ABSTRACT

The purpose of this study was to examine how high school and middle school band directors in the state of North Carolina currently implement technology into their band programs. Selection of participants for this study involved identifying middle school and high school band directors in the state of North Carolina. The participants were selected based on their membership in the North Carolina Bandmasters Association and maintaining an active email address. Therefore, a total of 489 band directors, including 221 middle school and 268 high school directors, were selected as potential participants. Out of the initial 489 band directors selected as potential participants for this study, one hundred twenty-nine band directors (N = 129) completed the survey. Participants completed an online questionnaire that asked them to list types of technology that they currently use, would like to use, and how prepared they feel to integrate technology into their band rehearsals.

"Proper Sound System Equipment," "Internet Resources," "Smart Board," "Audio Recording Devices," and "Play-Along Software" were the top five most frequently listed responses for what types of technology are currently being used in North Carolina band rehearsals. Directors were asked to list what types of technology resources they would like to be able to use given unlimited resources. The top five most frequently listed responses included, "Play-Along Software," "Music Notation Software," "Tablet Computers or other smart devices," "Smart Board and Peripherals," and "Audio Recording Devices." "Play-Along Software," "Audio Recording Devices," "Music Notation Software," and "Tuners and Metronomes" were listed among the most common and beneficial types of technology available for bands. Further, the majority of band directors in North Carolina surveyed indicate they feel adequately prepared to teach using technology.

Analysis of the data revealed some similarities among North Carolina band directors. Based on conclusions from the present study and previous research, given (a) adequate funding, (b) administrative leadership, (c) time, (d) support, (e) access to resources, and (f) applicable professional development, the appropriate implementation of technology should be pursued in order to enhance the quality of music education for music students.

AN EXAMINATION OF THE IMPLEMENTATION OF TECHNOLOGY IN SECONDARY SCHOOL BANDS

A Thesis

Presented To the Faculty of the Music Education Department

East Carolina University

In Partial Fulfillment of the Requirements for the Degree

Master of Music in Music Education

by

Michael Henderson

April, 2012

AN EXAMINATION OF THE IMPLEMENTATION OF TECHNOLOGY IN SECONDARY SCHOOL BANDS

by

Michael Henderson

APPROVED BY:

DIRECTOR OF THESIS: _____

Jay Juchniewicz, PhD

COMMITTEE MEMBER: _____

R. Scott Carter, DMA

COMMITTEE MEMBER: _____

C. Gregory Hurley, PhD

CHAIR OF THE DEPARTMENT: _____

Michelle Hairston, EdD

DEAN OF THE GRADUATE SCHOOL: _____

Paul J. Gemperline, PhD

ACKNOWLEDGEMENTS

I would sincerely like to thank everyone who has been a part of this process with me.

To my beautiful wife, Jennifer and our children, thank you for your support and selfless dedication to this endeavor. I love you.

Dr. Juchniewicz: I cannot begin to thank you enough for all of the professional advice and support you have given me during my entire time in this Graduate program. I am truly grateful for everything you have meant to me.

Dr. Hurley: Thank you for serving on my committee and being such an inspiration in professionalism.

Dr. Carter: Thank you for serving on my committee and challenging me to be a better band director through what you have taught me.

Dr. Hairston: Thank you for always being there to answer my questions and for this opportunity to further my education.

Thank you to my students at Chase High School for all of your support throughout my time in Graduate school.

Above all, I want to give glory to God for everything that has been accomplished.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

In the current educational climate there is a desire for an increased use of technology in many school systems nationwide. However, school music programs appear to be one of the few academic disciplines that still establish a positive student/teacher relationship without the assistance of technology. This aspect of music education will need to be addressed, as there may be direct consequences if technological expectations cannot be met in the music classroom. These consequences could include (a) reduction of administrative support, (b) reduction of funds, (c) termination of employment, (d) or even elimination of the music program in extreme cases.

Because "state and federal mandates are often implemented through a top-down, one-size-fits-all approach" (Baker, 2003, p. 1), teachers of all academic disciplines are left to decide how best to implement technological regulations in their classroom. While a number of teachers find this task difficult, others take it as an opportunity to challenge their own teaching practices and to improve as educators. As technology continuously evolves, teachers must maintain a perpetual awareness and be willing to revise current educational practices to not only recognize potential for technology as an educational resource, but to remain effective in the classroom as well (Cooper, 2004). Subsequently, Barron, Kemker, Harmes, and Kalaydjian (2003) investigated the use of technology in one of the largest school districts in the country. The data indicated that fifty percent of the teachers used technology as an instrument for communication. However, only a small percentage of those teachers reported using technology as a research, productivity, or problem-solving tool in relation to educational integration. Similarly, another investigation found that technology use in a scholastic environment is limited predominantly to

laboratory situations and that student involvement is not directly integrated into consistent classroom instruction or lesson preparation (Baker, 2003). Further researchers have indicated (a) administrative leadership, (b) planning, (c) funding, (d) time, (e) support, (f) access to resources, and (g) training have all been listed as factors when integrating technology into daily classroom use (Barron et al., 2003; Baker, 2003; Dorfman, 2008; Cooper, 2004; Criswell, 2011a; Sussman, 2011; Walls, 2011). If these issues are addressed in an educational environment, then technology can be taken from the monopoly of laboratory instruction and immersed into all classrooms in any given school, including music performance classrooms.

There are few music teachers who would disagree with the effectiveness of technology integration in the classroom. However, many music educators have yet to fully take advantage of the potential available through the use of classroom technology (Mark, 1996). One specific investigation on technology integration in the state of Ohio found that teacher technology usage is more frequent than student technology use. Results also suggest that specific technologies such as compact disc burning and the use of music notation software were the most conventional (Dorfman, 2008). Unfortunately, Dorfman (2008) states that only a limited amount of research has been conducted on (a) how music teachers use technology in their classrooms, (b) the knowledge about the various types of technology music educators use, (c) the professional development training music educators have in the use and implementation of technology, and (d) the obstructions faced by the integration of technology. Thus, while several researchers have examined the influence of technology within the general education classroom, only a limited number of studies have specifically focused on the impact of technology on music education.

Need for the Study

Because it appears that music educators are not using the full potential of technology in their classroom, research is warranted to investigate how technology is currently being utilized in the music classroom. Consequently, by establishing a baseline of the current uses of technology, music educators may start to observe the potential for growth in technology integration. Therefore, the purpose of this study was to examine how high school and middle school band directors in the state of North Carolina currently implement technology into their band programs. Specific questions to be addressed were:

1. What types of technology do band directors currently use in their band rehearsals?
2. What types of technology do band directors feel are the most common and beneficial to band rehearsals?
3. What types of technology would band directors like to have access to given unlimited resources?
4. How adequately prepared do North Carolina band directors feel to integrate technology into their band rehearsals?

CHAPTER TWO

REVIEW OF LITERATURE

It appears arduous to envision any facet of music today that is not affected in some manner by technology (Williams & Webster, 2006). In fact, all aspects of music, including composing, performing, and listening, have been affected by technological advances. Currently, (a) composers utilize music notation software and electronic sound devices on computers to create their compositions, (b) performers use venues to record their performances that have been improved by numerous technological advances, and (c) listeners hear music that has been recorded and produced using digital technology. As a result, the manner in which music is experienced today is considerably altered from the experiences of musicians and listeners in previous generations (Williams & Webster, 2006).

A Rationale for Technology Integration

In 1957, the Soviet Union launched the world's first man-made satellite, Sputnik. Because of this single event, the confidence the American people had in their technological superiority was deeply diminished. The launch of Sputnik brought about many profound alterations in the American educational system as both citizens and the government found that it was deficient in many areas. During this time, computer technology did not have an acute influence on music education due mostly to the fact the computers of the time were sizeable, costly, and complex (Mark, 2007). "A 1965 textbook on what was then called audio-visual teaching described what was then current and recommended: chalkboards, field trips, bulletin boards and posters, educational television, motion pictures, still pictures, and radio and

recordings" (Mark, 2007, p. 132). Notably absent from this textbook was any reference to digital media, including computers.

However, in today's educational climate, digital media is prevalent through education and most notably within music education. Music teachers are specifically motivated to use technology as "some students will be more motivated to learn when technology is used appropriately and some learning experiences are much more feasible when technology is used" (Walls, 2011). There are also practical reasons for utilizing technology in music programs. State and federal standards require that students use technology in all subject areas. In addition, teachers are evaluated concerning their use of technology (Walls, 2011). Notably, the state of North Carolina has adopted a set of four information and technology essential standards for all teachers. The first standard concerns sources of information. Under this standard, students should be able to (a) evaluate resources for reliability, b) evaluate resources for point of view, bias, values, or intent, and (c) evaluate content for relevance to assignment. Standard two addresses technology as a tool for education. The clarifying objectives of this standard call for students to use suitable technology tools and other resources to access and organize information, and design products to share information with others. Through standard three, students should be able to design global-awareness project-based products both as individuals and in collaborative learning situations. Lastly, the fourth standard concentrates on safety and ethical issues, expecting students to be able to analyze ethical issues and practices related to copyright and plagiarism, as well as analyze safety issues and practices when using online resources (*North Carolina Department of Public Instruction, 2011).* Thus, teachers in all academic disciplines are responsible for teaching the North Carolina technology standards regardless of the subject's status in the academic core.

The Teacher's Responsibility for Technology Integration

According to Kirk (2006), a core responsibility of teachers is to inspire life-long learning. For music educators, this responsibility extends to motivating students to continue to participate in music for the duration of their lives. This goal of life-long participation in music is accomplished by providing a solid musical foundation that develops independent learners of music. Therefore, teachers do not have a responsibility to teach certain technologies, but a larger responsibility to assess which technologies can help stimulate and encourage students to continue in music once they depart from music classrooms (Kirk, 2006). As Mark (1996) and Tozier (2011) postulate, music teachers should be aware not to become so enthralled by technology that it becomes more important than the subject matter. Mark (1996) argues that "technology has the potential to make music better; the musicianship behind the technological application, however, will always make the difference in the music we hear" (p. 196). Littrell et al. (2005) indicate that most human behavior is acquired observationally through demonstration. If teachers can model technology in the classroom, students should be able to acquire the skills necessary to complete assignments using that technology. Collier et al. (2004) posit that technological literacy should no longer be developed in separate classes, but should be integrated across the entire curriculum. Without teachers' capable academic application of technology in education, technology cannot inherently impart educational change and innovation (Levin & Wadmany, 2006). "Technology is still just a tool in a bigger picture. It can't take the place of an effective and passionate teacher. You can buy the best cookware and ingredients in the world, but if you don't know how to cook, the meal is still going to taste awful" (Sussman, 2011).

Teacher Training in Technology

Considerable research has been performed in the area of teacher training in technology (Bauer, Reese, & McAllister, 2003; Dorfman, 2008; Baker, 2003; Littrell, Zagumny, & Zagumny, 2005; Collier, Weinburgh, & Rivera, 2004). A number of teachers are discouraged by the fact that technology is an ever-changing entity and that they must continually develop new technological skills in order to keep up with their students (Mark, 1996). Teachers' knowledge, comfort, and frequency of use with regards to technology can all be attributing factors to the effectiveness of teacher training on technology integration in the classroom (Bauer et al., 2003). Baker (2003) proposes "training can positively enhance the integration of computers into instruction, while lack of training inhibits integration and teacher use of technologies" (p. 17). Researchers also suggest appropriate and relevant teacher training in technology can increase educators' self-confidence in the use of educational technology (Collier et al., 2004). Dorfman (2008) concurs by stating:

> Development of knowledge and skills related to sophisticated music technologies such as notation software and sequencing software may encourage teachers to include those technologies in the curricula more readily. This supports earlier research that suggests that training in music technology integration may increase comfort level and frequency of use. (p. 35)

A study conducted in 1999 stated that only 20% of public school teachers in the United States feel comfortable using technology in the classroom (Collier et al., 2004). Because of this low number of teachers that feel comfortable in their own use of technology in the classroom, it appears that self-esteem plays a crucial role in the frequency of use of instructional technology (Littrell et al., 2005).

The *International Society for Technology in Education (ISTE)* has sought to actively promote technology in education through the creation of the document, the *National Education Technology Standards for Teachers* (Collier et al., 2004). This document is noteworthy in that it outlines what abilities student teachers should obtain by the end of their teacher preparation courses. According to the *ISTE*, there are six core standards that are a part of this teacher education process that include (a) technology operations and concepts, (b) planning and designing learning environments and experiences, (c) teaching, learning and the curriculum, (d) assessment and evaluation, (e) productivity and professional practice, (f) social, ethical, legal, and human issues (Collier et al., 2004). Under each standard are specific indicators of competency depending upon how advanced a student teacher is in their specific teacher training process. Additionally, these guidelines encourage future teachers to consider technology as a developmental process (Collier et al., 2004). In fact, these technology standards are similar to a new North Carolina teacher evaluation instrument, which is also marked as a developmental instrument designed to help teachers improve weak areas in their own instruction (North Carolina Department of Public Instruction, 2009). Other researchers indicate most of the instruction imparted to pre-service teachers is about technology, not necessarily about how to integrate technology into daily classroom use (Littrell et al., 2005). Proper training for teachers in the area of technology should proliferate teachers' knowledge of how to make a conversion from using technology as an instrument for planning materials outside of class to using technology as an educational utility with which students are engrossed (Dorfman, 2008).

Factors Affecting Technology Immersion

There are many factors that either contribute to or inhibit the success of technology integration in secondary schools. One examination found that leadership may be the chief component in the accomplishment of integrating technology into the classroom (Baker, 2003). Schools that do not possess administrative leadership having optimistic expectations for computer use, or do not encourage a philosophy of technological propensity, can inhibit full integration in the classroom (Baker, 2003). Additionally, funding has been found to affect the progress of technological advancement in academics (Baker, 2003; Sussman, 2011). Specifically, in a recent survey of band and orchestra directors, Sussman (2011) found that fifty-eight percent of respondents had no budget for technology tools while only two percent had a significant budget of $10,000 or greater.

The manner in which many educators define educational technology places a limited scope on the potential for academic implementation (Okojie, Olinzock, & Okojie-Boulder, 2006; Dorfman, 2008). For maximum effectiveness of the integration of technology within the educational curriculum, teachers should consider technology in relation to actual technological skills and how they can be merged with the (a) learning objectives, (b) methods of instruction, (c) learning style, (d) pace of learning, and (e) assessment strategies relevant to the daily classroom (Okojie et al., 2006). Dorfman (2008) offered an expedient definition of the integration of technology into scholastic settings:

> In a broad sense, technology integration can be described as a process of using existing tools, equipment and materials, including the use of electronic media, for the purpose of enhancing learning. It involves managing and coordinating available instructional aids and resources in order to facilitate learning. It also

> involves the selection of suitable technology based on the learning needs of students as well as the ability of teachers to adapt such technology to fit specific learning activities (p. 25)

Teachers are mostly comfortable with their content area knowledge, however, when it comes to technology, they appear to learn at the same pace, if not slower than students (Gorder, 2008). In many instances of technology integration, teachers are merely offering instruction in how to use the given technology instead of focusing on higher order thinking skills including an expanded knowledge of analyzing information (Gorder, 2008). Sheingold (1990) suggests that the implementation of technology in an educational setting is not about teaching students to operate computers, but about helping teachers to use technology as a tool for learning. As a result, Puentedura (2006) developed a model of technology adoption to help assist teachers in the area of technology integration. Entitled *SAMR*, this model is an acronym for the four levels of immersion from lowest to highest (a) substitution, (b) augmentation, (c) modification, and (d) redefinition. The *SAMR* model can assist teachers in the integration of technology by offering a rubric to judge where new lesson plans may fall in the scale of technological immersion.

Technology Integration Methods

Numerous studies regarding educational technology have focused on quantifying the exact number of computers used or how many classrooms have access to the Internet, as opposed to exploring the method with which technology is integrated (Barron et al., 2003). However, within music education, specific hardware and software for use in the music classroom as well as methods and training on the implementation of these devices have received a great deal of attention in recent years (Criswell, 2011a; Criswell, 2011b; Kuzmich, 2010a; Kuzmich, 2010b;

Kuzmich, 2011; Leong, 2004; Peterson, 2006; Tozier, 2011; Walls, 2011).

While many technological devices are produced with the general population in mind, music pedagogues have found that specific hardware can be useful in music performance classes such as (a) iPads, (b) smart phones, (c) digital cameras, (d) mp3 players, (e) MIDI keyboards, (f) video players, (g) and other peripherals (Peterson, 2006; Criswell, 2011b; Kuzmich, 2010c; Williams & Webster, 2006). Electronic instruments continue to expand in usefulness to secondary school performance courses (Criswell, 2010b; Criswell, 2011b). Video and audio recording appear to be some of the most effective methods of integrating technology into the secondary music performance class. Recording auditions, rehearsals, and concerts can be an effective way to get students to reflect on their performance, thus changing the manner in which assessment is conducted (Kuzmich, 2011a; Criswell, 2012).

Various types of software have been and continue to be developed and enhanced. Pedagogues have found many different categories of software available that could be utilized effectively in music performance classrooms in order to improve musicianship and enhance assessment (Criswell, 2011a; Criswell, 2011b; Kuzmich, 2010a; Kuzmich, 2010b; Kuzmich, 2011a; Leong, 2004; Peterson, 2006; Tozier, 2011; Walls, 2011). These programs include (a) music notation software, (b) play along software, (c) audio editing applications, and (d) digital music software. Utilizing Internet based software in order to videoconference with experts in the field of music can allow teachers to bring authorities into their classrooms that otherwise may not be available in person (Kuzmich, 2011b).

Because students raised in the digital age speak the language of technology very fluently (Kerstetter, 2010), teachers have a responsibility to integrate technology into their instruction to effectively communicate and connect with their students. To these students teachers who were

not raised in an overwhelmingly digital environment speak an outdated language. Therefore, in order for students to be prepared for life in the 21st century, teachers of all academic subjects, including music, should effectively immerse their classrooms in technology. Currently, organizations such as the *Technology Institute for Music Educators* (*TI:ME*) are dedicated to assist music educators in implementing technology for the benefit of classroom instruction and student learning (Kuzmich, 2010b). Thus, the music education profession considers technological integration within the music curriculum as important and has allocated resources to provide music educators the tools needed to enhance the quality of their music instruction.

Summary

There are many aspects that either contribute to or hinder the effective and proper integration of technology into classrooms. These factors include (a) teacher attitudes, (b) administrative support, (c) funding, and (d) teacher training. While technology in and of itself is not substantial to the quality of education, the manner in which educators employ digital technology into classroom learning is paramount to the enhancement of a given scholastic atmosphere. Specifically, music educators have been found to utilize (a) play-along technology, (b) music notation software, (c) digital metronomes and tuners, and (d) recording technology within their classrooms. However, there appears to be a lack of consensus regarding which are the most common forms of technology used within the music classroom.

Therefore, the purpose of this study was to examine how high school and middle school band directors in the state of North Carolina currently implement technology into their band programs. Specific questions to be addressed were:

1. What types of technology do band directors currently use in their band rehearsals?

2. What types of technology do band directors feel are the most common and beneficial to band rehearsals?
3. What types of technology would band directors like to have access to given unlimited resources?
4. How adequately prepared do North Carolina band directors feel to integrate technology into their band rehearsals?

CHAPTER THREE

METHOD

Participants

Selection of participants for this study involved identifying middle school and high school band directors in the state of North Carolina. The participants were selected based on their membership in the North Carolina Bandmasters Association and maintaining an active email address. Therefore, a total of 489 band directors, including 221 middle school and 268 high school directors, were selected as potential participants.

Materials

A questionnaire was designed to investigate the respondents' integration of technology in the classroom from a qualitative and quantitative approach (see Appendix A). The survey began with three demographic questions, which asked respondents (a) if their primary teaching responsibility was middle school or high school, (b) whether the community of their school would be considered rural, urban, or suburban, and (c) to indicate years of music teaching experience. Following these inquiries, respondents were asked to rate their comfort level with teaching using technology on a Likert-type scale (1= *not comfortable at all* to 5 = *very comfortable*). Finally, respondents were presented with four open-ended questions asking what types of technology band directors (a) currently use, (b) would like to be able to use given unlimited resources, (c) find the most common, and (d) find the most useful for performance-based classes. This allowed each respondent the liberty to interpret each question individually and to answer each question without the bias of predetermined answers (Dorfman, 2008; Baker,

2003). In order to reach a large number of potential participants, Qualtrics, an online survey software, was used to create and distribute the survey (Qualtrics, Version 1.0).

Procedure

Following the initial construction of the survey, a pilot study was conducted in order to determine any problems or limitations with the survey and/or the online survey software. Four collegiate music education faculty members and two band directors from outside the state of North Carolina were asked to complete the survey and offer any feedback. From this pilot, no changes were made to the survey.

The questionnaire was placed on the Qualtrics website (www.ecu.edu/ecusurvey) and a direct link to the survey was created. An email containing an invitation to participate in the study, and a direct hyperlink to the survey, was sent to all participants (see Appendix B). There were no specific instructions other than asking the participants to complete the survey. Because of the range of qualitative and quantitative questions asked, no time limit was given to complete the survey.

Data Analysis

This study represented a mixed-methods approach to examine how high school and middle school band directors in the state of North Carolina currently implement technology into their band programs. Data was analyzed both quantitatively and qualitatively in order to accurately evaluate the participants' responses. Frequency of responses were reported as percentage data as well as depicted graphically in four figures. Additionally, open-ended responses were grouped into a taxonomic structure based on themes that emerged from the data.

CHAPTER FOUR

RESULTS

Out of the initial 489 band directors selected as potential participants for this study, one hundred twenty-nine band directors ($N = 129$) completed the survey, yielding a 26.4% response rate. Specifically, the sample consisted of middle school ($n = 67$) and high school ($n = 62$) band directors. Respondents were asked to categorize the setting of their school as urban, suburban, or rural. Band directors in urban settings comprised 19% ($n = 24$) of the sample, 51% ($n = 66$) were rural, and 30% ($n = 39$) were suburban. The respondents were asked to indicate years of music teaching experience. Teachers indicating zero to ten years of experience consisted of 45% ($n = 58$) of the sample, 33% ($n = 43$) had eleven to twenty years of teaching experience, and 22% ($n = 28$) had twenty-one or more years of experience.

Next, respondents were asked to rate their level of agreement with the statement, "I feel adequately prepared to teach using technology" on a Likert-type scale (1= *strongly disagree* to 5 = *strongly agree*). Respondents affirming their agreement with the statement comprised 76% of the directors with 69 respondents agreeing and 29 strongly agreeing, respectively. Only 19 respondents, or 15% disagreed or strongly disagreed, with 9% neither agreeing nor disagreeing with the statement.

To examine the open-ended questions, a previously established qualitative approach was used in which responses were grouped into a taxonomic structure based on themes that emerged from the data (Juchniewicz, 2010; Kelly, 2000; Madsen & Kelly, 2002). The data was independently analyzed by the principle investigator and grouped according to similar categories. Next, the data was given to an expert in technology who reviewed the principle investigator's

classification of the responses. Based on the recommendations the data was revised until the categories were agreed upon by both the principle investigator and the technology expert. Finally, an outside observer trained in both qualitative and quantitative research techniques, viewed a random selection of 20% of all responses and placed each response into the established categorization structure. Reliability was found to be .77 by counting the number of identical response classifications and comparing the two lists using the formula agreements divided by the sum of agreements plus disagreements (Madsen & Madsen, 1998).

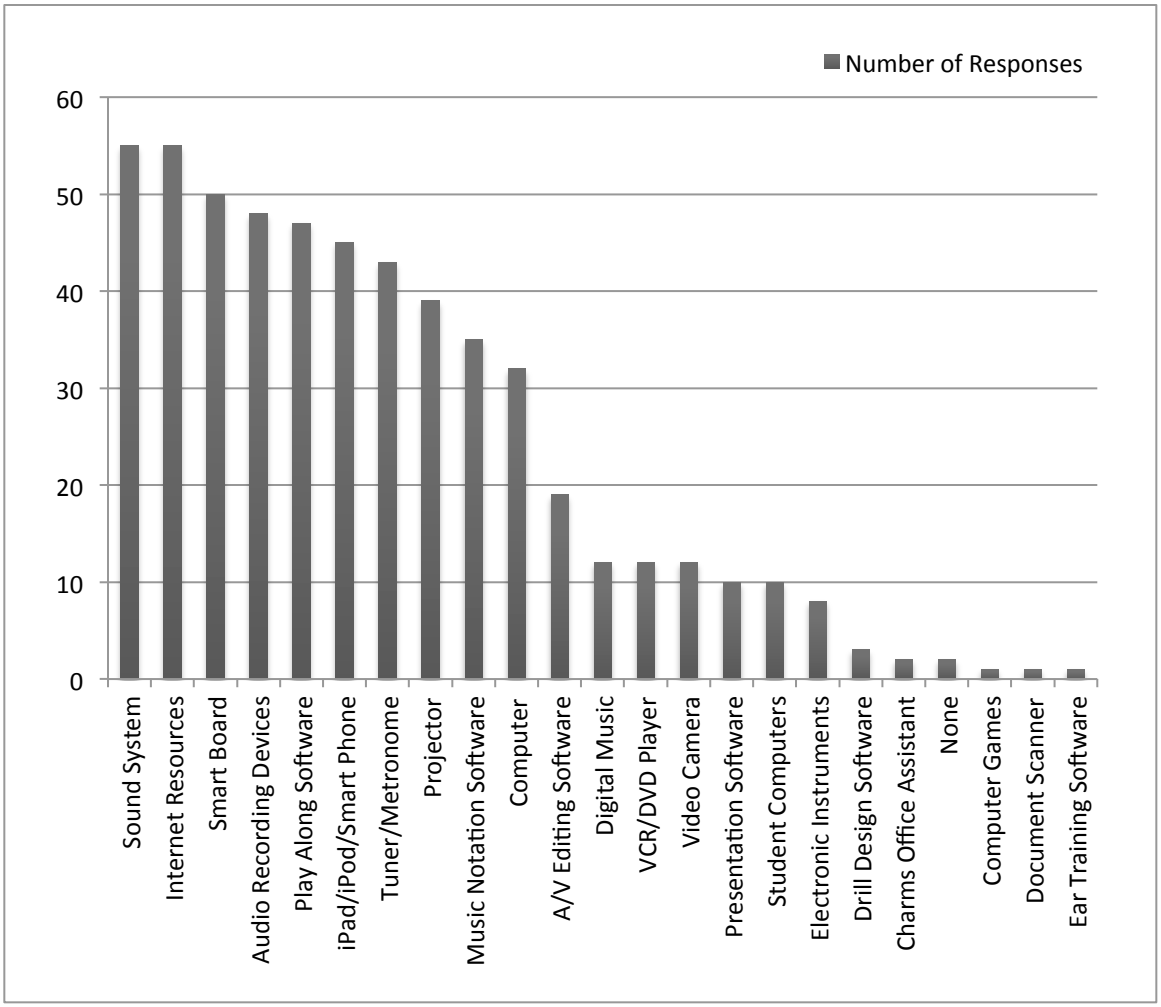

Figure 1. Response frequency for specific types of technology currently used in band rehearsals.

From the first open-ended question, which asked directors to list the specific types of technology currently used with their band, analysis of the data revealed consistencies in the responses of both middle and high school directors (see Figure 1). "Proper Sound System Equipment," "Internet Resources," "Smart Board," "Audio Recording Devices," and "Play-Along Software" were the top five most frequently listed responses, respectively. Among the least frequently listed responses were "Ear Training Software," "Document Scanners," "Computer Games," and "None."

The second open-ended question asked directors to list what types of technology resources they would like to be able to use given unlimited resources (see Figure 2). The top five most frequently listed responses were, "Play-Along Software," "Music Notation Software," "Tablet Computers or other smart devices," "Smart Board and Peripherals," and "Audio Recording Devices."

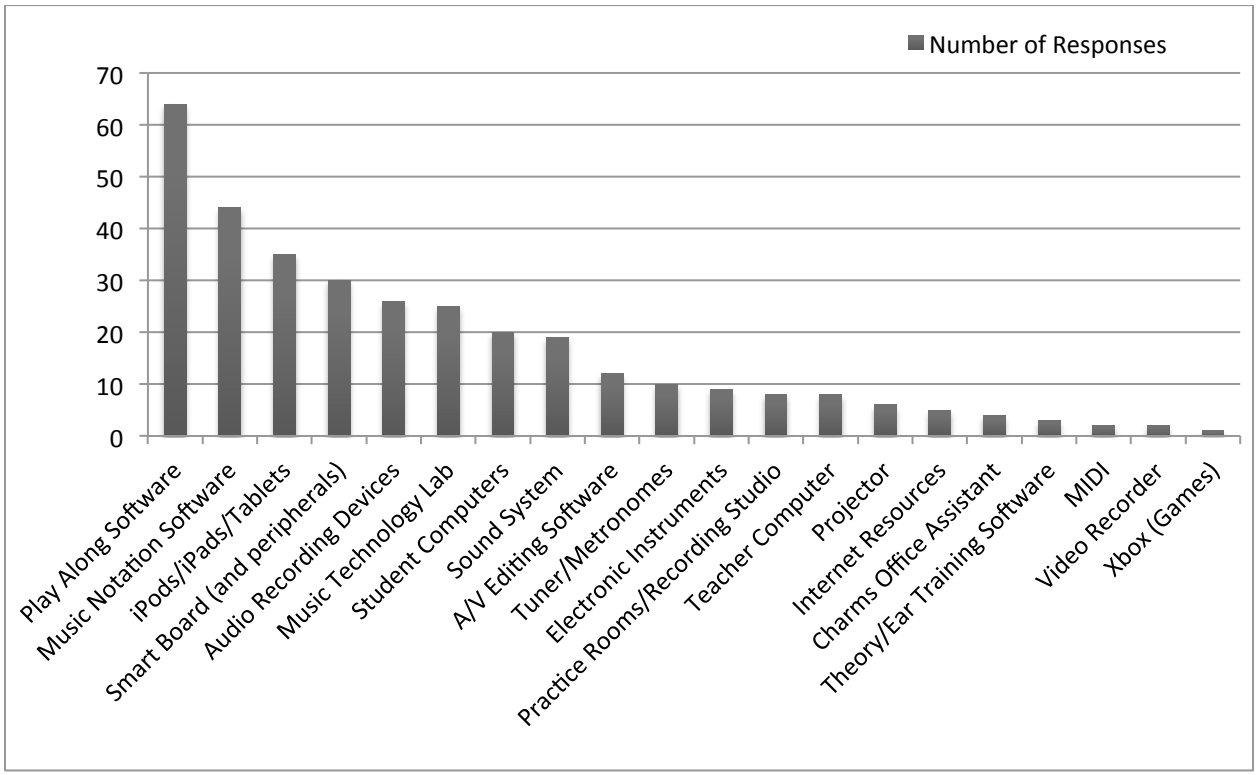

Figure 2. Response frequency for specific types of technology directors would like to be able to use given unlimited resources.

Participants were asked to indicate what they feel are the five most common types of technology available for bands, revealed consistent themes among responses of band directors (see Figure 3). The categorization of participant responses revealed that "Tuners and Metronomes," "Proper Sound System Equipment," "Play-Along Software," "Audio Recording Devices," and "Music Notation Software" were listed as the top five most common types of technology available for bands.

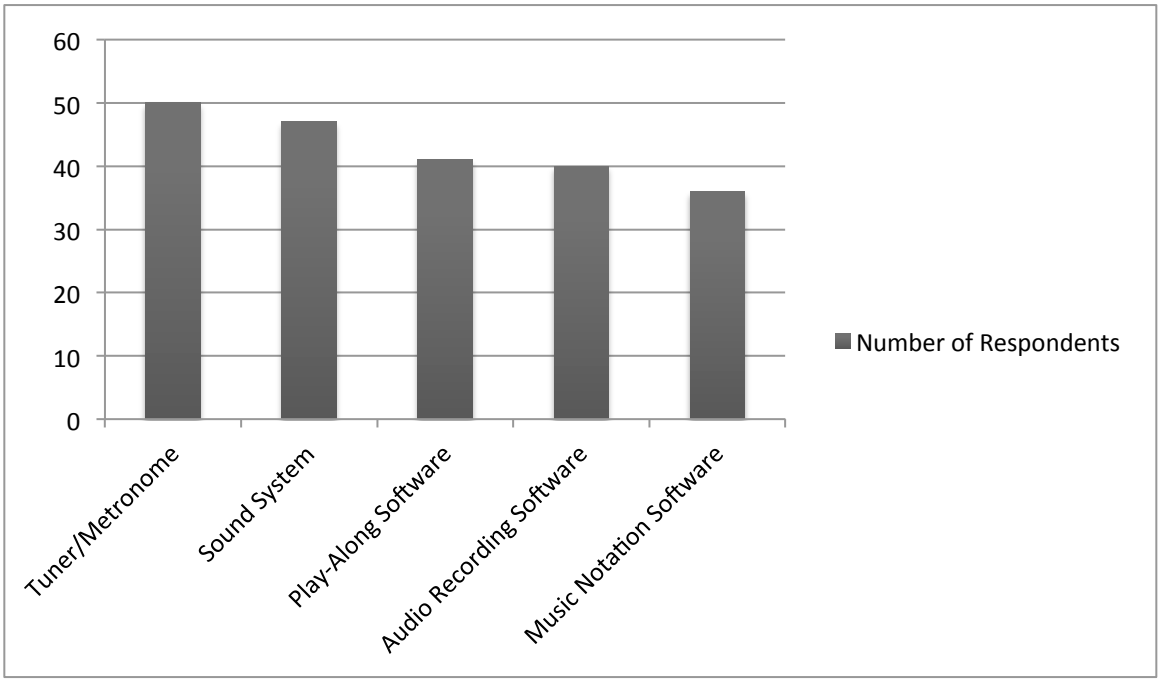

Figure 3. Top five most common types of technology available for bands.

Finally, respondents were asked to list what they feel are the five most beneficial types of technology available for bands (see Figure 4). "Play-Along Software," "Audio Recording Devices," "Music Notation Software," "Tuners and Metronomes," and "Smart Boards" were listed as the top five most beneficial types of technology available for bands, respectively.

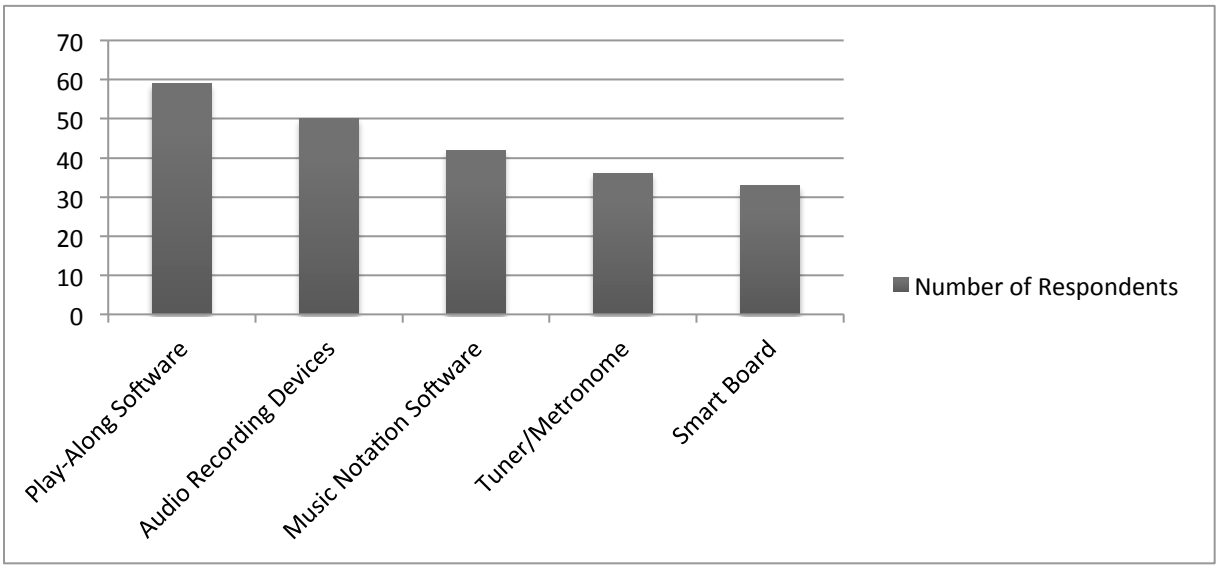

Figure 4. Top five most beneficial types of technology available for bands.

CHAPTER 5

DISCUSSION

Purpose Statement

The purpose of this study was to examine how high school and middle school band directors in the state of North Carolina currently implement technology into their band programs. Specific questions to be addressed were:

1. What types of technology do band directors currently use in their band rehearsals?
2. What types of technology do band directors feel are the most common and beneficial to band rehearsals?
3. What types of technology would band directors like to have access to given unlimited resources?
4. How adequately prepared do North Carolina band directors feel to integrate technology into their band rehearsals?

Discussion

While analysis of the data revealed some similarities among North Carolina band directors, many of the responses were widely varied due to the open-ended nature of the survey instrument. Still, the data disclosed certain trends in all four of the open-ended questions. In response to what types of technology band directors currently use in their band rehearsals, 43% responded with some type of sound system equipment that allowed their students to listen to quality music or even listen to themselves playing in order to self-assess their own performance. Forty-three percent also responded they use Internet resources or web sites in their rehearsals.

Additionally, 39% of directors stated they use a smart board or interactive white board with their bands. Further, audio recording devices and play along software such as Smart Music and Band-in-a-Box followed with 37% and 36% of the respondents, respectively. These findings illustrate that four of the five most frequently listed types of technology currently in use are teacher-driven for use in the classroom as opposed to student-driven usage. These results concur with Gorder (2008) who found often teachers merely use technology for professional efficiency or enabling them to deliver instruction more effectively. While it is important to remember all uses of these technologies are designed to aid in student learning, these results show that only a limited number of these types of technology allow the students to have a personal hands-on opportunity to work with them. In direct contrast to these findings, Dorfman (2008) suggests technological professional development in music education should focus on effective ways to integrate technology into the classroom where students are actively engaged in using the technology as opposed to teachers solely relying on technology to facilitate more effective instructional delivery. More specifically, Reese and Rimington (2000) have postulated that "instructional models should include direct student use of computers for music learning even though student access to computers in music remains quite limited" (p. 32). However, it appears the findings of the present study conflict with Reese and Rimington's conclusions, as technology utilized by band directors involved technology other than computers.

The next question asked participants to identify what they felt were the top five most common or most used types of technology in music education. Analysis of the data revealed that band directors are the most knowledgeable of (1) tuners and metronomes, (2) proper sound system equipment, (3) play-along software, (4) audio recording devices, and (5) music notation software. This corresponds with the data from the first open-ended question, which states that

these technology items are among the top nine cited types of technology currently used by band directors in their classroom. The participants were also asked to distinguish what they believe to be the most beneficial types of technology for music education. The frequency of responses indicated that (a) play-along software, (b) audio recording devices, (c) music notation software, (d) tuners and metronomes, and (e) smart boards were listed as the top five most beneficial types of technology available for bands. These findings concur with Leong (2004) and Peterson (2006) who concluded the effectiveness of play-along software and music notation software are valuable to a more enhanced learning environment for music students.

The third question of the present study asked band directors to list the types of technology they would like to use given unlimited resources. Fifty percent of respondents indicated that a variety of play along software such as Smart Music or Band-in-a-Box would be in their ideal technological classroom. Music notation software was listed by 34% of the respondents as a type of digital technology they would like to have in their classrooms. Smart devices such as iPods, iPads, and other tablets were the third most frequent response among band directors garnering 27% of all responses. Smart boards and audio recording devices followed with 23% and 20% of the responses, respectively. In contrast with the findings of the first research question, these data show that band directors would prefer to use technological devices that are more student-driven, if given unlimited resources. These findings concur with Sussman (2011) who found Smart Music, smart devices, and audio recording devices were among the most frequently listed responses regarding technological advancements that would be beneficial to music classrooms. Additionally, the results of the present study are consistent with Leong (2004) who concluded that smart boards, music notation software, and play-along software were effective in music classes. Thus, the data from the present study are encouraging as they indicate

North Carolina band directors are knowledgeable of what types of technology can be effective if utilized properly in rehearsals.

Finally, participants were asked to rate how adequately prepared they feel they are to teach using technology. Seventy-six percent of respondents stated they did feel adequately prepared to utilize technology in their classrooms. While research has shown that general educators are skeptical of the immersion of technology because of (a) knowledge, (b) comfort level, (c) constant changes in technological advancement, (d) lack of training, and (e) frequency of use (Mark, 1996; Bauer et al., 2003, Collier et al., 2004), it is encouraging to note the band director participants in the present study felt adequately prepared to integrate technology into their music classroom. Further, while researchers have also indicated technology usage has not always focused on improving classroom instruction for the benefit of student learning (Baker, 2003; Dorfman, 2008; Barron, et al., 2003), it is important to note the results of all four questions in this study show band directors have selected types of technology that are student-centered and are employed to increase student performance in the classroom.

Limitations of the Study

This study was restricted to a specific state and population of music teachers; therefore, it is difficult to make generalizations of the data outside of North Carolina band directors. Additional research could expand to include a larger and more diverse population in order to compare this study to findings from various populations including administrators, students, and other music teachers. Additionally, the research questions lacked information concerning teachers' perceptions on the need of appropriate resources, including professional development. Lack of specificity regarding technological devices also limited the responses. Further, since

individuals appear to differ on specific definitions of digital technology and what actually qualifies as computer digital technology, future research should include a more clear definition of technology in order to achieve more clarity in the responses from the participants.

Implications of the Findings

The findings indicate that band directors in the state of North Carolina are knowledgeable of technological enhancements that could advance their instruction in the classroom. The respondents also indicated there is an overall desire for technology to be applied to band rehearsals. Therefore, if directors (a) want to utilize technology, (b) are knowledgeable about technology, and (c) appreciate the overall benefit to the students, then as a profession the advancement of technological integration should be a priority. Based on the conclusion from the present study and previous research, given (a) adequate funding, (b) administrative leadership, (c) time, (d) support, (e) access to resources, and (f) applicable professional development, the appropriate implementation of technology should be pursued in order to enhance the quality of music education for our students (Barron et al., 2003; Baker, 2003; Dorfman, 2008; Cooper, 2004; Criswell, 2011a; Sussman, 2011; Walls, 2011).

Recommendations for Future Research

In light of the findings from the present study, continued investigations into technology integration in the music classroom is needed. Given the present study was limited to examining middle and high school band directors, further research is necessary to determine the opinions of orchestra, choir, general music, and elementary teachers as to how effective technology can be in their classrooms. Additionally, the opinions of music students and principals could warrant

additional research from a different perspective of the integration of technology in music classrooms. Moreover, while the present study attempted to investigate band directors perceptions of the implementation of technology in the classroom, examining whether technology enables music educators to deliver their instruction more effectively, could provide valuable insight into the effectiveness of technology integration. Obviously, future research into all aspects of technology integration is warranted.

APPENDIX A

IRB APPROVAL LETTER

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
1L-09 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office 252-744-2914 · Fax 252-744-2284 · www.ecu.edu/irb

Notification of Exempt Certification

From:	Social/Behavioral IRB
To:	Michael Henderson
CC:	Jay Juchniewicz
Date:	2/8/2012
Re:	UMCIRB 12-000103 An examination of the implementation of technology in secondary school bands

I am pleased to inform you that your research submission has been certified as exempt on 2/8/2012. This study is eligible for Exempt Certification under category #2.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B

QUESTIONNAIRE

1. Do you currently teach in a middle school or high school?
2. Would you consider the community of your school to be rural, suburban, or urban?
3. How long have you been teaching?
    a. 0-10 years
    b. 11-20 years
    c. 21-30+ years
4. Using the Likert scale below, please select how much you agree or disagree with the following statement: I feel adequately prepared to teach using technology.
    a. Strongly Disagree
    b. Disagree
    c. Neither Agree nor Disagree
    d. Agree
    e. Strongly Agree
5. What specific types of technology do you currently use in your band rehearsals?
6. Given unlimited resources, what types of technology would you like to be able to use in your band rehearsals?
7. Please list what you feel are the five (5) most common types of technology available for bands.
8. Please list what you feel are the five (5) most beneficial types of technology available for bands.

APPENDIX C

EMAIL INVITATION

Dear North Carolina Band Director,

You are being invited to participate in a study that will investigate the implementation of technology in your classroom. Your involvement will simply consist of completing an online survey accessible by clicking on the link located at the bottom of this e-mail. No personal identifiers will be asked for and your responses will remain completely anonymous.

While there are no foreseeable risks to participating in this study, potential benefits may include an increased understanding of the specific technology uses and resources available to band directors. Results of this study will be made available upon completion of the investigation. Participating in this study is voluntary and you will not receive any monetary compensation for participation in this study. By clicking on the link below, you give your voluntary consent to participate in this survey.

https://ecu.qualtrics.com/SE/?SID=SV_bNja3cSztgQLyAI

Thank you for your consideration,

Michael Henderson

REFERENCES

Baker, D. C. (2003). *Make it so: How low-resourced school districts implement a Virginia state mandate to prepare K-12 teachers to integrate technology into the classroom*. (Unpublished doctoral dissertation). Virginia Polytechnic Institute and State University, Blacksburg, VA.

Barron, A. E., Kemker, K., Harmes, C., & Kalaydjian, K. (2003). Large-scale research study on technology in K-12 schools: Technology integration as it relates to the national technology standards. *Journal of Research on Technology in Education*, *35*(4), 489-507.

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

Collier, S., Weinburgh, M. H., & Rivera, M. (2004). Infusing technology skills into a teacher education program: Change in students' knowledge about and use of technology. *Journal of Technology and Teacher Education*, *12*(3), 447-468.

Cooper, L. G. (2004). *Teaching band & orchestra: Methods and materials*. Chicago: GIA Publications.

Criswell, C. (2010a). Making a music lesson out of online research. *Teaching Music*, *18*(3), 26-27.

Criswell, C. (2010b). The creative benefits of electronic marching. *Teaching Music*, *18*(2), 26-27.

Criswell, C. (2011a). Free software for budget-challenged music programs. *Teaching Music*, *18*(6), 26-27.

Criswell, C. (2011b). Technology on the horizon. *Teaching Music*, *18*(5), 30-35.

Dorfman, J. (2008). Technology in Ohio's school music programs: An exploratory study of teacher use and integration. *Contributions to Music Education, 35*, 23-46.

Gorder, L. M. (2008). A study of teacher perceptions of instructional technology integration in the classroom. *The Delta Pi Epsilon Journal*, *L*(2), 63-76.

Juchniewicz, J. (2010). The influence of social intelligence on effective music teaching. *Journal of Research in Music Education*, 53, 276-293.

Kerstetter, K. (2010). Instructional blogging in the general music room. *General music today*, *24*(1), 15-18.

Kirk, S. (2006). Random access: Do music teachers have a responsibility to teach with technology? *American Music Teacher, 56*(1), 72-73.

Kuzmich, J. (2008). Creative alternatives for non-traditional music classes. *School Band and Orchestra*, *11*(5), 48-55.

Kuzmich, J. (2010a). Three tech winners for music ed. *School Band and Orchestra*, *13*(4), 40-44.

Kuzmich, J. (2010b). TI:ME seminars: Diving into technology. *School Band and Orchestra*, *13*(5), 52-55.

Kuzmich, J. (2010c). Using smart phones for music education. *School Band and Orchestra*, *13*(6), 38-42.

Kuzmich, J. (2011a). Reality TV: Using portable digital video recorders. *School Band and Orchestra*, *14*(8), 48-53.

Kuzmich, J. (2011b). The ALIVE project and you. *School Band and Orchestra*, *14*(3), 40-45.

Leong, T. (2004). Music makers: Technology - using technology as a vehicle to enhance musical performance. *Canadian Music Educator, 46*(1), 30-33.

Levin, T., & Wadmany, R. (2006). Teachers' beliefs and practices in technology-based classrooms: A developmental view. *Journal of Research on Technology in Education*, *39*(2), 157-181.

Littrell, A. B., Zagumny, M. J., & Zagumny, L. L. (2005). Contextual and psychological predictors of instructional technology use in rural classrooms. *Educational Research Quarterly*, *29*(2), 37-47.

Madsen, C. K., & Madsen, C. H., Jr. (1998). *Teaching/discipline: A positive approach for educational development* (4th ed.). Raleigh, NC: Contemporary Publishing.

Mark, M. L. (1996). *Contemporary music education* (3rd ed.). New York: Schirmer Books.

Mark, M. (2007). MENC from 1957 to 1982: Music education against the backdrop of the Cold War, the struggle for civil rights, and emerging technology. *Journal of Historical Research in Music Education, 28*(2), 127-139.

North Carolina Department of Public Instruction (2009). *North Carolina Teacher Evaluation Process*. Retrieved from http://www.ncpublicschools.org/.

North Carolina Department of Public Instruction (2011). *North Carolina essential standards grades 9-12: Information and technology essential standards.* Retrieved from http://www.ncpublicschools.org/.

Okojie, M., Olinzock, A. A., & Okojie-Boulder, T. C. (2006). The pedagogy of technology integration. *Virginia Tech Digital Library and Archives*. Retrieved from http://scholar.lib.vt.edu/ejournals/JOTS/v32/v32n2/okojie.html

Peterson, H. (2006). Technology tips and tricks for music educators. *General Music Today, 19*(3), 36-43.

Puentedura, R. R. (2006). Transformation, Technology, and Education. *Hippasus*. Retrieved January 2, 2012, from http://hippasus.com/resources/tte/

Qualtrics Software. (2011). (Version 1.0) [Online Software]. Retrieved from http://www.ecu.edu/ecusurvey.

Reese, S., & Rimington, J. (2000). Music technology in Illinois public schools. *Update: Applications of Research in Music Education*, *18*(2), 27-32.

Sheingold, K. (1990). Restructuring for learning with technology. The potential for synergy. In K. Sheingold & M. Tacher (Eds.), *Restructuring for learning with technology* (pp. 9-27). New York: Center for Technology in Education.

Sussman, E. (Ed.). (2011). Game-changing technology. *School Band and Orchestra, 14*(4), 32-34.

Tozier, B. (2011). Make TI:ME in your classroom. *TI:ME Technology Institute for Music Educators*. Retrieved November 14, 2011, from http://www.ti-me.org/index.php/publications-a-resources/imho/21-make-time-in-your-classroom

Walls, K. (2011). Starting with technology in school music. *TI:ME Technology Institute for Music Educators*. Retrieved November 14, 2011, from http://www.ti-me.org/index.php/publications-a-resources/imho/78-starting-with-technology-in-school-music

Williams, D. B., & Webster, P. R. (2008). *Experiencing music technology* (Updated 3rd ed.). Belmont, CA: Schirmer Cengage Learning.