in music technology in higher education in Britain. *Journal of Music, Technology, and Education, 1*(1), 7-21.

Boespflug, G. (2004). Performance and composition perspectives. In C. X. Rodriguez (Ed.), *Bridging the gap: Popular music and music education* (191–204). Reston, VA: MENC.

Bosch, M. (2008). *Everyone can compose music.* (Unpublished doctoral dissertation). Princeton University, New Jersey.

Brown, J. D. (1985). *The Gemeinhardt report II*. Elkhart, IN: Gemeinhardt Company, Inc.

Bula, J. (2010). Commercial music courses in secondary schools: A preliminary study of culture, motivation, and curriculum materials. (Unpublished graduate project). Florida State University: Tallahassee, Florida.

Burns, G. (1987). A typology of hooks in popular records. *Popular Music, 6*(1), 1-20.

Cain, Tim. (2004). Theory, technology and the music curriculum. *British Journal of Music Education, 21* (2), 215-221.

Choat, R. A., Fowler, C. B., Brown, C. E., & Louis, G. W. (1967). The Tanglewood symposium: Music in American society. *Music Educators Journal, 54*(3), 49-80.

Cook, F. D. et al. (2011). *Pro tools 101 official courseware.* Boston, MA: Cengage Learning.

Corenblum, B. & Marshall, E. (1998). The band played on : Predicting students' intentions to continue studying music. *Journal of Research in Music Education 46*(1), 128-140.

Coryat, K. (2008). *Guerrilla home recording: How to get great sound from any studio.* New York, NY: Hal Leonard.

Crow, B. (2006). Musical creativity and the new technology. *Music Education Research, 8*(1), 121-130.

Dammers, R. (2009). A survey of technology-based music classes in New Jersey high schools. *Contributions to Music Education, 36*(2), 25-43.

Dammers, R. (2010). Proceedings from the Association for Technology in Music Instruction (ATMI) Conference 2010. *Technology-based music classes in high schools in the United*

States. Retrieved from http://www.musiccreativity.org/research_papers/dammerstbmisurvey2010.pdf.

Davis, G. & Jones, R. (1989). *Yamaha sound reinforcement handbook, second edition.* Milwaukee, WI: Hal Leonard.

Davis, S. G. (2005). That thing you do: Compositional processes of a rock band. *International Journal of Education & the Arts, 6*(16). Retrieved from http://www.ijea.org/v6n16/.

DeBenedetti, G. (n.d.). *G-Major Music Theory* (Website). Retrieved from http://gmajormusictheory.org/.

Edwards, N. (2006). Estimate of percentage of non-music-performers grade 6-12. (Unpublished graduate project). Illinois State University, Normal, IL.

Elps, K. E., & Abril, C. R. (2011). High school music ensemble students in the United States: A Demographic Profile. *Journal of Research in Music Education, 59*(2), 128-145.

Everest, F. A. & Pohlmann, K. C. (2009). *The master handbook of Acoustics, fifth edition.* New York, NY: McGraw-Hill.

Fábregas, E. (1992). *Designing and Implementing an Electronic Music Program in a Community Music School in New York City.* (Unpublished doctoral dissertation). Columbia University, New York, NY.

Fábregas, E. (1994). Proceedings of the First International Technological Directions in Music Learning Conference. *How to design and implement an electronic music program in a community music school.* Retrieved from http://music.utsa.edu/tdml/conf-I/I-Fabregas.html.

Florida Department of Education (2011). *2011-2012 course directory – Adopted by State Board of Education on June 21, 2011.* (Website). Retrieved from http://www.fldoe.org/articulation/CCD/1112.asp.

Folkestad, G., Hargreaves, D. J., & Lindström, B. (1998). Compositional strategies in computer-based music-making. *British Journal of Music Education, 15*(1), 83-97.

Frith, S. (1996). *Performing rites: on the value of popular music.* Oxford and New York: Oxford University Press.

Gray, L., Thomas, N., & Lewis, L. (2010). *Educational technology in U.S. public schools: First look.* National Center for Education Statistics: Jessup, MD.

Green, L. (2008). *Music, informal learning, and the school: A new classroom pedagogy*. Aldershot, UK: Ashgate.

Green, L. (2001). *How popular musicians learn: A way ahead for music education.* Aldershot, UK: Ashgate.

Hargreaves, W., Purves, R. & Marchal, N. (2003). Effective teaching in secondary school music: teacher and pupil identities. *The Teacher Identities in Music Education Project.* London, Economic and Social Research Council, ESRC.

Hewitt, M. (2008). *Music theory for computer musicians*. Boston, MA: Course Technology, Cenage Learning.

Ho, W. (2004). Use of information technology and music learning in the search for quality education. *British Journal of Educational Technology, 35*(1). 57-67.

Hodson, R. (2011). *Using Pro Tools in music education.* Milwaukee, WI: Hal Leonard.

Hope, S. (2004). Proceedings of the National Association of Schools of Music Annual Meeting, San Diego: CA. *Creating a positive future for P-12 music education*.

Huber, D. M. & Runstein, R. E. (2010). *Modern recording techniques, seventh edition.* Burlington, MA: Focal Press.

Humphreys, J. T. (2004). Popular music in the American schools: What history tells us about the present and the future. In C. X. Rodriguez (Ed.)*, Bridging the gap: Popular music and music education* (91–105). Reston, VA: MENC.

Indaba, (n.d.), Indaba Music, an online electronic music community [Web site]. Retrieved from: http://indabamusic.com/.

Kelly, S. (2008). *2007-2008 12th grade cohort & fine arts enrollment comparison.* Retrieved from https://flmusiced.org/dnn/Advocacy/12GradeCohortFineArtsEnrollmentComparison.aspx

Kelly, S. (2009). *Teaching music in American society*. New York, NY: Routledge.

Kennedy, M. A. (2002). Listening to the music: Compositional process of high school composers. *Journal of Research in Music Education, 50*(2), 94-110.

King, A. & Vickers, P. (2007). Problem solving with learning technology in the music studio. *Journal of Music, Technology, and Education, 1*(1), 57-67.

Klinedinst, R. E., (1991). Predicting performance achievement and retention of fifth-grade instrumental students. *Journal of Research in Music Education, 39*(3), 225-238.

Koops, A. P., (2009). *Incorporating composition in middle school band rehearsals*. (Unpublished doctoral dissertation). University of Southern California, Los Angeles, CA.

Kuzmich, J. (2003). Technology: Music technology labs. *School Band and Orchestra, April 2003*, Retrieved from: http://www.sbomagazine.com/ME2/Segments/Publications/Print.asp?Module=Publications::Article&id=E0E1320067D3454D9A80588D8020784C.

Leung, C. C. (2003). Extra-curricular music activities in Hong Kong secondary schools. *Music Education Research, 5*(2), 183-197.

Madsen, C. K. & Madsen, C. H. (1998). *Teaching/Discipline: A positive approach for educational development.* Raleigh, NC: Contemporary Publishing.

Magno, M. (1993). *Creative music –making through the use of new technologies: An approach to comprehensive musicianship*. (Unpublished doctoral dissertation). Columbia University Teachers College, New York, NY.

McAllester, D. (1967). The substance of things hoped for. From: *Documentary report of the Tanglewood symposium*, MENC, 96-99.

Meier, S.A. (2007). *The effect of lecture support media on software skills learning.* (Unpublished doctoral dissertation). Florida State University, Tallahassee, FL.

MENC. (1994). *The school music program: A new vision.* Reston, VA: MENC. Retrieved from http://www.menc.org/resources/view/the-school-music-program-a-new-vision.

MENC, (1999), *Vision 2020: The Housewright symposium on the future of music education.* Retrieved from http://www.menc.org/resources/view/vision-2020-the-housewright-symposium-on-the-future-of-music-education.

Middleton, P. & Gurevitz, S. (2008). *Music technology workbook: Key concepts and practical projects.* Burlington, MA: Focal Press.

Nahmani, D. (2009). *Apple pro training series: Logic pro 9 and Logic express 9*. Berkeley, CA: Peachpit Press.

Odam, G. (2002). Teaching composing in secondary schools. *Aspects of teaching secondary music*. London: Open University Press.

Parsons, A. (Director) & Colbeck, J. (2010). *Art and science of sound engineering* [Motion Picture]. Santa Cruz, CA: Keyfax New Media.

Propellerhead (2004). *Teaching music with Reason*. Retrieved from http://www.propellerheads.se/download/index.cfm?fuseaction=get_article&article=tmwr_download.

Puckette, M. (2007). *The theory and technique of electronic music*. New York, NY: World Scientific.

Roads, C. (1996). *Computer music tutorial, The*. Cambridge, MA: Massachusetts Institute of Technology.

Rudolph, T. E. (1999). *Finding funds for music technology.* Melville, NY: Soundtree.

Rudolph, T. E. (2004). *Teaching music with technology*, Chicago, IL: Gia Publications.

Rudolph, T. E. & Frankel, J. (2009). *YouTube in Music Education*. New York: Hal Leonard.

Rudolph, T. E., Richmond, F., Mash, D. Webster, P., Bauer, W. I., Walls, K. (2005). *Technology strategies for music education*. Wyncote, PA: Technology Institute for Music Education.

Ryan, K., Boulton, M., O'Neill, S.A., & Sloboda, J.A. (2000) Perceived social support and children's participation in music, in: Woods, C., Lluck, G., Brochard, R., Seddon, F., & Sloboda, J. (Eds) *Science, Music, & Society: Proceedings of the 6th International Conference on Music Perception and Cognition.* Newcastle, Staffordshire, Keele University.

Savage, J. (2005). Working towards a theory for music technologies in the classroom: how pupils engage with and organize sounds with new technologies. *British Journal of Music Education, 22*(2), 167-180.

Schmidt, C. P., Baker, R., Hayes, B., & Kwan, E. (2005). *A descriptive study of public school music curricula in Indiana.* Paper presented at the Committee for Institutional Cooperation Conference, Indiana University.

Seifried, S. (2002). Making the scene: Popular teenage music, guitar class, and the creation of identity and place. *Dissertation Abstracts International, 63* (01), 24A.

Seifried, S. (2006). Exploring the outcomes of rock and popular music instruction in high school guitar class: a case study. *International Journal of Music Education, 24*(2), 168-177.

Sloboda, J. (2001). Emotion, functionality, and the everyday experience of music: where does music education fit? *Research in music education: conference abstracts*. Exeter University.

Sloboda, J.A., O'Neil, S.A. & Ivaldi, A. (2001) Functions of music in everyday life: An explanatory study using the experience sampling methodology, *Musical Scientiae, 5*(1), 9–32.

Solly, B.J. (1986). A study of attrition from the instrumental music program in moving between grade levels in Cherry Hill, New Jersey. *Dissertation Abstracts International, 47*, 2877A.

Stark, S. H. (2004). *Live sound reinforcement, Bestseller edition.* Vallejo, CA: Artistpro.

Strand, K. (2006). Survey of Indiana music teachers on using composition in the classroom. *Journal of Research in Music Education, 54*(2), 154-167.

Tweakheadz (n.d.). *Tweakheadz Lab* [website]. Retrevied from http://tweakheadz.com.

Väkevä, L. (2006). Teaching popular music in Finland: what's up, what's ahead? *International Journal of Music Education, 24*(2), 126-131.

Väkevä, L. (2010). Garage band or GarageBand®? Remixing musical futures. *British Journal of Music Education, 27*(1), 59-70.

Walker, L. M., & Hamann, D. L. (1995). Minority recruitment: The relationship between high school students' perceptions about music participation and recruitment strategies. *Bulletin of the Council for Research in Music Education, 124,* 24-38.

Watson, S. (Ed.). (2006). *Technology guide for music educators*. Boston, MA: Thompson Course Technology.

Watson, S. (2011). *Using technology to unlock musical creativity.* New York, NY: Oxford University Press.

Webster, P. R. (2007). Computer-based technology and music teaching and learning: 2000-2005. *International Handbook of Research in Arts Education, 16*(12), 1311-1330.

Wells, J. & Lewis, L. (2006). *Internet access in U.S. public schools and classrooms: 1994-2005. Highlights: NCES 2007-020.* Jessup, MD: Ed Pubs.

Westerlund, H. (2006). Garage rock bands: A future model for developing musical expertise? *International Journal of Music Education, 24*(2), 119-127.

Williams, D. B. (1987). Do our models for music research and teaching reflect our human social nature? *Council for Research in Music Education, 90*, 65-73.

Williams, D. B., (2007). Reaching the "other 80%:" Using technology to engage "non-traditional music students" in creative activities. Prepared for the proceedings of the Tanglewood II "Technology and Music Education" Symposium, University of Minnesota, April 2007. Retrieved from http://musiccreativity.org/documents/tanglewood2tech_dbwilliams0.pdf.

Williams, D. B. (2008). Proceedings from the music technology ymposium, University of Alabama-Birmingham. *Opening new doors to music creativity: New tools and new strategies.* Retrieved from: http://musiccreativity.org/articles_and_presentations.html.

Williams, D. B., (2011). *Non-traditional music (NTM) survey results from teachers of technology-based music classes*. Unpublished. Retrieved from http://musiccreativity.org/research_papers/dbwntmsurveyresults-aug2011.pdf.

Williams, D. B. & Beirne, C. T. J. (2005). Composition for non-traditional music students: A pilot study determining the feasibility of a music curriculum geared toward inexperienced (non-traditional) music students in the high school level. Retrieved from http://www.musiccreativity.org/research_papers/cbeirne_researchpaper_2005.pdf.

Williams, D. B., & Dammers, R., (n.d.). *Music creativity through technology* [website]. Retrieved from: http://musiccreativity.org.

Williams, D. B. & Webster, P. R. (2006). *Experiencing music technology: Software, data, and hardware*. New York: Schirmer.

BIOGRAPHICAL SKETCH

Name:	Josh Alan Bula
Birthplace:	Colorado Springs, Colorado
Date of Birth:	November 1, 1973
Higher Education	Florida State University Tallahassee, Florida Major: Music Education Degree: BME (1997) University of South Florida Tampa, Florida Major: Instrumental Conducting Degree: MM (2001) Florida State University Tallahassee, Florida Major: Music Education Degree: PhD (2011)
Professional Positions:	Newberry High School Newberry, Florida 1997-2000 Director of Bands Bayside High School Palm Bay, Florida 2000-2001 Director of Bands Leon High School Tallahassee, Florida 2001-2008 Director of Bands