Current Trends of Educational Technology in Band Rooms in Southeastern North Carolina

Prepared by:
Charles A. Dumas, Jr.

In partial fulfillment of the requirements for the Master of Arts in Music Education

Approved by:

Thesis Advisor	Date 4-12-10
Thesis Committee Member	Date 4/8/10
Thesis Committee Member	Date 4/12/10
Thesis Committee Member	Date 4/12/10
Dean of Graduate Studies	Date 5-3-10

Table of Contents

Page

Abstract

This thesis will examine ways in which band directors in high schools and middle schools in southeastern North Carolina utilize technology in their educational settings to improve student performance and achievement. Educational settings will include but are not limited to band rooms, practice areas, and performance venues. In the current educational climate band directors must become innovative and develop their use of technology based on the standards established by the North Carolina Department of Public Instruction. Successful lesson plans that incorporate technology should be made accessible to all band directors so that no teacher should be without the tools necessary for an optimal learning experience for their students. Band directors throughout southeastern North Carolina will be asked to complete a survey that will help to determine which forms of multimedia technology are being implemented with the emphasis centered on audio, video, and computer based resources. Both audio technology and video technology will include devices used to record and play back media in both analog and digital forms. Computer based resources will include hardware, software, internet applications, and information management. Factors impacting technology implementation include the types of multimedia resources available to the band director. Funding sources for the technology used, the availability of sufficient professional development opportunities that address music related technology will also be examined. How the director is supported financially and the amount of that support is a key factor in the purchase and maintenance of technology. Annual budgets for technology and the professional development to help use that technology may be funded by booster programs, school administration, local education agencies, and the band director themselves may also be a possible financial resource. Each band program and director implements technology in a different manner based on the respective situation, experience, and knowledge of the band director or the media specialist located in their school. Professional development for music related technology is generally not offered as a standard class for staff development which necessitates directors using a tactile learning method. With the advent of more rigorous standards for the use of technology proper training should be offered to enhance teacher performance.

Chapter 1

Introduction

Technology in the 21st century classroom has served to facilitate the music education process, while at the same time providing many new challenges. Instant access to information and resources has put the world at the fingertips of students and teachers alike. That same technology can be seen as an insurmountable obstacle to professionals in the field of education if they possess limited experience with or knowledge of the current trends in technology and the implementation of technology in their classrooms.

Information found on the website for the North Carolina Department of Public Instruction (NCDPI) has stated that:

> "Students use technology in a variety of ways as a tool for exploring music. Compact disc, cassette, and video recordings help bring the world of music into the classroom, allowing students to see and hear the wide scope of music literature that exists, and introduce students to people and events that have shaped music history. Video and audio recordings are used to help students note their own development and evaluate their progress. The internet, electronic musical instruments, and computer software and hardware provide students with the opportunity to study music in many ways including researching, practicing skills, composing, arranging, orchestrating, and publishing musical works." (North Carolina Standard Course of Study, 2010)

Technology should be viewed as a resource that facilitates instruction and helps to improve student performance. Music educators, in this case specifically band directors,

already employ technology in different forms as part of their daily teaching, but there are many new resources for new technology, professional development, and funding that should be made available to them regardless of school size, teaching experience, and economic disposition of the school.

For the purpose of this research project, technology will be divided in to the sub-categories of audio technology, video technology, and computer technology. The means in which band directors currently employ these forms of multimedia will be examined, to include what forms of media are being used, the source of funding for the technology, and the possible impact upon student learning. Another goal of this research is to provide information to those directors who wish to expand their knowledge of the acquisition of new, or upgrading existing technology and resources for the implementation of technology in the classroom. An area that the research will examine is the professional development resources available to the band director, both within their school and district as well as outside resources.

Audio technology is categorized as either digital or analog for the purposes of recording and playback. While the teaching profession still employs analog media in limited capacities, the commercial world has embraced digital media to the level that almost all forms of analog technology are not readily available in the marketplace. While albums and cassette tapes are still used in classrooms the research will examine to what extent they have been replaced by Compact Discs (CD) and digital media. Digital audio devices provide the educator with equipment that is smaller in size and therefore highly portable while the quality of sound produced is substantially improved. Just as audio media is divided into analog and digital, so too is video technology. Videocassette Recorders (VCR) and tape operated video cameras have been replaced by mini-Digital Versatile Disc (DVD) recorders and Hard Disc Drive (HDD) recorders which save video

directly to a hard drive. Media recorded digitally can be uploaded directly to computers, often requiring no additional editing software, so that videos can be uploaded directly to the internet or enhanced with software designed for that purpose.

If the last twenty-five years of the twentieth century is known as the age of information, or technology, then the twenty-first century can be arguably considered as the beginning of the digital age. Computers and computer driven technology have had the greatest impact on the field of education both in the classroom and in the market place. Gone are the antiquated media devices such as reel-to-reel or filmstrip projectors, only to be replaced today by SMART Board interactive white boards and Liquid Crystal Display (LCD) projectors which are driven by desktop and laptop computers. The World Wide Web (WWW) has allowed virtually unlimited access to infinite forms of information, regardless of age, knowledge, or level of education. The challenge for educators is attempting to stay current with the both the technology available and how it can be applied in their classrooms.

In education, the concept of equal resources and equal funding for all students is the desired outcome, but not necessarily the reality. Site based decision-making and inadequate local, state, and federal funding places educators in positions of funding their own programs, either through booster organizations or from their own personal resources. Because of this disparity there are varying levels of technology and multimedia available not only on a school by school basis but also on a local education agency level. Larger school systems, which typically have a substantially larger technology budget, may encourage the implementation of technology in their schools while smaller school systems may not have the same level of resources available, meaning the students in smaller systems may not be given the same opportunities. Also, the

emphasis that a school administration places upon technology plays a major role in the funding and support that a school or teacher receives.

Professional development in education generally focuses on student attendance software, grading software, or information management software. Technology designed for use in a music classroom is typically very user specific and as a result the professional development for music educators is limited. Fiscally it is not in the best interest of a school to provide a professional development course for one or two teachers for the same cost as providing a course for an entire staff. As a result, band directors are often forced to teach themselves or to contact other band directors in the hope that their colleague might have the necessary information that is needed or sought. Most professional resources for band directors can only be found at larger events such as state music conferences or courses offered at the college and university level.

The ultimate goal of the research found in this thesis is to provide a necessary resource for band directors who choose to employ technology in an effort to enrich student learning. Technology is a constantly changing entity and as such, no educator can hope to stay current but we should make every effort to provide as comprehensive base of knowledge as possible.

Chapter 2

Literature Review

The focus of this research is to determine how band directors are utilizing available and appropriate technology and if that technology is beneficial to student performance. The review of current literature will be organized in to three sections, each focusing on a separate question. After an initial explanation of the role of technology in music education, the first question concerns what types of multimedia technology is available to the band director and how that technology is used to meet the North Carolina Standard Course of Study. The second question concerns what financial and material resources are available to the band director. The third question relates to the band director and how they are able to receive training or professional development for the technology in their classroom. Being in possession of the most current materials and having adequate funding is not effective if the educator is not themselves proficient in the use of technology and can pass that information along to students.

In his book *Teaching Music with Technology* Thomas E. Rudolph states, "The place and purpose of technology in music education must be found before beginning to properly apply technology." (Rudolph T. E., 1996, p. 6) While Rudolph's book was published over 14 years ago, the basic tenants described still have value. Using technology without a desired outcome belittles the advantages that can be gained through proper uses of multimedia and as a result, "Teachers have found that technology can enhance cross-curricular teaching, hands-on learning, cooperative learning, independent study, and higher level thinking skills as well as provide an excellent assessment tool." (Rudolph T. E., 1996, pp. 6-7) Technology has the ability to give

band directors new opportunities to reach students at a level that the students can both understand and are extremely comfortable.

According to Rudolph, "Technology devices are either passive or interactive. A passive device merely plays music or displays information." (Rudolph T. E., 1996, p. 5) Building upon that statement technology such as cassette players, CD players, digital audio devices (MP3 players), television, VCRs, and DVD players would all be considered passive devices. Although the use of passive technology is not considered an ideal source of student learning, "With passive devices, the student perceives the material but there is no interaction with the device or medium." (Rudolph T. E., 1996, p. 5) If a band director uses a CD player to present a musical example for students they have not only used technology in their classroom but also have met the state and national teaching standards goal 6 which involves "Listening to, analyzing, and describing music." (North Carolina Standard Course of Study, 2010) Examples of interactive devices include "playing a video game and using a computer." (Rudolph T. E., 1996, p. 5) In most educational instances the term technology is generally referring to computers and computer related devices which provide a high level of interaction between the student and the device. While both passive and interactive technology is a useful resource to the educator, "We know from experience and years of educational research that interactive learning is much more effective than passive learning." (Rudolph T. E., 1996, p. 5)

A very innovative use of technology, coupled with tactile instruction, can be found in the *Music Education Technology Magazine* article "Marching to a Different Drum" by Debra Barbre. One focus of this article is the use of digital instruments and amplification by the indoor percussion ensemble at Center Grove High School, Greenwood, Indiana. Indoor percussion is a competitive organization that is under the auspices of Winter Guard International (WGI), an

organization which focuses on the color guard and marching drum lines and provides a national competitive outlet for these groups. At Center Grove High School the 2005 indoor percussion show involved the use of "Roland electronic drum pads mounted on marching harnesses . . . transmitted through Sennheiser wireless systems" (Barbre, 2006, p. 14) and the electronic signal was then amplified through an audio sound system. This marked one of the first instances where performers marched in this type of competition using electronic instruments. Electronic instruments such as guitars and keyboards had been use in years past as part of the stationary front ensemble. According to the directors, "Technology . . . has to be musical and enhance the musical idea of the show. Electronic drums are never used gratuitously." (Barbre, 2006, p. 14) The article by Barbre exemplifies the concept of technology use and how it can enhance student learning, which is part of the basis for this research.

The adoption of the CD as the first accepted media for digital music had far ranging affects in both the music world and the computer world, "In the early 1990's, personal computer companies . . . saw the potential of audio applications, and began to develop affordable consumer machines that included CD-ROM devices" (Kusek & Leonhard, 2005, p. 4) Development of the CD-ROM (Read-only Memory) drive coupled with advances in the computer world that included the microprocessor helped to make the personal computer both portable and affordable. As found in *Electronic and Experimental Music* by Thom Holmes, "A microprocessor is a programmable integrated circuit. It contains all of the basic functions of a Central Processing Unit (CPU) on a single chip." (Holmes, 2008, p. 272)

David Kusek and Gerd Leonhard in *The Future of Music* propose that, "Just about every new transformative technology was fought, tooth and nail, until it could no longer be contained, discredited, or sued out of existence, and only then it was reluctantly embraced." (Kusek &

Leonhard, 2005, p. 140) Just as it is in the music industry, technology follows a similar history in the field of education. With the rapid development of the computer industry, coupled with the growth of the Internet, students are able to access information at a level never before seen in history. Education must look to find new ways of reaching today's children, new ways that will engage and interest students. David Bowie in a *New York Times* article in 2002 best describes the music industry, and technology and education as well:

> The absolute transformation of everything that we ever thought about music will take place within ten years, and nothing is going to be able to stop it. I see no point in pretending it's not going to happen. . . . Music itself is going to become like running water or electricity. [. . .] It's terribly exciting. But on the other hand it doesn't matter if you think it's exciting or not; it's what's going to happen . . . (Kusek & Leonhard, 2005, p. 3)

With the available access to the World Wide Web (WWW) growing on a national scale, there now exists a possible means for both communication and learning that is highly utilized by students. In the article "Social Media as an Opportunity for Pedagogical Change in Music Education" from the *Journal of Music, Technology, and Education*, Miikka Salavuo proposes the argument that unless institutions of higher learning develop a means to incorporate media and alternative means of learning that students are already using the institutions themselves are at risk of becoming irrelevant to students needs. As stated earlier by Rudolph, interactive learning is the more effective means of teaching using technology. Students are now utilizing Social Networking Platforms (SNPs) as resources for music in both an educational setting and also a social setting. Because students utilize the WWW both to communicate and as a resource for

learning and media sharing, music educators must find ways to incorporate this technology in their classroom in order to actively engage their students.

An application of computers in the band room that has potential for growth is the use of computers and related software for ear-training and music theory. In "Music Theory and Ear-training Tools," Tom Rudolph provides information that is applicable to not only theory and ear-training but to all software and computer use. Ear training and music theory abilities can be enhanced through current technology and the research will examine the level of technology being used to develop and improve student performance in those two areas. Rudolph suggests the first step is choosing the right program, "To determine which one is best for you, start by checking with other music teachers to see which programs they use." (Rudolph T. , 2005, p. 28) Look at the publishers' website and read the documentations and reviews found there to determine if the software is a good fit for this application, "When you find one that appears to suit your needs, download a demo and check it out. Don't buy a program until you have reviewed and approved the content and the lesson structure and are confident that the software has the "right stuff"." (Rudolph T. , 2005, p. 28) A feature of the software that should be considered is student record keeping, tracking the amount of student interaction as well as their performance should be included as part of the program.

Meeting the standards as set by the NCDPI as well as the national standards as prescribed by MENC: The National Association for Music Educators is addressed in Floyd Richmond's article "Music Technology and the National Standards" found in *Music Education Technology Magazine*. MENC: The National Association for Music Educators is an organization that has existed since 1907 as a resource for music educators. The original name of Music Supervisors National Conference was changed to Music Educators National Conference (MENC) and in

1998 changed to the current name. Richmond demonstrates that by using notation software, sequencers, and electronic instruments each of the nine MENC National Standards, and as such the NCDPI standards, can be met. For example:

> The first two national standards state that students will sing and perform on instruments alone and with others. One way to use notation software to accomplish these goals is to have students sing and play with accompaniments that are performed by the computer. (Richmond, 2004, p. 25)

This journal article is a valuable resource for music educators who wish to incorporate technology, in this case computers and notation software in to their existing curriculum. The conclusion of Richmond's article best summarizes the goals for technology use in the music education classroom.

> Although notation and sequencing software and electronic instruments were designed primarily to notate, record, and perform music, they also have educational applications. With these tools, students can create and listen to complex arrangements and compositions and learn about the inner workings of music. Creative teachers will be successful as they identify efficient means of accomplishing tasks so that students do not become overburdened with the complexity of the software. (Richmond, 2004, p. 30)

How music educators, and specifically band directors, acquire technology funding will be examined in the thesis. Music is not a subject that has standardized testing and as a result it is often regarded as a low priority for funding and equipment by school administrators. In the article 'Feeding the Beast" Stephen Wilensky addresses a critical problem facing all educators who use technology, which is how to provide for upgrades to technology that is constantly

evolving. While the material presented in the article is designed for upgrading existing technology, it has many possible applications for the initial purchase of technology as well.

A common dilemma faced by the band director is whether to upgrade the currently used software, or purchase newer, more powerful hardware. In the case of a computer-science lab the funding source is usually the school system or district, if not state funded. "As a result, most computer-science departments do not deal with locating funding streams for new equipment and upgrades; the school district makes these decisions." (Wilensky, Feeding the Beast, 2006, p. 34) Most music labs are the result of grants or donations from individuals or organizations which means the music educator is responsible for searching for funding.

Some of Wilensky's suggestions include contacting computer companies in order to inquire about the possibility of educational discounts or rebates for educators. He suggests maintaining a list of needs and make annual reports to your school principal or school district representative. If there exists a list of original sponsors send them a progress report on their donations, including what use the students have made of their donation. If the technology at the school was obtained through a grant from corporations invite their representatives to do an on-site visit with students actively using the materials that were donated.

Parent organizations in music, such as band boosters, and school wide organizations such as Parent Teacher Student Organization (PTSO) exist to support and enhance the entire school and should not be discounted as a possible funding source. Wilesky's viewpoint of, "Do not be apprehensive about approaching parents for a small grant." (Wilensky, Feeding the Beast, 2006, p. 36) is very sound advice and can often jump start or help complete a technology purchase. Also there is the school wide fund-raiser as a possible source of revenue, and according to

Wilensky, "They may not be pretty, but they work" (Wilensky, Feeding the Beast, 2006, p. 36) Wilensky further states:

> Raising money at any level is a time-consuming and often laborious process. But establishing a positive relationship with various funding sources can prove advantageous over time. Maintain accurate records of funders, maintain communication with them, and make it a point to contact your school district grant office for advice. Once you develop an understanding of the different levels of funding streams and the most efficient method to access them, you will become more effective at raising the money that your program requires. (Wilensky, Feeding the Beast, 2006, p. 36)

Another possible source of funding for music education technology is grants. Applying for grants can be a daunting task. In the area of music those grants are often very specific for uses such as performances or equipment. When looking for a grant the writer often has the end result in mind and is looking for funding to support that end. "Sometimes, considering smaller grants ($500.00 to $2,500.00) or matching funds yields better results. Remember the goal is to obtain funding to jump-start the project, even if it's necessary to begin on a smaller scale than expected." (Wilensky, Multidisciplinary Funding, 2007, p. 37) To increase the possibility of being awarded a grant the article suggests looking at using multiple disciplines both in the arts and out of the arts. "Projects encompassing multiple disciplines can often have greater appeal to community-based organizations, local foundations, and, of course, businesses related to music, theater, technology, and so on." (Wilensky, Multidisciplinary Funding, 2007, p. 37) Often other disciplines and departments have possible contacts that would be receptive to donating to a larger project or to a project that has multiple media outlets.

> Teaching across disciplines is more complex and therefore involves teamwork, patience, cooperation, and administrative support. That said, give it serious consideration and plan carefully. After all, an educator's mission is to maximize the potential of every student by creating opportunities to explore areas of study beyond the standard set of courses. (Wilensky, Multidisciplinary Funding, 2007, p. 37)

Professional development in technology for the band director is the final area of research. Allocating the time necessary for professional development is necessary for proper training on new technology, "The purchase of equipment is just a splash that starts a ripple of cultural change throughout the music program and all connected with it, and a staff development program is critical to ensuring that the impact takes hold as a permanent improvement." (Brown, 2007, p. 306) Also, a part of the process is overcoming technophobia, which may affect band directors who have limited technology experience. A positive professional development plan can ensure that directors can become comfortable with the use of technology in their classroom, "Changing technologies requires a process of training and support to enable changes of mind in the staff that will make use of them." (Brown, 2007, p. 306) In his book *Computers in Music Education* Andrew R. Brown makes several suggestions of possible sources of professional development:

> Depending upon the significance of the music technology integration and on local circumstances, there can be a range of options for professional development. It may be possible for an existing staff member, alumni, or a student to assist staff with how to operate new software or hardware purchases. Staff of retail outlets from which equipment is purchased may agree to run a session covering

> installation and operation of the equipment. It may be possible for staff from outside the music department to offer their experiences in pedagogical approaches or to facilitate a workshop. (Brown, 2007, p. 306)

As for professional development outside the school setting there are resources available either through the internet, software companies, or at colleges and universities. The larger technology companies can arrange for professional development classes but often these classes are not on a set schedule and require a large number of participants. This arrangement is advantageous for directors working in larger school districts but is not successful for smaller school systems. In the United States, possible web-based resources for directors seeking professional development include MENC and ProSchool.

The website, *Technology Institute for Music Educator,* (TI:ME) is a valuable resource to any music educator that is considering the use of technology in any form. This is a not-for-profit organization based in the state of Pennsylvania with the purpose of empowering music educators in the use of technology. TI:ME has a general webpage that provides open access and there is a membership section which requires the payment of a minimum fee to receive access to archived materials. Access to the publications and resources page serves to make this website invaluable for research in the area of music education technology in many different fields, both in and out of the music genre, and in different classroom situations from early childhood through post secondary. A popular new feature on the TI:ME website is the section titled "In My Humble Opinion." (Technology Institute for Music Educators, 2010) This section is dedicated to "opinions and advice from some of the top thought leaders in music education technology." (Technology Institute for Music Educators, 2010) Several of the articles found in this section are applicable both inside and outside the music education classroom setting.

Music Tech for Me is a website that is organized by V. Keith Mason, a member of the School of Music at Belmont University. At the university his responsibilities include music technology coordinator, as well as director of instrumental ensembles. Located in Nashville, Tennessee, Belmont is one of the nation's leading music centers for commercial music. Mason utilizes podcasts, a newer form of information technology, in place of standard written articles and journal entries. The podcasts are listed in a column on the right side of the Music Tech for Me webpage and begin in March of 2007 and continue to September 2009. Fewer internet resources are listed on the links page than found on other websites but what sites are provided are intended more for academic use than commercial intent.

Designed with a significantly higher academic target market, the website for *Association for Technology in Music Instruction* (ATMI) "was formed in 1975 as a special interest group of the Association for the Development of Computer-Based Instructional Systems (ADCIS). Since 1992, ATMI has been an independent professional organization." (Association for Technology in Music Instruction, 2010) Comprised of approximately 200 members from the United States and a small number of international members, a main goal of ATMI is to provide an annual conference, "as a forum for scholarly presentations, software and hardware demonstrations, panels, and discussion groups." (Association for Technology in Music Instruction, 2010) The ATMI also serves as an internet resource open to anyone who is seeking information on music technology and how it can be utilized for music instruction. Information found on the ATMI website can be used for both student instruction as well as sources of professional development for band directors. Similar to other websites of this nature, the membership fee is $40.00, which provides the member with access to discussion boards as well as a discounted rate for their annual conference.

Chapter 3

Method

This research study seeks to address student performance and the influence of appropriate and available technology use in the band room. In order to gather accurate information it is necessary to first determine what technology is being used by students. In addition, research as to the band director's view of the level of effectiveness of technology on student performance will be collected. The first step is the gathering of basic demographics of the school and director. Basic demographics will include teaching experience, which states the director has taught, number of students taught, degrees held by the director, and socio-economic school climate.

Technology will be divided into three categories of audio, video, and computer-based. Each of the three categories will ask what types of equipment is being used as well as the funding sources for the existing materials. The final question asked in each category is the band director's opinion on the use of technology as it relates to overall student performance. All of the equipment usage questions are in a five point Likert scale form with answers ranging from never to a great deal. Directors are able to rank the amount of use for each individual piece of technology as well as list any technology that they may use that was not listed. The survey instrument can be found in Appendix 1.

Participants

Band directors from southeastern North Carolina who work in either a middle school or high school were chosen as participants for this research. The participants were chosen based on

the variety of teaching experience, differing levels of socio-economic situations, and existence of both new and existing programs. Middle school and high school directors were chose to provide a broader spectrum of teaching environments and levels of student experiences.

Though not specifically addressed as participants in the research, opinions on student performance and how technology affects that performance is measured by the band directors involved. The band director's perception of their student's performance level is a critical part of the research. Band is not yet a testable subject by the NCDPI and as such the measurement of student achievement and performance rests solely with the band director. How technology is incorporated in to the curriculum and how students are exposed to that technology directly affects student performance and achievement.

Materials

The only material used for this research was a survey prepared by the principal investigator. The survey is divided in to three sections consisting of demographics, technology, and open discussion. The demographics section is short answer and consists of questions designed to determine level of experience, school size, and socio-economic level of the schools in question. The technology section is based on a five point Likert scale with 37 questions regarding basic use of technology. The third section consists of open ended questions that seek to determine the director's opinion on student performance as it relates to technology, sources of funding for technology, useful resources, and professional development.

Procedure

Once the survey was completed, it was necessary to obtain the proper authorization from the Institutional Review Board (IRB) for use of human subjects. Permission to administer the survey was granted on February 12, 2010 and the survey was given that day to band directors at the Southeastern District Middle School Band Clinic held in Buies Creek, NC. The directors were given the opportunity to take the survey that day or return their copy to the principal investigator at their convenience. The second administration of the survey was completed on February 15, 2010 to a group of band directors at a staff development workshop. Again, directors were given the opportunity to complete the survey or return it at a later date to the principal investigator. After each survey session there were several directors who wished to express interest in the subject and to offer suggestions as to their own methods of technology use in the classroom.

Chapter 4

Demographic Results

The first section of the results involves the basic demographics of the school band program, to include the years of teaching experience for the band director, the level of education attained by the director, number of students enrolled in the band programs and in which performing ensemble, and the socioeconomic climate of the schools surveyed. The grade level of the students taught will be presented in terms of middle school (6^{th} through 8^{th} grade), high school (9^{th} through 12^{th} grade), and post secondary. The level of education will also indicate the type of bachelor and masters degrees that each director indicted. When appropriate the mean, which is the average response for each question, and the mode, which is the frequency of each response provided for each question, will be presented. In addition, unusual occurrences in the data retrieved will be noted as they arise.

The research was completed by 45 individuals who were currently employed as band directors in southeastern North Carolina. The sum of years of experience for the band directors was 611.5 years with the average time of service being 13.58 years. The fewest years of experience given from the subjects surveyed was 1 year and the highest level of experience was 30 years. Demographics involving the total grade levels that the band directors have had experience indicate that 8 directors had taught only high school, 10 directors had taught only middle school, 17 directors had taught both middle school and high school, 2 directors had taught grades K-12, and one director had post-secondary school experience. Eight directors did not indicate the grade levels that they have had experience teaching. The responses for current grade levels taught indicated that 22 directors are currently teaching high school only, 19

directors are currently teaching middle school only, three directors are currently teaching both middle school and high school, and one teacher is teaching at a post-secondary level.

The response to the inquiry as to the states in which the band directors had taught indicated that 35 directors had only taught in the state of North Carolina. Six band directors had only taught in both North Carolina and South Carolina. The responses indicated that four directors had taught in North Carolina and a different state or states, which included Virginia, Tennessee, Ohio, Maryland, and Florida. The survey results indicated that 43 band directors held at least a bachelor's degree in music with a distribution of 11 Bachelor's of Music in Music Education, 4 Bachelor's of Science in Music Education, 7 Bachelor's of Arts in Music, 18 Bachelor's of Music, 2 Bachelor's of Arts in Music Education, and 1 Bachelor's of Arts in Music Performance. In addition, 15 of those had also received a master's degree with a distribution of 6 Master's of Arts in Music Education, 5 Master's of Music in Music Education, and 1 Master's of Arts in Performance. Two directors did not indicate their degrees.

This section of the demographics involves the number of students enrolled in the band programs from the schools questioned, to include the types of performing groups. The total number of students taught based on the information provided by the band directors is 6,374. The average number of students enrolled in a music class taught by the school band director is 141.64. Enrollment numbers for concert band students indicated a total of 5,481 and an average of 127.46 per school. Jazz band enrollment numbers indicated 788 students total with an average of 21.88 per school. High school marching band enrollment total was 1,597 with an average of 66.54 student participation per school. Music theory student total is 31 which indicated an average of 1.94 students per school. There is an indication that 60 students were enrolled in a class other than the four choices indicated with an average of 4 students per school. No specific

course was indicated on the responses as to the nature of the other class that these 60 students were involved.

The socio-economic level of the school was questioned with the band director having the choice of low, low – medium, medium, medium – high, and high as a response. The low socio-economic indicator was chosen by 9 band directors, low – medium was chosen by 11 band directors, medium was chosen by 12 band directors, medium – high was chosen by 5 band directors, and three indicated the high socio economic level for their school. Band directors were given the choice of responding if their school was designated as a Title 1 school. Of the 45 responses, 29 directors indicated that their school was not a Title 1 school and 12 responded that their school was designated as a Title 1 school. If a school is designated as a Title 1 school the indications are that the school is receiving federal assistance and is considered to be at or below poverty level or at risk of failure.

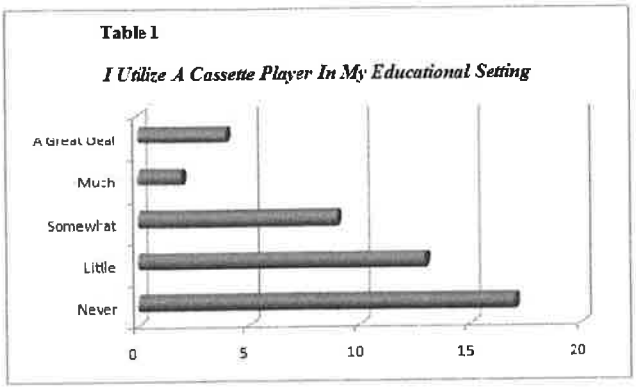
Audio Technology Results

The responses provided by the band directors in the second section of the research involve the types of technology used in their band rooms and are measured on a five point Likert scale. The information collected was separated based on the type of technology used in the band room to include audio, video, or computer based. In audio technology, the first device that was included in the survey was the cassette player which had a sample mean utilization rating of 2.18 on a 5-point Likert scale. As illustrated in Table 1, of the 45 band directors questioned the results show that 17 indicated never using a cassette player, 13 indicated little use of a cassette player, 9 indicated they used a cassette player somewhat, 2 indicated much use of a cassette player, and 4 indicated that they used a cassette player a great deal. The research did not address

brand preference or how the technology was implemented by the band director to facilitate instruction.

Table 1

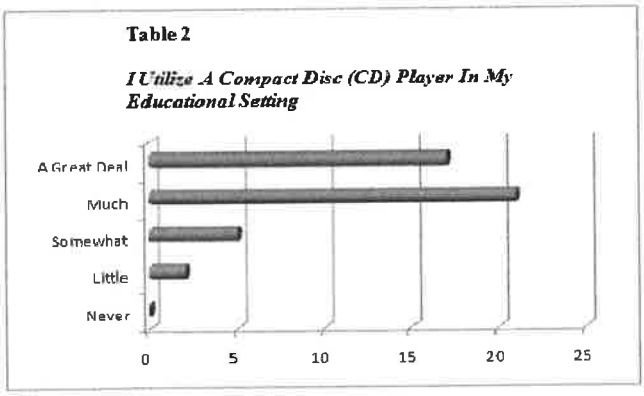
I Utilize A Cassette Player In My Educational Setting



The CD player is the second audio device included in the survey with a sample mean utilization by the band directors surveyed of 4.18 on a 5-point Likert scale. The modal score can be found in Table 2, with the results indicating that no band director had failed to utilize a CD player, 2 band directors had little CD player use, 5 of the band directors had used a CD player somewhat, 21 band directors had much use of a CD player, and 17 band directors used a CD player a great deal. The research did not address brand preference or how this audio technology was implemented by the band director to facilitate instruction.

Table 2

I Utilize A Compact Disc (CD) Player In My Educational Setting

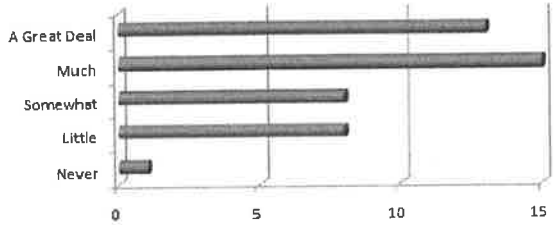


The use of a digital media player as a resource was the next survey question and results from the survey produced a sample mean utilization rating of 3.69 on a 5-point Likert scale. The modal score can be found in Table 3 with the results indicating that 1 band director had never

utilized a digital media player in their instruction, 8 band directors had little use of a digital media player, 8 band directors used a digital media player somewhat, 15 band directors indicated much use of a digital media player, and 13 band directors used a digital media player a great deal. The research did not address brand preference, or specific type of digital media player, or how this audio technology was implemented by the band director to facilitate instruction.

Table 3

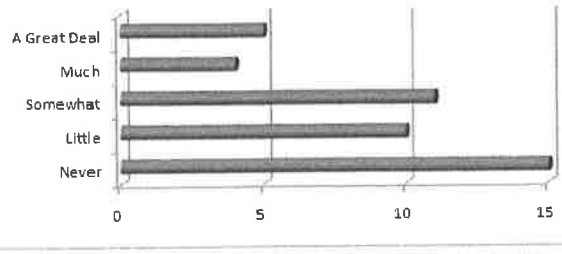
I Utilize A Digital Media Player (MP3, IPOD) In My Educational Setting



The next two survey questions address two types of recording devices, analog and digital, that are available to the band director in their classrooms. The sample mean response provided by the band directors utilizing analog recording technology was 2.42 on a 5-point Likert scale. The modal score results provided by the band directors for analog recoding, and displayed in Table 4, showed that 15 band directors had never used analog recording, 10 directors had little use with analog recording, 11 directors had used analog recording somewhat, 4 directors had much use of analog recording, and 5 directors had used analog recording a great deal in their classroom. The research did not address brand preference or how this analog audio technology was implemented by the band director to facilitate instruction.

Table 4

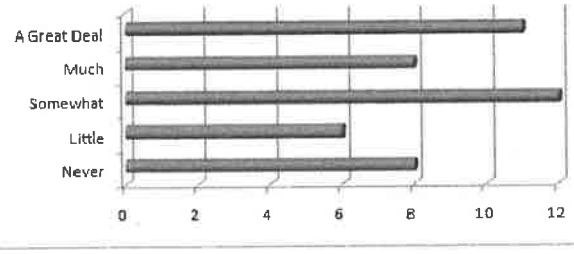
I Have Access To Analog Recording Facilities In My Educational Setting



The sample mean response for the accessibility of digital recording technology is 3.18 on a 5-point Likert scale. In Table 5 the results indicated 8 directors had never used digital recording in their band room, 6 directors had little digital recording use, 12 directors had used digital recording technology somewhat, 8 had much use of digital recording technology, and 11 directors had used digital recording technology a great deal. The research did not address brand preference or how this audio technology was implemented by the band director to facilitate instruction.

Table 5

I Have Access To Digital Recording Facilities In My Educational Setting

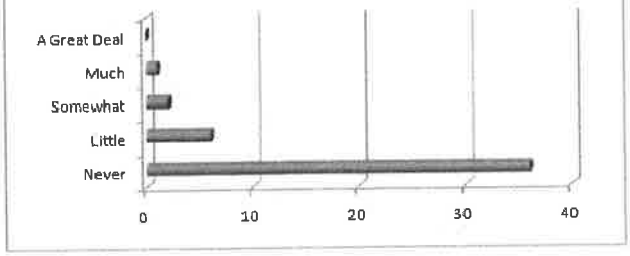


The use of silent brass technology had a sample mean utilization rate of 1.29 on a 5-point Likert scale. Of the 45 band directors involved with the survey, 36 had indicated that they had never used the silent brass technology, 6 directors had little use of the silent brass, 2 directors indicated they employed the silent brass somewhat, and 1 director had much use of the silent brass technology. No band director indicated they had used the silent brass a great deal, as

indicated in Table 6. The research did not address how this digital audio technology was implemented by the band director to facilitate instruction.

Table 6

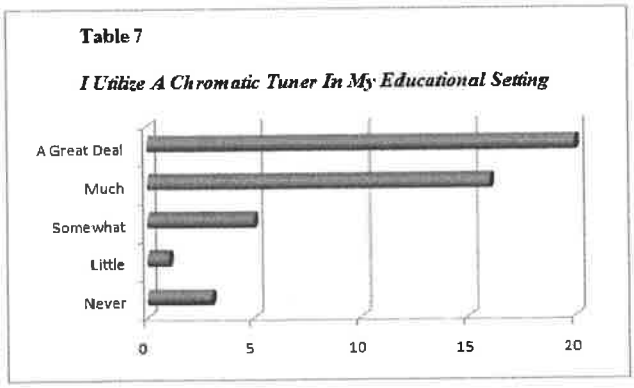
I Utilize Silent Brass Technology In My Educational Setting



Band directors indicated a sample mean utilization rate of 4.09 on a 5-point Likert scale for the chromatic tuner based on the results of the research. The modal score results, found in Table 7, indicate that 3 directors never used a chromatic tuner in their classroom, 1 band director had little use of a chromatic tuner, 5 directors used a chromatic tuner somewhat, 16 directors had much use of the chromatic tuner, and 20 directors used a chromatic tuner a great deal. The research did not address brand preference, or type of chromatic tuner, or how this audio technology was implemented by the band director to facilitate instruction.

Table 7

I Utilize A Chromatic Tuner In My Educational Setting

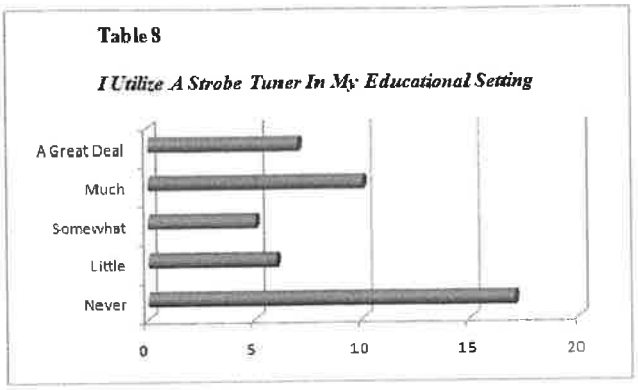


The use of a strobe tuner by band directors in their classroom had a sample mean utilization of 2.64 on a 5-point Likert scale. The illustration in Table 8 indicates that 17 band directors had never used a strobe tuner in their classroom, 6 directors had little use of a strobe

tuner, 5 directors had used a strobe tuner somewhat, 10 directors had much use of a strobe tuner, and 7 directors used a strobe tuner a great deal. The research did not address brand preference or how the technology was implemented by the band director to facilitate instruction.

Table 8

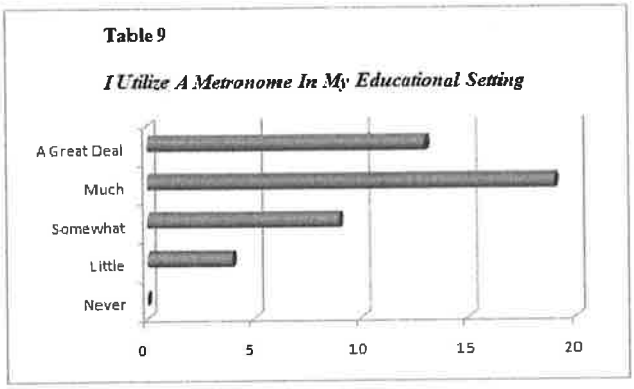
I Utilize A Strobe Tuner In My Educational Setting



Band directors who indicated the use of a metronome in their classroom had a sample mean response of 3.91 on a 5-point Likert scale. No band directors indicated never using a metronome in their classroom, which is illustrated in Table 9, while 4 directors indicated little use of a metronome in their classroom, 9 directors indicated they used a metronome somewhat, 19 directors had much use of a metronome, and 13 directors used the metronome a great deal. The research did not address the type of metronome used or how this type of audio technology was implemented by the band director to facilitate instruction.

Table 9

I Utilize A Metronome In My Educational Setting

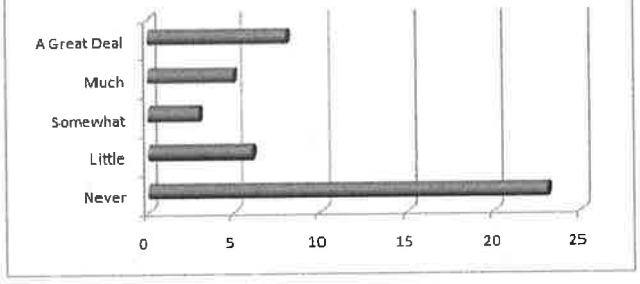


The next three research responses involve the use of audio amplification with a specific performing ensemble, either concert band, jazz band, or marching band. The survey questions

did not specifically address the grade levels involved with the performing groups. The choice by the band director to use audio amplification with the concert band produced a sample mean of 2.31 on a 5-point Likert scale. The modal score results are indicated in Table 10 and show that 23 directors had never used audio amplification with the concert band, 6 directors had little use of concert band audio amplification, 3 directors had amplified the concert band somewhat, 5 directors had much used audio amplification, and 8 directors had used audio amplification with the concert band a great deal. The research attempted to ascertain the type of audio amplification technology used by the band director and the extent of audio amplification, however, the low response rate did not produce a definitive amount of measureable data.

Table 10

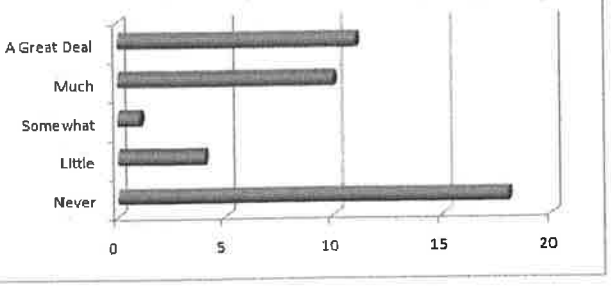
I Utilize Audio Amplification With My Concert Band



The responses by the band directors to the use of audio amplification with a jazz band produced a sample mean of 2.82 on a 5-point Likert scale. The responses from the band directors, found in Table 11, indicated that 18 had never used audio amplification with a jazz band, 4 directors had little use of jazz band amplification, 1 director had used amplification somewhat, 10 had much use of amplification with a jazz band, and 11 directors had used amplification a great deal with a jazz band. The research attempted to ascertain the type of audio amplification technology used by the band director and the extent of audio amplification, however, the low response rate did not produce a definitive amount of measureable data.

Table 11

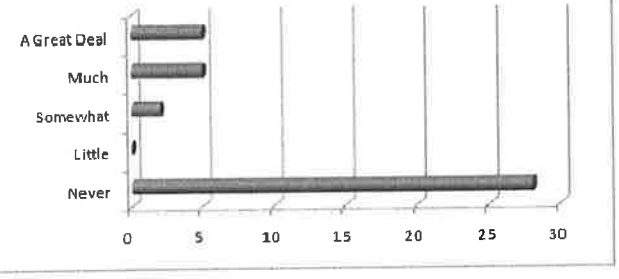
I Utilize Audio Amplification With My Jazz Band



Audio amplification used in conjunction with a marching band produced a sample mean response of 1.98 on a 5-point Likert scale. This survey question did not specifically indicate if a marching band was part of the music program, but this information can be obtained based on the basic demographic in the first section of the survey. The modal score, found in Table 12, indicates that 28 directors had never used audio amplification with a marching band, 2 directors had used audio amplification somewhat, 5 directors had much experience using audio amplification, and 5 directors used audio amplification with a marching band a great deal. The research attempted to ascertain the type of audio amplification technology used by the band director and the extent of audio amplification, however, the low response rate did not produce a definitive amount of measureable data.

Table 12

I Utilize Audio Amplification With My Marching Band

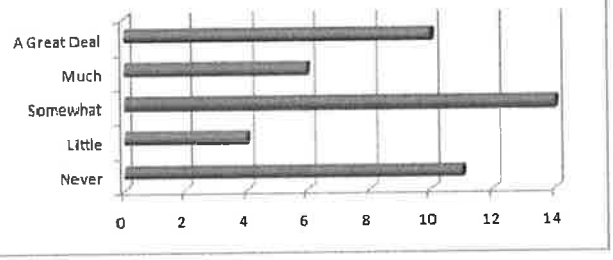


The band directors surveyed were asked to indicate if the school or school system where they were employed provided the audio technology for use in the band room. While specific

sources of funding were not provided, the sample mean yielded a score of 3 on a 5-point Likert scale. Of the 45 band directors that responded to the research question, Table 13 displays that 11 directors indicated the school or school system never provided adequate audio resources, 4 indicated that the school or school system provided little of the necessary audio resources, 14 directors responded that the school or school system somewhat met the audio resource needs, 6 directors indicated that much of the audio needs were supplied by the school or school systems, and 10 directors felt the school or school system provided a great deal of the audio resources. No specific funding amounts or sources for funding were listed as part of this survey question.

Table 13

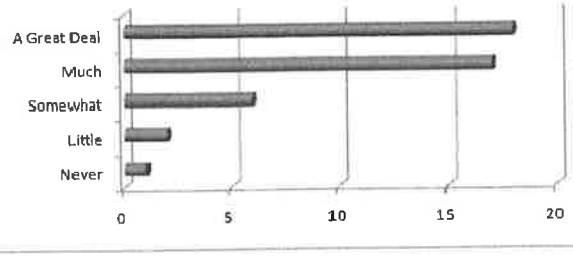
My School/School System Provides All Of The Necessary Audio Devices For Use In My Educational Setting



When asked if the addition of audio technology helps to improve student performance, the director's response provided a sample mean of 4.11 on a 5-point Likert scale. Modal score results are provided in Table 14 and indicate that while 1 director felt that audio technology never improved overall student performance, 2 directors indicated that audio technology had little effect on student performance, 6 directors felt that student performance was somewhat affected by audio technology, 17 directors felt that student performance was much affected by audio technology, and 18 directors thought that a great deal of student performance was affected by audio technology.

Table 14

I Feel The Use Of Audio Technology Improves The Overall Performance Of My Students

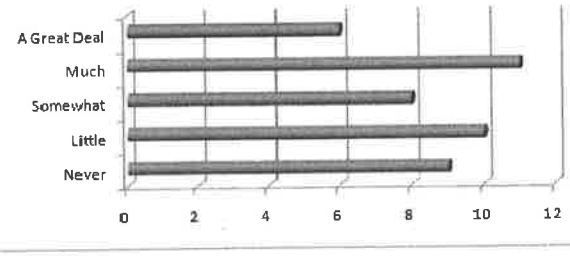


Video Technology Results

In the third section the research results provided by the band directors will concentrate on the use of video technology in the band room. The first two question concern the types of technology used to play back recorded video material, either through a VCR or a DVD player. Use of a VCR by the band directors was measured with a sample mean response from the 45 research subjects of 2.88 on a 5-point Likert scale. As shown in Table 15, the modal score indicated that 9 band directors had never used a VCR in their band room, 10 directors had little use of a VCR, 8 directors had used a VCR somewhat, 11 directors had much use of a VCR, and 6 directors had used a VCR a great deal in their band room. The research question did not address brand preference or how the specific video technology was implemented by the band director to facilitate student instruction.

Table 15

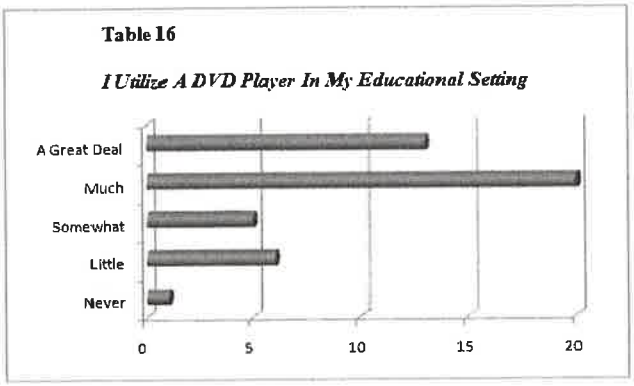
I Utilize A Video Cassette Recorder (VCR) In My Educational Setting



The responses provided by the band directors as to their use of a DVD player as an instructional tool produced a sample mean of 3.84 on a 5-point Likert scale. The modal score, as seen in Table 16, indicated that 1 director had never used a DVD player to facilitate instruction in their band room, 6 directors had little use of a DV player, 5 directors had used a DVD player somewhat, 20 directors had much experience using a DVD player in their band room, and 13 band directors used a DVD player a great deal. The research question did not address brand preference or how the specific video technology was implemented by the band director to facilitate student instruction.

Table 16

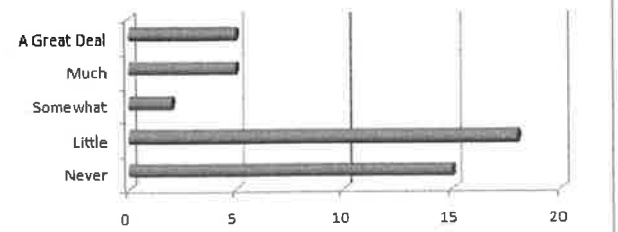
I Utilize A DVD Player In My Educational Setting



The subject of the next two series of research questions involves how live video material is captured through the use of either an analog video recorder or a digital video recorder. When asked to respond concerning the use of an analog video recorder, the response from the band directors point toward a sample mean of 2.27 on a 5-point Likert scale. The modal score, illustrated in Table 17, indicates that 15 band directors had never used an analog video recorder in their band room, 18 directors had little use of a video recorder, 2 directors had used the video recorder somewhat, 5 directors had much use of a video recorder, and 5 directors had used an analog video recorder a great deal in their band room. The research question did not address brand preference or how the specific video technology was implemented by the band director to facilitate instruction.

Table 17

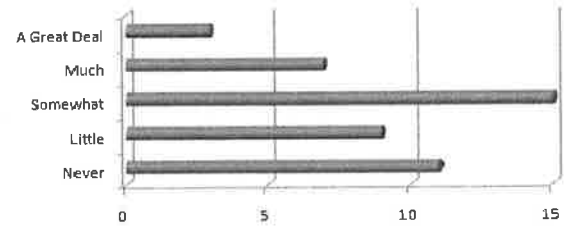
I Utilize An Analog Video Recorder (Tape) In My Educational Setting



Digital video recorders are the second type of technology used to capture live video and the sample mean response for these devices by band directors to facilitate student instruction is 2.60 on a 5-point Likert scale. As seen in Table 18, the modal score for use of a digital video recorder shows that 11 directors had never used this type of technology in their band room, 9 directors had little use of a digital video recorder, 15 directors had used a digital video recorder somewhat, 7 directors had much use of this video technology in their classroom, and 3 directors used a digital video recorder a great deal to facilitate student instruction. The research question did not address brand preference or how the specific video technology was implemented by the band director to facilitate instruction.

Table 18

I Utilize A Digital Video Recorder (Mini DVD, HDD) In My Educational Setting

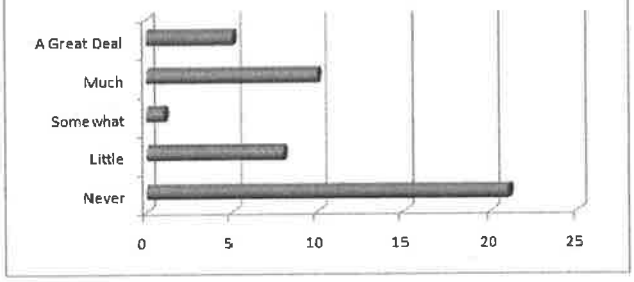


The subject of the next research question is the use of YouTube as an educational resource in the band room. Of the band directors who completed the survey, 2.33 on a 5-point Likert scale indicated use of YouTube to facilitate instruction. Table 19 indicates that 21

directors had never used YouTube in their band room, 8 responded that YouTube had been used little, 1 director had used YouTube somewhat, 10 directors had much use, and 5 had used YouTube a great deal in their band room. How the band director had provided access in their band room to YouTube and the method for instruction that incorporated YouTube was not indicated as a part of the survey.

Table 19

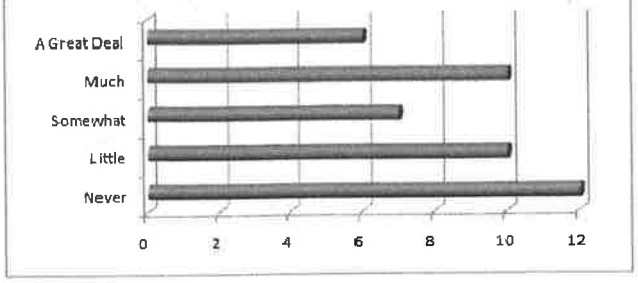
I Utilize YouTube In My Educational Setting



Digital cameras provide an alternative form of video technology that employs still videos as opposed to live action video recordings. The use of a digital camera as a means to facilitate instruction by the band directors surveyed produced a sample mean of 2.73 on a 5-point Likert scale. The modal score found in Table 20 indicated that 12 directors had never used a digital camera in their band room, 10 had little use of a digital camera, 7 responses showed a digital camera was used somewhat, 10 directors had much use of a digital camera, and 6 responses show that a digital camera was used a great deal to facilitate instruction. . The research question did not address brand preference or how the video media provided by the digital camera was implemented by the band director to facilitate instruction.

Table 20

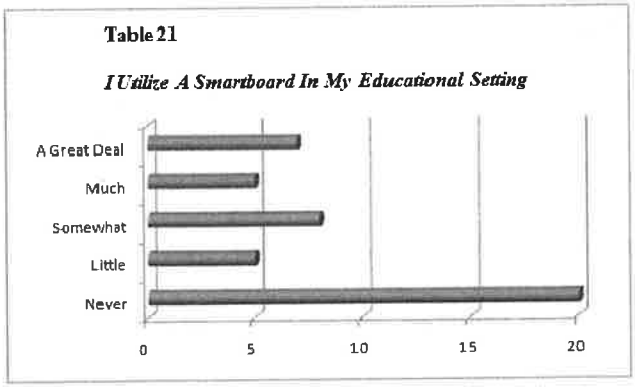
I Utilize A Digital Camera In My Educational Setting



The responses of the band directors surveyed in the next research question illustrate if SMART Board technology is being employed as a means of instruction in the band room. The responses show that the use of SMART Board technology has a sample mean of 2.42 based on a 5-point Likert scale. The modal score, which is illustrated in Table 21, indicated that 20 band directors had never used SMART Board technology in the band room, 5 have little use, 8 directors have used a SMART Board somewhat in their band room, 5 directors have much experience with using a SMART Board, and 7 responses indicate a great deal of use for the SMART Board in the band room. How the SMART Board was used as a teaching resource and other technology resources used in conjunction with a SMART Board were not part of this research question.

Table 21

I Utilize A Smartboard In My Educational Setting

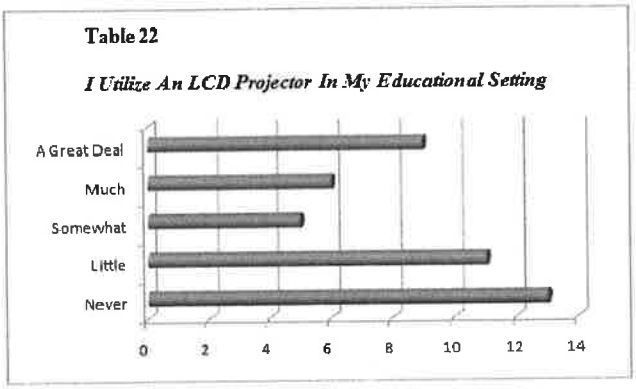


The next survey question involves using an LCD projector as a resource for instruction in the band room. The statistics provided by the band directors surveyed indicated a sample mean

of 2.70 on a 5-point Likert scale. The modal score provided shows that 13 directors had never used an LCD projector in their band room, 11 had little use of an LCD projector, 5 directors used an LCD projector somewhat in their band room, 6 directors had much use, and 9 responses indicate a great deal of use for the LCD projector in the band room. How the LCD projector was used as a teaching resource and other technology resources used in conjunction with an LCD projector were not part of this research question.

Table 22

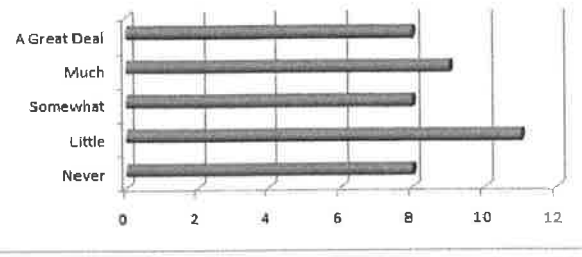
I Utilize An LCD Projector In My Educational Setting



The band directors who participated in the survey were asked if the school or school system where they were employed provided the video technology for use in the band room. The sample mean supplied by the band directors to this question was 2.95 on a 5-point Likert scale. Modal score results found in Table 23 illustrated that 8 directors felt the school or school system never met their video technology needs, 11 directors indicated little provision was made for video technology, 8 schools or school systems somewhat provided for their video technology, 9 directors responded that much of their video technology was provided for them, and 8 responses from directors indicated that a great deal of the video technology resources were met by the school or school system. No specific funding amounts or specific sources for funding were listed as part of this survey question.

Table 23

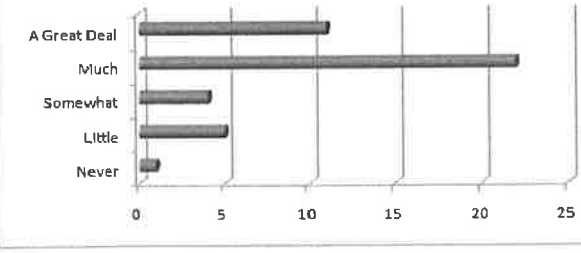
My School/School System Provides All Of The Necessary Video Devices For Use In My Educational Setting



Band directors were asked to supply their opinion regarding the question of improved student performance through the use of video technology. The sample mean provided by the directors was 3.86 on a 5-point Likert scale. Table 24 reflects the modal score provided by the 45 directors shows that 1 director indicated that video technology never improves student performance, 5 responses indicate that video technology has little impact on improving student performance, 4 directors felt that video technology improved student performance somewhat, 22 of the responses felt there was much improvement of student performance, and 11 directors responded they felt that student performance was improved a great deal by video technology.

Table 24

I Feel The Use Of Video Technology Improves The Overall Performance Of My Students



Computer Technology Results

Computer based technology is the fourth area of research in this study and how the band director applies that technology to enhance student performance as well as the possible sources

of the technology. The directors were asked to indicate if a computer was used in their class room and the sample mean indicates a score of 4.25 based on a 5-point Likert scale. As illustrated in Table 25, no responses indicated that a computer was never used in the band room, 2 band directors responded that they had little use of a computer, 8 directors stated that a computer was used somewhat in their band room, 11 responses showed much use of a computer, and 23 directors stated that a computer was used a great deal in their band room. While specific brands and models of computers were not specified in the research, Table 26 displays the results of the type of computer operating system used in the band rooms included in this research study. The operating system choices of Mac (Apple), PC (Windows), or both were possible choices and the results indicate that 2 band directors use Mac, 31 use PC, and 6 employ both operating systems.

Table 25

I Utilize A Computer In My Educational Setting (See Table 26)

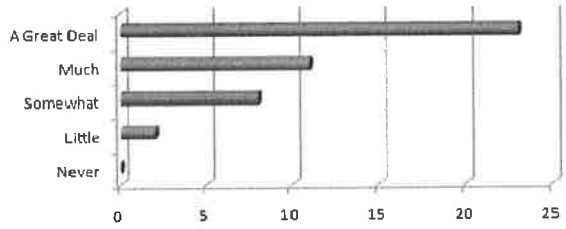
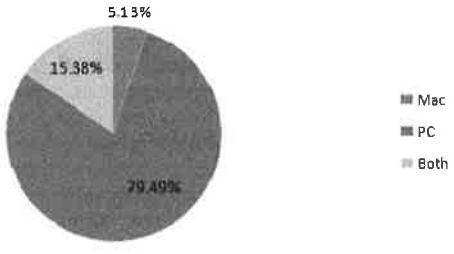


Table 26

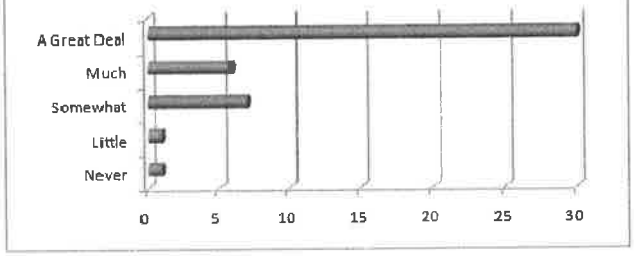
Type Of Computer Used In Educational Setting



Word processing software was the topic of the next research question, to include the use of spread sheets and databases. The sample mean provided by the band directors surveyed indicated a response of 4.40 based on a 5-point Likert scale. While only 1 director responded that they had never used a word processing program in their band room and 1 director responded as having little use for a word processing program, as Table 27 illustrates, 7 directors indicated they had used a word processing program somewhat, 6 related much use of a word processing program, and 30 directors indicated a great deal of use of a word processing program. The specific types of word processing programs were not identified in the research question as well as how the band directors implemented the software in their band room to facilitate student instruction.

Table 27

I Utilize Word Processing/Spreadsheet/Database Programs (Microsoft) In My Educational Setting

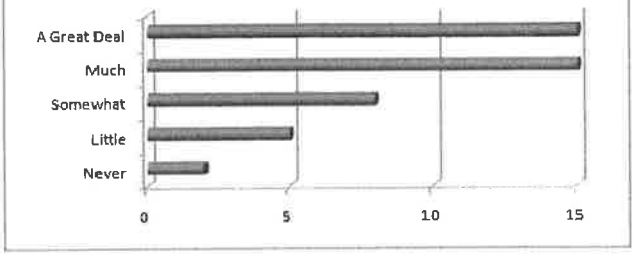


Band directors provided information regarding music notation software, specifically *Finale* and *Sibelius*, and if these music notation software are used as part of student instruction. The specific program used by the director was not part of the research question, merely that the program was utilized. The sample mean by the band directors indicated a score of 3.8 based on a 5-point Likert scale. The individual modal score, found illustrated in Table 28, indicates that 2 directors had never used music notation software in their band room, 5 directors had little use with the software in their band room, 8 had used music notation software somewhat, 15 directors

had much use for music notation software, and 15 directors used music notation software a great deal in their band room.

Table 28

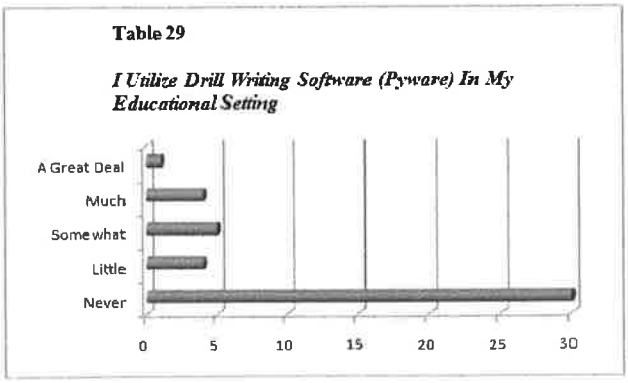
I Utilize Music Notation Software (Finale, Sibelius) In My Educational Setting



The next research question addresses if band directors used drill writing software, specifically *Pyware*, in conjunction with their marching band. The responses provided by the band directors indicated a sample mean of 1.68 based on a5-point Likert scale. Table 29 indicates the modal score results of 30 directors responding that they never used drill writing software, 4 directors responded they had little use with drill writing software, 5 directors had used drill writing software somewhat, 4 had much use for the software, and 1 director indicated a great deal of use of the drill writing software. The extent that the drill writing software was used was not included as part of the research question.

Table 29

I Utilize Drill Writing Software (Pyware) In My Educational Setting

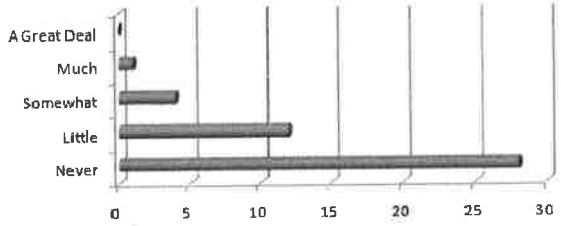


The topic for the next research question involved the use of software designed for instruction in ear training, with *McGamut* and *Auralia* provided as examples. The responses

from the band directors surveyed indicated a sample mean of 1.51 based on a 5-point Likert scale. The data collected, illustrated on Table 30, indicates that 28 directors had never used ear training software in their band room, 4 directors had little use of the software, 12 had used the ear training software somewhat to facilitate instruction, and 1 director had much use of the software. No director had used the ear training software a great deal. The specific applications of the computer software were not part of the research question.

Table 30

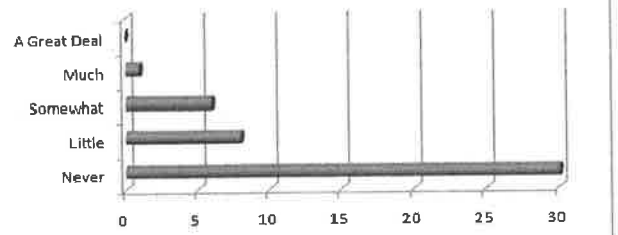
I Utilize Ear Training Software (McGamut, Auralia) In My Educational Setting



The next research question involves video technology and how the band director uses computer software to create a form of video media intended for use on the Internet, and therefore is categorized with computer based technology rather than the video technology classification. The sample mean provided by the directors questioned is 1.51 on a 5-point Likert scale. The scores listed on Table 31 indicate that 30 directors had never used software to produce an internet video, 8 directors had little use of internet video software, 6 directors had used the software somewhat, and 1 director had much use of software used to produce an Internet video. No directors indicated a great deal of use with the software used to produce an internet video. The specific application of this software or internet video technology was not provided as part of the research question.

Table 31

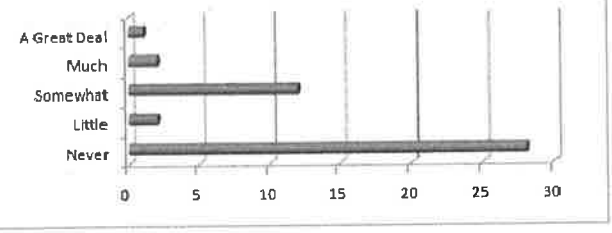
I Utilize Software To Create Internet Video (Podcasts) In My Educational Setting



Music editing software is the topic of the next research question, with software titles of *Soundforge*, *Adobe*, and *Pro Tools* provided as examples. Band directors responded with a mean score of 1.80 based on a 5-point Likert scale. The responses presented in Table 32 shows that 28 directors had never used music editing software, 2 directors had little use of the software, 12 indicated use of the software somewhat, 2 directors had much use of the music editing software, and 1 director had used the music editing software a great deal. How the directors specifically used the software to enhance or facilitate student learning was not included in the research question.

Table 32

I Utilize Music Editing Software (Soundforge, Adobe, Pro Tools) In My Educational Setting

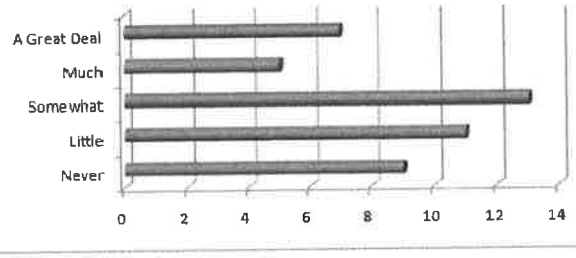


The next research question posed to the band directors involved student access to computers in the band room. The band directors responded to this question with a sample mean of 2.78 on a 5-point Likert scale. As illustrated in Table 33, of the 45 band directors participating in this research, 9 directors indicated that students never had access to computers in

their band room, 11 directors responded that students had little computer access, 13 stated that students had somewhat access to computers, 5 directors responded that students had much access to computers in their band room, and 7 stated that students had a great deal of computer access in their band room. The number of computers available to students and the amount of time each student had access to the computers was not part of the research question.

Table 33

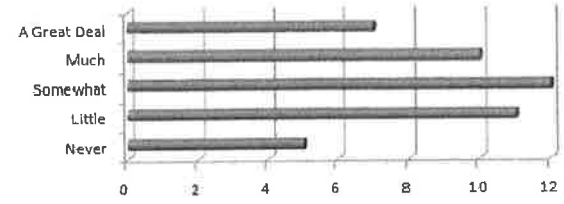
Students Have Access To Computers In My Educational Setting



The research question that examines the extent that the school or school system provides the necessary computer technology in the band room produced a sample mean of 3.07 on a 5-point Likert scale. As demonstrated in Table 34, the modal score from the band directors who responded to the research indicated that 5 schools and school systems never provided necessary computer technology, 11 schools or school systems provided necessary computer technology, 12 directors indicated that their computer technology needs were met somewhat, 10 responded that they received much of their computer needs, and 7 directors indicated that a great deal of their necessary computer technology resources were provided by their school or school system. Data regarding any specific funding amounts provided by the school or school system was included in the discussion question section but provided a minimal amount of measureable data.

Table 34

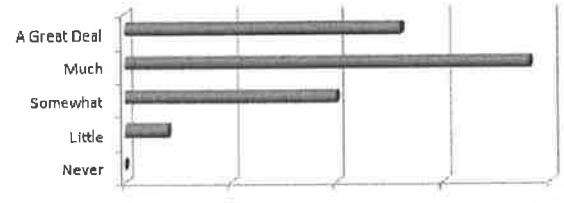
My School/School System Provides All Of The Necessary Computer Technology For Use In My Educational Setting



The final research question that employed a Likert scale response concerns the band director's opinion as to the use of computer technology as it relates to overall student performance. The responses from the band directors participating showed a mean score of 3.98 on a 5 point scale. As presented in Table 35, no director indicated that student performance was never influenced by computer use, 2 band directors indicated that computer technology had little influence in improving student performance, 10 directors responded that student performance was somewhat affected by computer technology, 19 directors responded that computer technology had much of an impact on student performance, and 13 directors indicated that a great deal of student performance was affected by the use of computer technology.

Table 35

I Feel The Use Of Computer Technology Improves The Overall Performance Of My Students



The implications of the data collected from the research study have many possible applications and the conclusions drawn from the raw data will be presented to provide insight as to the technology use by the band directors involved in this research. The basic demographics

results will address the band director's experience, grade levels taught, band program size, and socio-economic status of their school. The next results to be examined consists of information based on the three original research questions which involve the forms of media technology used in the band room, the band director's perceived available technology resources, and professional development for the director in the use of existing and new technology. Individual conclusions as well as comparisons between answers will be provided based on the data collected.

Based on the data collected the average directors experience level is 13.5 years and ranges from one year of experience to 30 years of experience. This provides a very broad range of ages and experience levels that serves to provide an excellent basis for the research information provided. Of the 45 directors surveyed, the current grade levels taught indicate a slightly higher rate of band directors who teach grades 9-12, at 22 responses, with 19 directors teaching grades 6-8 and 3 directors teaching grades 6-12. One director responded with university level experience, but is currently teaching grades 6-12. The results of the grade level responses provided an even distribution between high school and middle school so that the majority of data will not be skewed in either direction. Some of the questions involved in the survey, specifically questions involving marching band and, to some extent jazz band, have decidedly more implications for high school teaching situations than middle school.

The responses from the band directors concerning the size of their band programs produced a varied amount of statistical information. While the sample mean of overall students enrolled in band programs produced a substantial number of 141.64 students per band director, the number of students involved in marching band, reported at 66.54, was noticeably lower than the number of students enrolled in concert band with 127.46 reported. The inconsistency with the responses provided arises from the large number of middle school students that are enrolled

in concert band only, while most high schools that responded have both concert band and marching band students. The responses that provided the most accurate information involved the jazz band, which produced a mean number of 21.88 students per school where jazz band is offered as a performing ensemble.

Responses by the band directors reflecting the socioeconomic status of the schools involved in the survey indicate that the largest number of schools is considered to be of medium wealth by the band directors involved, but only by a margin of one school. The results indicate a decided lower socioeconomic tendency with only eight schools reporting to be of either medium-high or high wealth and the remainder evenly distributed amongst medium, low-medium, and low economic status. Twelve of the directors reported that their school was considered to be a Title 1 school but the responses provided indicates that number should be closer to 20 schools, based solely on information provided by the band directors on their schools economic standing and not reflective of standardized test performance.

Comparing the information collected on audio technology, the type of media player employed by the band directors at a slightly higher rate than other forms of audio technology was the CD player at 4.18, .49 points higher than the score calculated by the digital media response, and two points higher than the results for the cassette tape player. The conclusion can be drawn that the CD is still the standard form of audio media, while the digital media player has not yet surpassed the CD player and the cassette player appears not be utilized at the same level as either the CD or digital media player. The data suggests that the standard form of audio media employed in band rooms from the survey area has moved from analog form, with the cassette player, to a true digital form with the CD and digital media player.

Recording audio by the band director was examined from the standpoint of either analog recording or digital recording. The results indicate that digital recording holds a slight advantage in use over analog recording by .76 of one point. Although directors used digital recording at a mean rate of 3.18, on the scale used this signifies a rating of somewhat, while analog recoding received a mean score that reflected little use based on the scale employed in the survey. The results from the survey show that there is not a significant amount of recording, either digital or analog, occurring in band rooms in southeastern North Carolina. The other statistic that indicated a very low use of audio technology involves the Silent Brass system. The mean score for the Silent Brass audio technology was 1.29 which signifies the lowest use of a specific type of media based on the responses provided.

The chromatic tuner received the second highest audio technology score by the band directors completing the survey with a mean use rate of 4.09, second only to the CD player. Conversely the strobe tuner, which many directors consider to be more accurate for tuning instruments than the chromatic tuner, received a mean score of 2.64 by the respondents. While the research did not address the differences between the two audio tuning devices, the high rate of use for the chromatic tuner is evident by the difference in mean score and may also contribute to the high use rate of the metronome. The third highest response for use of an audio device by the band directors surveyed is the metronome, with a rating of 3.91. Currently the chromatic tuner is often produced as one device in conjunction with a metronome, providing the director with accessibility to both devices, a feature which is not available with most strobe tuners.

The information provided concerning the use of audio amplification produced mixed results based on the wording of the research questions. Every respondent supplied information concerning the concert band, but not all schools offer a jazz band or, in the case of middle

schools, a marching band which results in a mean score for those two performing groups that does not reflect the existence of that group at the directors school. For concert band, the mean score for use of amplification was 2.31, which represents little use of amplification with that performing ensemble. Although the band directors were asked to provide information as to the types of amplification used with their ensembles, there were no responses that indicate how the technology was utilized to amplify the specific ensembles.

The results provided by the directors who use amplification with their jazz band indicates an overall sample mean of 2.82, but this score does not differentiate between high school and middle school. With the data extrapolated in to a middle school mean of 2.65 and a high school mean of 2.95, the use of amplification is slightly higher by the high school directors. The same format has considerably greater difference when applied to the marching band sample mean. The overall sample mean for marching band amplification is 1.98, but when examined from a grade level standpoint middle school directors responded with a mean of 1.18 and high school directors responded with a score of 2.58. The final inference based on the data submitted is that no performing ensemble utilizes amplification at a significantly higher rate than another, and the highest level of implementation by any performing group was the high school jazz band at 2.95, which remains slightly below the average level of 3, or somewhat, based on the scale used on the survey.

When asked if their schools or school system provided the necessary audio technology for student instruction the band directors responses indicated a mean score of 3.00 which demonstrates that while the technology needs were adequately met, when compared to the resources provided for other forms of technology the directors needs were considered slightly under supported. Comparing the sample mean of 4.11 to the question of whether audio

technology improves overall student performance with the level of support provided by the school and school, the statistical implication is that while directors highly value audio technology as it relates to student performance they feel that there is not enough support provided by either the school or school system. The directors responses indicated that audio technology has a slightly higher impact on student overall performance than the other two forms of technology listed in this research study.

Video technology utilization provided relatively low overall ratings in the responses provided by the band directors when compared to audio technology and computer technology, with the exception of video playback. Based on the responses provided, the DVD player received a sample mean utilization rating of 3.84 while the VCR received a use rate of 2.88. Similar to the information provided for audio technology, results suggest the technology used for playing video media is moving towards digital media replacing analog media. This trend is mirrored in the technology used to capture video, although to a lesser degree. Analog video tape recorders were used on a mean of 2.27 while a score of 2.6 for use of digital video recorders shows just a slightly higher rate of use. The results suggested that while directors are utilizing technology in their classroom to play video, the use of video recording technology is done at a significantly lower rate.

A similarly surprising result was the evidence that illustrated directors not utilizing YouTube as a resource to enhance student performance in their band rooms. The responses that were provided by the band directors suggested that directors only utilized YouTube at an average rate of 2.33 on a 5-point scale, slightly lower than the rate of use for a digital video recorder. A possible explanation for the band directors choosing not to employ this possible resource is the school or school systems use of security software designed to limit access to uncontrolled

Internet sites, which would prevent band directors from utilizing a possibly useful classroom resource that is accessible by most students from their personal computers. While most security software of this type can be altered to allow access to a specific Internet site that has been blocked, it is often the responsibility of the individual teacher to request that the site be unblocked.

Three devices that are used to capture or display video images are the digital camera, SMART Board, and the LCD projector, all of which received a similar rate of use by the band directors surveyed. The digital camera received a sample mean of 2.73, the SMART Board a sample mean of 2.42, and the LCD projector a sample mean of 2.70, which indicates that all three technology media are either not used by band directors to improve student performance, or the band director does not have access to these three forms of technology. A possible flaw in the original research failed to inquire if the technology is readily available for use by the band director, which can potentially alter the results of the data collected.

Band directors indicated a similar response concerning audio technology when asked if they felt video technology would help to improve student performance, with a mean score of 3.86. The potential for using video technology to improve student performance exists, but the survey results indicate that the actual use of the technology is not occurring. A possible factor impacting the results is the slightly lower mean score of 2.95 based on the question designed to measure the school and schools systems contribution to video technology in the band room. If the technology does not physically exist in the school, or the director does not have ready access to the technology, then the ability for the band director to effectively use video technology to contribute to student achievement would be impaired.

Computer based technology produced significantly higher rates of use in certain categories, most notably word processing and music notation software use, and substantially lowers rates of use in ear training, drill writing, and internet video software. Band directors indicated a higher rate of computer use than any other technological device found on the survey, with a score of 4.25, which surpassed the CD player by .07 of one point. The highest rate of software type utilized in the band room shows that programs that focus on word processing, spreadsheet, and database are used at a rate of 4.40 points, 0.60 points higher than the other software choices provided on the survey. Music notation software, with a mean use rate of 3.80, is the only other software choice from the survey that is used at considerable rate in the band room. Ear training software, music editing software, and internet video creating software all received usage scores between 1.51 and 1.8 which indicates these programs are not being utilized by the band directors in their schools. The marching band drill design program received a mean utilization rate of 1.68 by both high school and middle school directors and when the data from the high school directors is separated from the total mean the score rises slightly to 1.86.

Directors responded to the question as to the school or school system providing the necessary computer technology with a rate of 3.06, a difference of 0.06 higher than the mean rate for audio technology. Conversely, the directors indicated that audio technology has more of an impact upon overall student performance than computer technology, reflected by the mean score of 3.98 for computer use which is 0.13 points lower than audio. A possible explanation arises when examining both the individual school demographics as it relates to socio-economic status and if the school is a public school or a private school. Lower wealth public schools, or those schools designated as Title 1, receive more federal funding for technology use in the classroom,

although that technology assistance often includes computers and computer related technology rather than audio technology or video technology.

Directors were able to provide short answers to four discussion questions located on the reverse side of the research study. The first question asked directors to describe how they felt technology has had an impact on student learning and performance. One director responded that their students love to hear what they have played and how to correct an issue. A response to the survey question by a band director stated that "Using technology helps students to recognize different styles of music and also helps them critique their performances, thereby improving their musicianship." Most directors responded that they had too little technology, were just beginning to incorporate CDs and DVDs into their teaching, or they wished that they could use it more in their classes. The second discussion question requested information about how money is allocated for technology in their school. There were two responses provided, the first stating they received $3500.00 annually for technology and the second response was "none!"

The third discussion question sought information concerning possible web sites that the band directors may have employed or in some way found useful as a resource. This discussion question had significantly more responses than the other discussion questions, with one director providing " www.musictheory.net, www.8notes.com, www.makingmusicfun.net, www.vicfirth.com, and www.clarinet-space.net" as useful resources in their classroom. Other directors suggested the websites www.musiciansfriend.com, www.classicsforkids.com, SMART Board Online Gallery, www.jwpepper.com, and www.smartmusic.com. Accessing commercial websites at school computers was prohibited by one director's school system, which also serves to limit possible references and teaching resources.

The final aspect of the research study did not produce the anticipated results that the other data illustrated as a result of limited responses from the band directors involved in the research study. The band directors input on professional development was part of the final discussion question located on the reverse side of the survey and the response to the question provided only minimal feedback. Responses included web site training, SMART Board Basic and SMART Board Advanced, Skype, Groupwise, and e-sheets. One director responded that he or she was self taught and did a considerable amount of arranging for his or her classes. The responses from the six band directors who answered this question did not provide a substantial amount of information other than basic descriptions of classes that the directors had attended. The information provided indicates a possible lack of professional development for band directors in the area of technology.

The research study provided substantial amounts of information that show insights into the types of technology used in band rooms in southeastern North Carolina. Digital media is replacing analog media in both audio and video technologies, with the CD player receiving the highest use rate of any media device. Video technology, other than the DVD player, produced very limited use rates when compared to either audio technology or computer technology, while the directors responded that adequate video technology resources were provided. Overall, the computer received the highest use rates of any technology and was also supplied for use by the school or school system at a higher rate than any other technology. Sources for funding other than the school or school system yielded limited responses with only one director indicating a funding amount and no director specifying a technology source other than the school or school system. Professional development for instruction on new and existing technology produced limited responses from the band directors surveyed.

Conclusions

This research study produced an abundant level of raw information with regards to educational technology and how it is used to enhance the learning experience for band students in southeastern North Carolina. Computers and computer related technology received positive responses that show a high user rate by students and teachers, as did several forms of audio technology, including chromatic tuners, CD players, and digital media players. Conversely, many survey questions produced responses that indicate areas that need attention in order to provide students with a positive educational experience. School administrators and band directors should be made aware of a severe underutilization of currently existing video technology and a lack of necessary professional development for the band directors in the area of technology. Also, the research indicated a limited amount of funding provided to school band programs for the updating of existing technology or the purchase of new technology.

While the information gathered demonstrates a high level of computer technology use by band directors, the only types of software that were used at a high rate were word processing software and music notation software. There exist several types of computer software for ear training that would improve student's musicianship and performance ability. Every director would benefit from a student performer that has a highly developed sense of pitch and intonation. This would mean that the performance levels of the ensembles in which the students participate would be elevated to a higher level. In addition, one director suggested using Smartmusic, which is a valuable resource for students and teachers that allows students to perform music and get instant evaluation and feedback on their performance, and through the use of a computer would virtually eliminate any possibility of teacher bias in grading. These resources, along with many

others, should be available to every band director and every music student state-wide, not just to the "lucky few" who are familiar with the technology or band programs that can afford the technology.

Digital audio and video technology are both examples of the how media has grown and changed in educational settings, but the survey results indicate that some directors are still employing analog technology in the form of VCRs and cassette players. The mainstream electronics market has almost completely converted to a digital format, since the CD became the industry standard for audio media and computer technology in the early 1990's, but education has been slow to embrace the changes in audio media and video media technology. It is encouraging that a majority of the responding directors employ CD players and DVD players, but even that technology is rapidly becoming obsolete. The result is that educators are being forced to attempt to stay current with the latest technology, a race that no one can possibly win. The commercial technology marketplace is driven to constantly change and produce the latest innovation in order to convince the consumer to buy their latest product. This commercialism is what prevents educators, as well as the average consumer, from having the ability to stay current with the demands of technology.

Funding for technology is a source of complications faced not just by the band director, but by all educators. The commercial market for technology progresses at a rate infinitely faster than that of the funding rate of education, therefore, schools are challenged to financially stay on the "cutting edge" of technology. As the information indicated, digital media is slowly replacing analog media in education, but the forms of digital media being employed by band directors is already considered antiquated if not obsolete. The CD has been an integral part of audio music for many years, but is slowly being replaced by digital audio players. School administrations

and school system administrators do not have the financial resources available to keep their schools technologically current, or to upgrade the existing technology. Band directors indicated that all three forms of technology are beneficial to the overall student performance level, but each type of technology is faced with the often impossible task of providing current technology for student use with limited or non-existent financial resources.

Band directors are failing to use video technology to enhance student learning. Responses to the questions regarding the use of video technology by band directors provided a predominance of response levels at the lower end of the Likert scale. The use of a digital or analog video recorder or digital camera made no difference in the responses. In addition, the directors responded in the same manner when questioned about using websites such as YouTube as a form of research. Directors have answered that the technology exists at their schools but the results show that it is not being used. Digital video technology would also be beneficial to the band director to evaluate their own performance as an educator. The next step in the research process should involve determining what is preventing directors from making use of the technology that already is present in their schools. Every band room should have the resources and knowledge to digitally record performances for either publicity, evaluation, or even as a possible fundraising source. Directors should have the ability to record performances of all types, to include practice sessions, so that the students involved may evaluate their own performance. Digital video recordings published on the internet can be used as a means of recruiting or advertisement for their program, and professionally recorded videos can be sold to parents as a possible fundraiser. While these are all possible uses of video technology in an educational setting, the results remain that band directors, either through lack of possible

resources or professional training on the technology, are simply not using what is available to them.

Although the research study provided limited information about technology professional development, the implications exist that this is a viable source of a breakdown in technology use in the band room. Based on the responses provided for all three types of technology, the band directors expressed that their school or school system provided the necessary technology for use in their band room. If the technology is available for use by the band director, then a possible solution of why directors are not using their technology is that they have not received adequate training. School administrators must provide adequate training to their teachers on the technological resources they are providing. Most new schools are designed with technology integrated into the basic construction of the building, including band rooms, but if the band directors are not given adequate instruction as to the implementation of the new technology, the students are not receiving the intended level of instruction based on the provided facilities. Every possible source of professional development should be made available to the band director, either internally at a school level, or externally at a regional or state-wide level.

The level of computer use is a strong indicator that directors are embracing technology, principally as a source of information management. Directors are using word processing software as a method to manage the considerable amounts of information that is part of the profession. The information collected in this research that involves computer software could be expanded to a research study that would examine the possible uses in the band room. Band directors also responded with a high use of music notation software. Music notation software has helped give directors several opportunities to provide their students with written music, and the ability to customize music to their individual performing groups. The current

music notation software editions include pre-written music exercises for multiple band applications. A middle school band director responded that he or she had used *Finale* to print scale and rhythm exercises for his or her classes and the students playing ability and sight reading skills increased noticeably.

Professional development for all types of technology and sources of funding for new technology are concerns that need to be addressed by educators and administrators. There are many obstacles involved in the use of technology in any aspect of education, but the amount of gain for student performance is far outweighed by any negative aspect. This research has shown that band directors are continuing to be inventive in their instruction and finding new ways to employ technology that can help maximize student potential. There are drawbacks and complications involved in the implementation of technology in the band room but the responses provided by the band directors who participated in the survey indicate that they feel technology use improves the overall performance of their students. When employed effectively and supported properly as an educational resource, technology has the capability to support the band director and enhance student achievement and performance.

References

Association for Technology in Music Instruction. (n.d.). Retrieved February 2, 2010, from http://atmionline.org/.

Barbre, D. (2006). Marching to a Different Drum. *Music Education Technology Magazine* , 12-19.

Brown, A. R. (2007). *Computers in Music Education, Amplifying Musicality.* New york: Routledge.

Holmes, T. (2008). *Electronic and Experimental Music, Third Editiion.* New York: Routledge.

Kusek, D., & Leonhard, G. (2005). *The Future of Music.* Boston: Berklee Press.

Mason, V. K. (2007, March). *Music Tech For Me*. Retrieved February 2, 2010, from http://www.musictechforme.com/.

North Carolina Standard Course of Study. (n.d.). Retrieved January 31, 2010, from North Carolina Department of Public Instruction: http://www.dpi.state.nc.us/curriculum/artsed/scos/music/index

Richmond, F. (2004). Music Technology and the National Standards. *Music Education Technology Magazine* , 24-30.

Rudolph, T. E. (1996). *Teaching Music with Technology.* Chicago: GIA Publications.

Rudolph, T. (2005). Music Theory and Ear Training Tools. *Music Education Technology Magazine* , 28-31.

Salavuo, M. (2008). Social Media as an opportunity for pedagogical change in music education. *Journal of Music, Technology, and Education* , 121-136.

Technology Institute for Music Educators. (n.d.). Retrieved January 29, 2010, from http://www.ti-me.org/.

Wilensky, S. (2006). Feeding the Beast. *Music Education Technology Magazine* , 34-36.

Wilensky, S. (2007). Multidisciplinary Funding. *Music Education Technology Magazine* , 36-37.

Appendix 1

Band Technology Survey

Demographics:

List your years of teaching experience and the levels you have taught? _____

At what grade level are you currently teaching?_____

List the states in which you have taught?_____

How many students do you have in your school instrumental program?

Total _____ Concert Band _____ Jazz Band _____ Marching Band _____

Music Theory _____ Other _____ (please specify) _____

What degree(s) do you hold?_____

How would you describe the socio-economic climate of your school? _____

Is your school designated as a Title I school? YES NO

Directions: For the following sections please circle the number which best corresponds to the use of technology for your
current educational setting (to include but not limited to the band room, practice and performance fields, and any performance venue).

1=never....2=little....3=somewhat....4=much....5=a great deal

Audio Technology:	
I utilize a cassette player in my educational setting.	1 2 3 4 5
I utilize a Compact Disc (CD) player in my educational setting.	1 2 3 4 5
I utilize a Digital Media Player (MP3, Ipod) in my educational setting.	1 2 3 4 5
I have access to Analog recording facilities in my educational setting.	1 2 3 4 5
I have access to Digital recording facilities in my educational setting.	1 2 3 4 5
I utilize Silent Brass technology in my educational setting.	1 2 3 4 5
I utilize a chromatic tuner in my educational setting.	1 2 3 4 5
I utilize a strobe tuner in my educational setting.	1 2 3 4 5
I utilize a metronome in my educational setting.	1 2 3 4 5
I utilize audio amplification with my Concert Band.	1 2 3 4 5
Please describe:	
I utilize audio amplification with my Jazz Band.	1 2 3 4 5
Please describe:	
I utilize audio amplification with my Marching Band.	1 2 3 4 5
Please describe:	
My school/school system provides all of the necessary audio devices for use in my educational setting.	1 2 3 4 5
Please include any other devices not listed:	
Do you feel the use of audio technology improves the overall performance of my students?	1 2 3 4 5
Video Technology:	
I utilize a Video Cassette Recorder (VCR) in my educational setting.	1 2 3 4 5
I utilize a DVD player in my educational setting.	1 2 3 4 5
I utilize an analog video recorder (tape) in my educational setting.	1 2 3 4 5
I utilize a digital video recorder (mini DVD, HDD) in my educational setting.	1 2 3 4 5
I utilize YouTube in my educational setting.	1 2 3 4 5
I utilize a Digital Camera in my educational setting.	1 2 3 4 5
I utilize a Smartboard in my educational setting.	1 2 3 4 5
I utilize a LCD projector in my educational setting.	1 2 3 4 5

My school/school system provides all of the necessary video devices for use in my educational setting.	1 2 3 4 5
Please include any other devices not listed:	
Do you feel the use of video technology improves the overall performance of my students?	1 2 3 4 5

Computer Technology:	
I utilize a computer in my educational setting.	1 2 3 4 5
Please circle: Mac PC Both	
I utilize word processing/spreadsheet/database programs (Microsoft) in my educational setting.	1 2 3 4 5
I utilize music notation software (Finale, Sibelius) in my educational setting.	1 2 3 4 5
I utilize drill writing software (Pyware) in my educational setting.	1 2 3 4 5
I utilize ear training software (McGamut, Auralia) in my educational setting.	1 2 3 4 5
I utilize software to create internet video (podcasts) in my educational setting.	1 2 3 4 5
I utilize music editing software (Soundforge, Adobe,Pro Tools) in my educational setting	1 2 3 4 5
Students have access to computers in my educational setting.	1 2 3 4 5
My school/school system provides all of the necessary computer technology for use in my educational setting.	1 2 3 4 5
Please include any other devices not listed:	
Do you feel the use of computer technology improves the overall performance of my students?	1 2 3 4 5

Please describe how technology has had an impact, if at all, upon student learning and performance.

Please indicate the amount of monetary support for technology provided annually by either yourself, a Booster Club, School Administration, Local Education Agency, or other organization. Also, please list any added sources Of funding or "windfall" additions that are not part of an annual budget.

Please provide any band related websites that have been a useful resource.

Please describe any technology professional development that you have received, and indicate to what degree It has been applicable to your teaching.