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A Case Study of the Integration of SmartMusic into Three Middle School Band Classrooms found in Upstate South Carolina

Carla Fowler Tucker
Gardner-Webb University

A Case Study of the Integration of SmartMusic® into Three Middle School Band Classrooms found in Upstate South Carolina

By
Carla Fowler Tucker

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Approval Page

This dissertation was submitted by Carla Fowler Tucker under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

_____	_____
Phyllis Tallent, Ed.D. Committee Chair	Date
_____	_____
Steven Bingham, Ed.D. Committee Member	Date
_____	_____
Stephen C. Laws, Ed.D. Committee Member	Date
_____	_____
Jeffrey Rogers, Ph.D. Dean of the Gayle Bolt Price School of Graduate Studies	Date

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Abstract

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Technology is at the forefront of education as teachers expand their instructional strategies to incorporate technology in the hope of educating students to be 21st century learners. As more and more districts encourage educators to use technology in all classrooms, teachers search to find programs that will help their students in their particular subjects. The band classroom is not immune to this push in education; therefore, we find band directors searching for a tool to use in their band rooms.

This study looked at a web-based music program designed for performance-based groups. The purpose of the study was to examine three middle school band directors and their use of SmartMusic® in their day-to-day classroom activities. Specifically, this case study looked at the various implementation avenues, the process teachers followed to use the program in the band setting, barriers to using the program, and successful strategies used by teachers. Through observations, interviews, and artifacts the researcher was able to paint a holistic picture of each teacher and how they used SmartMusic® in their classroom.

Conclusions were drawn that each implementation process was found to be similar. The actual utilization of SmartMusic® was found to vary from teacher to teacher. Students enjoyed using the program and were a source of encouragement for teachers to continue use of SmartMusic®, thus increasing the self-efficacy of teachers. Barriers were rare, and success was found when teachers used the program consistently. Professional development was recommended for teachers using the program due to the lack thereof and at teachers' requests. Future studies include the precise utilization of the program and the effect using SmartMusic® has on a whole-group setting.

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Chapter 1: Introduction

Today's schools have entered the 21st century and begun to use technology in daily activities. Integration of technology is defined as "the incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools" (Schmitt, 2002, p. 75). Teachers use numerous sources of technology: internet, LCD projectors, document cameras, a SmartBoard®, iPads, and digital cameras; however, core curriculum classrooms are not solely the classrooms where technology is being integrated. In South Carolina, fine arts teachers have begun to incorporate 21st century technology, aligning their teaching to the South Carolina State Technology Plan in an effort to help create students who are career and college ready.

Music educators want to preserve the art of music education while incorporating technology into their classroom (Carpenter, 1991). Therefore, educators must make professional decisions on how technology can enhance their teaching. It is not a question of when they should integrate technology but how. "Electronic keyboards, music software, and computers are tools that can greatly aid students in performing, improvising, composing, reading, and notating music" (Bissell, 1998, p. 36). Today, with the emergence of "apps," teachers and students have access to digital tuners, metronomes, music display apps, and ear and vocal training (Riley, 2013). MakeMusic®, a leading music technology company, has created a program for music educators and students.

SmartMusic® is a web-based music program that was produced to "transform the way students practice and learn" ("SmartMusic® for Educators–Music Education Software," 2015, Connect with every student, every day, para. 1). The interactive tool gives students instant feedback on their performance and gives students the ability to hear

their correct part in context with a full ensemble ("SmartMusic® for Administrators–Individualized Attention for All Students," n.d.). This program can be used in various settings: whole group, small group, and individual. SmartMusic® was introduced in 1994 originally as a hardware-based tool named Vivace® and was eventually replaced by the software-only version (Long, 2011, p. 18). With technological advances, the program improved to a more user-friendly, web-based program, SmartMusic® (Rudolph, 2006). While research can be found on students using SmartMusic® (Buck, 2008; Lee, 2007; Long, 2011), little to no research was found with regard to teacher experiences while using SmartMusic®. This case study explored the experiences of middle school band directors as they used SmartMusic® in their instrumental classrooms.

Overview of Research Problem

In a report on using technology to support education reform, Means et al. (1993) wrote about challenges facing teachers while using technology in today's classrooms. Means et al. stated five challenges: "learning how to use a variety of technology applications; using adapting, and designing technology-enhanced curricula to meet student's needs; expanding content knowledge; taking on new roles; and responding to individual student"(p. 1). While these challenges are listed individually, each can be intertwined together in various ways. As teachers acquire how to use a variety of technology applications, they must also stay ahead of new software developments because the skills we teach students today will be different when they graduate or before (November, 2006). As software options change so do instructional options, thus changing how individual student needs may be met. Means et al. also stated,

> Regardless of how extensively technology is used (one program or multiple programs) or how state of the art the technology applications being used might be

> (word processing, laser disc, CD-ROM) any technology integrations require that teachers engage in rethinking, reshifting, and reshaping their curriculum. (Chapter 4, Using, Adapting and Designing Technology-Enhanced Curricula, para. 2)

This new way of thinking with technology integration creates a revolution in planning, instruction, and assessment. When teachers are not familiar with the tool or even fear it, they will be tempted to use the tool incorrectly or not at all (Callister & Dunne, 1992).

The Research Problem

As educators develop 21st century learners, integrating technology brings challenges. Many teachers are comfortable with technology; however, "when it comes to employing technology as a pedagogical tool, teachers often must play catch-up, while still acting as instructional guides" (Hammonds, Matherson, Wilson, & Wright, 2013, p. 36). This study aimed to look at the experiences of middle school band directors as they integrated SmartMusic® into their classroom. The researcher hoped to discover common threads in the area of integration, implementation strategies, and professional development and thereby provide suggestions for future success while using SmartMusic®. By discovering commonalities and successful strategies, one would be able to share his or her discovery, thus leading to a more successful technology implementation.

Research Questions

The primary purpose of this research was to discover the experiences of middle school band directors as they use SmartMusic® in their instrumental classrooms. The following research questions were used to guide the study.

1. What processes did research participants employ in implementing SmartMusic® technology in the classroom?
2. How is SmartMusic® technology utilized in the classroom?
3. What do teachers perceive as barriers to implementing SmartMusic® in their classroom?
4. What were strategies used to ensure success while using SmartMusic® in the classroom?

Rationale and Significance

Integration of technology into the classroom has become a necessity for many reasons including but not limited to expanded curriculum, students being motivated by technology, and literacy in technology (Dockstader, 1999). Music classrooms are not void of this necessity. SmartMusic® is a tool with which educators may integrate technology into the music classroom. Research studies found on the SmartMusic® website are independent studies that have "focused on the effects of SmartMusic® on music education and student learning" ("Research Studies," n.d., para. 1). Findings support and encourage educators to use SmartMusic®. Through a review of literature associated with SmartMusic®, little to no research has been found on experiences of the teacher while using SmartMusic®.

Technology availability and accessibility have been influenced by factors such as curriculum, training, time, and lack of resources and funds (Rashotte, 2005). As music classrooms begin to have appropriate devices/software, usage has increased. Along with SmartMusic® training provided at many state music conventions, teachers are becoming more familiar with SmartMusic®. Social media groups specifically tailored to band directors using SmartMusic® have been created to assist with using the tool in

classrooms.

The significance of the study was to offer educators information to assist in the implementation of SmartMusic® into classrooms and to inform administration on the need for effective implementation and professional development. This qualitative study hoped to reveal themes or patterns of implementation strategies, utilization of technology, perceived challenges or barriers, and successful strategies used to implement SmartMusic®.

Overview of Methodology

Inquiry links numerous forms of research. "Being alive renders us natural observers of our everyday world and our behavior in it. What we learn helps us make sense of our world and guides our future actions" (Merriam & Tisdell, 2014, p. 138). The researcher is fascinated in discovering not the end results students encounter but the process teachers endure while using SmartMusic®. Merriam (2009) termed the interest in "understanding how people interpret their experiences, how they construct their worlds, and what meaning they attributed to their experiences" (p. 14) as the desire of the qualitative researcher.

With the lack of research in regard to the teachers' experience using SmartMusic®, the researcher chose to do a case study of three different teachers. "Case studies often tackle subjects about which little was previously known" (Gerring, 2007, p. 79). The researcher analyzed each case study individually and across each setting. By using the collective case study method, the researcher "examin[ed] several cases to understand the similarities and differences between the cases" (Baxter & Jack, 2008, p. 550). Creating a comfortable setting was significant so research subjects were comfortable speaking. The goal was to create an atmosphere where the research

participants responded honestly.

Commensurate with the research questions, the researcher chose a qualitative approach for data collection and analysis. Creswell (2007) described qualitative research as a collection of data "in a natural setting sensitive to the people and places under study" (p. 44). This study looked at the natural setting of the band classroom and examined thoughts, processes, and feelings of directors within their environment as they used SmartMusic®. Data were collected through interviews, artifacts, and observations. Through these conversations, themes and common threads were pulled to find commonalities. Creswell (2007) described the final product of qualitative research to include the voices of participants and a "complex description and interpretation of the problem" (p. 44). In the conclusion, the researcher describes the researcher's contribution to the issue.

Role of the Researcher

The researcher is a full-time instrumental music teacher with an undergraduate degree in Music Education, instrumental, K-12, and a Master's Degree in Elementary and Secondary Administration. She has 16 years of teaching experience in a band class from Grades 6-12. The researcher began her career in middle school band, Grades 6-8. During this time, SmartMusic® was first introduced via mail-outs from the company. Lack of internet connection in the band room kept the researcher from using SmartMusic® except for in the teacher's personal office. The school did not provide practice rooms, student computers, or a SmartBoard®. During year 7, the researcher moved to the high school as Director of Bands. Three years later, the researcher was able to have a practice room equipped with a computer and internet access. SmartMusic® was purchased. The researcher has used SmartMusic® within her classroom at various

levels. It is used as an assessment tool for students and a practice tool during each student's free time. The program is not used with the whole group because of lack of visual projection, sound, and program access in the ensemble room. The role of the researcher in this study was to gather participants for surveys and collect data from surveys.

Researcher Assumptions

Peshkin (1988) described one's subjectivity like a "garment that cannot be removed" (p. 17). Personal experiences while teaching and feelings towards students and technology, along with literature explored, have shaped the researcher. This subjectivity, along with a study of literature, helped to shape this study. People cannot rid themselves of their subjectivity; however, they can learn to manage their thoughts and feelings. Researchers must reflect upon themselves to understand their connections to the subject and "disclose to their readers where self and subject became joined" (Peshkin, 1988, p. 17).

As a current band director of a small public high school where technology is important at the district office level, the researcher is urged by administration to utilize technology every day in the classroom. All students were issued iPads this school year. While technology is available, the district is unwilling to purchase SmartMusic® software for every student. Funds have been used to purchase one subscription for the researcher (teacher) and one for the "practice room." The researcher is familiar with the program, yet there are obstacles for implementation. The room where SmartMusic® is found on a student computer struggles with soundproofing. Other sounds mix into students' recordings while using SmartMusic®, thus making the assessment option very blurred at times due to outside sounds. The current practice room has now become a

storage room due to lack of storage in the rest of the band room, therefore taking away access to the computer by students. SmartMusic® was found to be helpful in assessing a large number of students when it was functioning. The researcher cannot use SmartMusic® in a whole-group setting due to the lack of computer access in the ensemble area. The researcher has not attended professional development for SmartMusic®. The researcher is a part of a larger organization, the South Carolina Band Directors Association, which has many members who utilize SmartMusic®. Through networking with other band directors across the state, the researcher is well aware of the successful use of SmartMusic® in other classrooms. Due to these experiences or lack thereof with SmartMusic®, the researcher has assumptions with regard to SmartMusic®.

The researcher assumed teacher attitudes towards SmartMusic® and technology would dictate teacher applications of SmartMusic®. In a study of a web-based learning system, teachers were found to have a more positive attitude toward using the system when they were more relaxed themselves with the system, understood its potential for instruction, and convenience to use the system (Gong, Xu, & Yu, 2004). Teachers' positive attitudes influenced how and to what extent the system was used. The researcher assumed teachers who have a positive attitude toward technology and SmartMusic® will create a positive culture while using the program with their students.

Social factors from students, parents, and community have been identified as factors that affect the implementation of technology in the classroom. "Students' achievements, encouragement from parents, and resource support from the community helped in supporting teachers' innovative approach to teaching" (ChanLin, Hong, Horng, Chang, & Chu, 2006). Trends in technology and a push in preparing students for a future in technology also affect implementation.

The researcher assumed classroom culture and environment would play a role in implementation of SmartMusic®. The learning environment, management, interaction, and pedagogical approaches may change.

> Teachers must be alert and constantly be "on-call" to function effectively in this very different form of learner-directed environment. The computers do not eliminate work for the teachers, but in fact, create more and different forms of demands in terms of classroom management, assessment, patterns of interaction, and pedagogical procedures. (Mandinach & Cline, 2013, p. 136)

Implementation of SmartMusic® will also be affected by technology available in each setting. Internet access is required along with a computer with 1GB or more of RAM. Teachers need speakers or headphones and a microphone, and the USB foot pedal is optional for hands-free operation ("Systems Requirments for SmartMusic®," n.d., Windows, Optional). While working with a large group, teachers need access to technology that would allow all students to see the screen of the computer. This could be done via a projector or SmartBoard®. Teachers who have all needed technology are more likely to implement and have more success using SmartMusic® versus teachers who attempted to use the program on a limited level. However, the researcher believed that "Integrating technology is what comes next after making the technology available and accessible" (Schmitt, 2002, p. 93).

No matter the way in which the program is used, the researcher believed that teachers who plan before they implement will be those who have used the program with success. Those who do not plan and work to implement the program will become frustrated and not see success as they first envisioned. While working with technology, the teacher's role changes from an active, lecture role to a facilitator of knowledge. The

teacher must plan so that once the task is assigned, teachers then become facilitators and work to ensure the desired learning outcome is achieved (Anderson, 1991).

The researcher also assumed teachers who attended professional development or workshops on SmartMusic® felt more comfortable with the program, thus creating positive teacher morale and positive experiences for their students. "Improved teacher skills in the classroom, in turn, help facilitate improved student performance . . . professional development program serves the needs of teachers with relevant examples and instruction" (Baylor & Ritchie, 2002, p. 16). Teacher professional development increases positive morale in the technology-using classroom.

Limitations of Study

The researcher used a qualitative research approach to the study. Implementation levels vary because of years of experience, experience with technology, professional development, experience with SmartMusic®, and past experiences. The teacher's choice as to how and to what extent he/she uses SmartMusic® may create limitations. The program may be used as a practice tool, ensemble instructional guide, or assessment tool. The degree to which teachers use the program is strictly dependent upon the teacher. The level to which teachers use the program is also dependent upon student computer and internet availability at home for certain aspects of the program. These variables were explored through teacher interviews, and how teachers overcame the limitations were recorded.

Results were restricted by accuracy of participating teachers. Self-reported data can be subject to social bias if participants answer as they feel the researcher would like them to respond. Validity was sought as the researcher combined surveys with follow-up interviews.

Delimitations

This study was conducted in three middle school band programs of South Carolina. The findings are only applicable to the schools studied. However, other schools may find the results to be applicable. Results may be found helpful to others in the area of professional development, possible barriers teachers may face, and successful strategies to implementation. The time frame of the study was a minimum set of 6 weeks versus an entire year's application of the program. School districts were chosen that were in different stages of technology implementation and had different amounts of technology available to teachers. All middle school band directors in South Carolina do not have SmartMusic®. Teachers were selected based on willingness to participate in this research study. The only determining factors were a middle school band program and utilization of SmartMusic®

Definitions

Academic standards. Statements of the most important and consensually determined expectations for student learning.

CD-ROM. Compact disc that contains a program used by a computer.

Director. Instrumental/vocal classroom teacher.

Indicators. Specific statements found in standards of the content knowledge, skills, and performance levels that students must demonstrate to meet a certain standard.

Instrumental ensemble. Group of two or more students who perform on musical instruments.

Instrumental classroom. Band/orchestra classroom where all students perform on their instrument of choice as an ensemble.

MakeMusic®. Father company of SmartMusic®, music technology company.

MIDI. Digital interface that connects computers to musical keyboards.

Nontraditional setting. Students have musical instruments as their tools versus pen/paper.

Nontraditional seating. Desks are not used; students are in arcs or rows.

Practica Musicia®. Software program designed to be a music tutor.

SmartMusic®. Web-based music program that can assist in real-time assessment of students and accompany students as they rehearse and monitor progress.

Technology integration. Using technology in the classroom as an aid in instruction/assessment.

Web-based. Content utilized via the internet.

Summary and Organization of the Study

Technology is being used in the nation's schools today. As educators are encouraged to use technology in band class, teachers may choose to use SmartMusic®. While studies show the effects of SmartMusic® on student achievement (Buck, 2008; Lee, 2007; Long, 2011), studies have not been conducted on the effects of the teachers utilizing the program. Through a case study, information can be gathered that will help other middle school band directors in their choices while implementing SmartMusic® into their instructional strategies. This study centered on the process followed, perceived barriers, successful strategies, and ways SmartMusic® was utilized in the middle school band room.

Chapter 1 provides an introduction of the research problem, importance of the study, and the reason for inquiry of the topic. Chapter 2 reviews literature associated with the topic of SmartMusic®, technology in the music classroom, and teachers' approaches to using technology in their classroom. Methodology is explained in Chapter

3. Findings and analysis of data are described in Chapter 4. Conclusions are drawn in Chapter 5, along with suggestions for future research.

Chapter 2: Literature Review

This study aimed to look at the experiences of middle school band directors as they integrated SmartMusic® into their classroom. The researcher hoped to discover common threads in the area of integration, implementation strategies, professional development, and suggestions for future success. By discovering commonalities and successful strategies, the researcher would be able to share his/her discovery, thus leading to a more successful technology implementation.

This chapter reviews existing research related to the history of music technology, SmartMusic®, technology in the classroom, barriers of technology integration, technology integration in the music classroom, SmartMusic® in the music classroom, music standards and SmartMusic®, technology professional development and teacher self-efficacy, and technology integration. Extensive research has been written with regard to technology, music technology, and teacher use of technology; however, research regarding teacher experiences with SmartMusic® specifically has not been documented.

History of Music Technology

Music technology can be divided into five phases: gears and levers, electricity, the vacuum tube, transistors, and integrated circuits (Webster, 2002). In the first three phases, the enhancement of musical instruments, electricity powering amplifiers, and music playing devices such as the phonograph and tape recorders are found.

Frances Elliot Clark, a music teacher from Iowa, developed a relationship with the Victor Talking Machine company in the late 1800s. Clark worked with Victor to bring recordings to schools. Within 1 year, she produced the first records made especially for schools. Specialized records came soon after. She believed that the phonograph was a

great teaching tool to expose her students to professional music. Through her leadership, music of the world was recorded for use in the classroom (Cooke, 1960).

It was during Webster's (2002) phase 4 mid-1950s to late 1970s that large mainframe computers emerged. Large college campuses were beginning to use computer-assisted instruction (CAI), and music programs were experimenting with synthesizers. One of the earliest forms of computer-based education, PLATO, was designed in the early 1960s at the University of Illinois (Woolley, 1994).

From phase 4 to 5 brought the personal computer and CD-ROM drive. By the 1990s, music educators were using the MIDI to help with composition, listening, and performance (Webster, 2002). Each of these devices or adaptions of are still used today to assist with instruction in the music classroom; however, computer software development played a crucial role in music education.

Music software development began as early as the mid-1950s. Programs for judging pitch accuracy were developed by Kuhn and Allvin of Sanford University in the late 1960s (Webster, 2002); followed by systems to aid in ear training, musical accompaniment, composition, and arranging. During the 1990s, Ars Nova introduced *Practica Musica* as "one of the first music theory/aural skills programs to incorporate options for students and teachers–creating a kind of 'flexible-practice' software that could be adapted to individual learning needs" (Webster, 2002, p. 42).

MakeMusic® was founded in 1990; and within the company, four families of products were provided: SmartMusic®, Finale®, Garritan®, and MusicXML®. The company prides itself on being a "world leader in music technology" (MakeMusic®, n.d., "About, Who we are"). The approach of MakeMusic® is to provide technology, content, and web services to musicians as a way to enhance how they prepare, create, and teach

music.

SmartMusic®

SmartMusic® is “interactive software that transforms the way students practice” (MakeMusic®, n.d., “About, Who we are”). The web-based, subscription program has an extensive library of over 4,000 ensemble titles, 18,000 solo titles, 50 method books, and technique exercises for all ability levels. Practice tools include built-in tuner, metronome, digital recorder, and on-screen keyboard. “With SmartMusic®, teachers can individualize instruction and document the progress of every student” (MakeMusic®, n.d., “About, Who we are”).

SmartMusic® was created to help teachers and students enrich their musical experience through practice and instructional and assessment tools that are specific to the learner. The program originally titled Vivace® was introduced in the 1990s; however, with technological advances, the program changed to a more user-friendly, web-based program that is now called SmartMusic® (Rudolph, 2006). Through using SmartMusic®, teachers can personalize a student’s learning experience. SmartMusic® is also being used in whole class settings where teachers are taking advantage of the numerous concert titles that are downloadable.

A subscription is required to access SmartMusic® for both educators and students. Educators may purchase an “Educator Subscription” for $140.00 a year. This is for teachers who use SmartMusic® in their classroom and send assignments to their classes, and it has the ability to manage grades. Educators may also purchase a subscription for practice rooms at the cost of $44.00 a year. Students may purchase their personal subscription for their own device. Students have the same options as the practice room subscription, but it is accessible at home for the cost of $44.00 a year.

Purchases can be made via credit card or school purchase orders. Schools may choose to purchase up to 4 years of subscriptions at a time ("Buy MakeMusic® Software & Accessories," n.d.).

System Requirements are listed via the MakeMusic® website. SmartMusic® is compatible with Windows and Macintosh. Headphones or speakers are required and can be purchased via the SmartMusic® website or at any local store. Internet access is required. A microphone is required; however, built-in computer microphones are not compatible with SmartMusic® ("System Requirements for SmartMusic®," n.d.).

Technology in the Classroom

Brown (2000) stated that the World Wide Web will be a "transformative medium, as important as electricity" (p. 12). This new medium not only gives information but allows one to share information. The web is also the first medium that supports the idea of multiple intelligences as it creates ways to learn and share through word, art, visual, and musical experiences. This new medium also creates ways to link the large with the small. Large companies can reach small groups of what typically may be out of reach. Small companies can now reach an audience of millions (Brown, 2000).

Rosen (2007) presented some stunning data. According to Rosen, teens are online an average of 5 days a week, 2-3 hours a day. Sixty-seven percent of teens and 40% of preteens own a cell phone and spend an average of an hour per day talking and texting (Rosen, 2007, p. 7). These numbers have risen since 2007. Recently, in a 2012 study of high school students (n=264) in Florence, Italy, results showed that 100% of students reported using the internet an average of 12.63 hours online per week (Fioravanti, Dèttore, & Casale, 2012). Over 96% of the respondents used the internet for communicating with Facebook, chat rooms, and instant messaging (Fioravanti et al.,

2012).

Technology will be essential in the future. Canton (2006) described the future workforce. Future-ready workers were described as future trailblazers. Future trailblazers are "goal-oriented, technology-driven, and highly materialistic" (Canton, 2006, p. 102). Technology drives these trailblazers as they think positively upon technology innovations and find them important to America's future success. Throughout Canton's entire book, the areas of innovation are powered by technology, climate control, fuel, the workplace, and medicine.

Technology has infiltrated society. For example, smart phones and tablets are being used from teachers and students in classrooms to those riding the subway. Smart phones have become the norm. Technology is not limited by age. Retirees enjoy social media as they keep up with grandchildren and each other. Technology is common in the workplace, and you seem to need an email address to fill out most forms.

Today's schools have embraced the 21st century and begun to use technology. This integration of technology is defined as "the incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools" (Ogle et al., 2002, p. 75). Teachers have begun to use various sources of technology such as the internet, LCD projectors, document cameras, a SmartBoard®, digital cameras, and grade-management programs.

Teachers can be found in many stages of implementation of technology. Moersch (1995) created a framework for measuring classroom technology use. According to Moersch's Level of Technology Implementation, there are seven stages of development teachers go through while moving toward integration of technology into their classrooms. The first level of implementation is actually no implementation at all. This is considered

"No Use." Teachers' lack of using technology could be due to lack of actual access to technology or lack of time to learn to implement technology.

The second stage is Awareness. In this stage, computers are being used by students but outside the teacher's classroom. There may be centralized computer rooms where students access word processing programs and the internet or even pull out programs. Technology has little to no relevance to the actual teacher's instruction. The teacher may use technology for tasks such as gradebooks, attendance, and correspondence (email).

Exploration is the third stage toward full integration of technology by teachers. Technology is now used by the teacher but in the forms of tutorials, educational games, and simulations. Technology programs are used as supplemental material or enrichment exercises. One may even find computers used as a reward system.

The next stage is Infusion. Teachers are beginning to use tools such as databases, spreadsheets, multimedia application, and desktop publishing to add to current instructional events. In science, one might use spreadsheets to visually represent results from an experiment or read graphs to draw conclusions of events. Students may use multimedia programs or webpages to show results of experiments.

Integration is level five. Here, technology-based tools are used to create context for students to understand important concepts. Technology is viewed as a tool to identify and solve problems relating to the overarching theme. Examples of these tools are multimedia, telecommunications, spreadsheets, and word processors.

Level six is Expansion. Technology has reached beyond the classroom. Teachers are working with outside sources to partner their students. Students are using technology to reach out to real life sources of information to see real world applications. Teaching

experiences are directed toward problem solving and issues resolution, and instructional content is centered on a theme or concept.

Refinement is the last state of technology integration. Students have a large tool box of technology tools. These tools are used with ease in everyday learning. Technology is used to solve everyday problems and as a source of information.

Moersch's (1995) levels of technology integration move from a teacher-centered classroom to a learner-centered classroom. Textbooks become less relevant. Technology is used as a means for information. Traditional assessment strategies are replaced by technology-driven experiences such as portfolios and presentations using new computer applications. Moersch's research created a framework that could be used by schools, districts, counties, and even states. By using the Levels of Technology Integration model and assessing the different levels of one's staff, administration can then create proper staff development for technology integration (Moersch, 1995).

Is the cup half empty or half full? This old saying can describe one's outlook on things: positive or negative. Teachers can ask themselves this same question with regard to technology implementation. Are they excited about what they have or worried about what is missing or the next obstacle to overcome? Integration of any new strategy will be met with difficultly. Williams (2013) followed a group of teachers as they integrated technology into their curriculums. She reported that teachers had a positive outlook when faced with barriers and obstacles. In fact, they did not look at them as barriers but as simple challenges to be conquered. Williams reported that "despite overwhelming odds at times, the participants' motivation, resilient nature, and passion for taking advantage of creative opportunities were the galvanizing characteristics that provided the resolve to succeed" (p. 127). These teachers were motivated to succeed at integrating technology

into their classroom. One must then wonder if the human element is perhaps the most important piece to successful technology integration. While each of these teachers were successful at integrating technology, they did ask for assistance and support at the administrative and district level.

Barriers of Technology Integration

Hope (1998) wrote, the "proliferation of computers and related technologies in schools constitutes one of the most substantive changes that have occurred in education over the last 20 years" (p. 137). Hope discussed the obstacles teachers face while integrating technology. By adding a new element (technology) into their planning and instruction, teachers are learning to adapt. This adaption takes time. Many lack personal experiences with technology, thus creating barriers in using technology in their teaching. "For teachers to integrate technology into their practice, they need to believe that using technology is more efficient and effective than their usual methodologies" (Hope, 1998, p. 137).

In 1993, a report by the Office of Educational Research and Improvement in Washington, D.C. titled "Using technology to support classroom reform" was produced. In Chapter 4, Means et al. (1993) wrote about the challenges facing teachers using technology in today's classrooms. Means et al. stated five challenges:

- learning how to use a variety of technology applications;
- using, adapting and designing technology-enhanced curricula to meet students' needs;
- expanding content knowledge;
- taking on new roles; and

- responding to individual students (Chap. 4, Challenges for Teachers Using Technology).

While these challenges are listed separately, each is woven together in different ways. These challenges are barriers teachers must overcome.

In a 2010 report from the Department of Education (Gray, Thomas, & Lewis, 2010), it was found that 97% of teachers had one or more computers located in their classroom. The ratio of students to computers in the classroom on a daily basis was 5.3 to 1. Teachers reported that over 69% of students used computers for instructional purposes "often" or "sometimes." Teachers also reported having other technology available for their use such as LCD projectors, whiteboards, and digital cameras. Of those teachers who had these materials available, reported use was 72% for LCD projectors, 57% whiteboard use, and 49% digital cameras (Gray et al., 2010). These numbers are an increase from a 2004 study by Muir-Herzig on technology and its impact in classrooms. Muir-Herzig's findings, based on a survey of technology use by teachers in a local high school using a Likert scale (1=none, 2=little, 3=moderate, 4=high), found that over 74.7% of teachers surveyed used digital cameras "none" while 69.8% of teachers surveyed used LCD projectors "none." Through the sample taken, only one teacher fell into the category of overall "high" use of technology in their classroom (Muir-Herzig, 2004). This transformation from 2003 to 2010 shows the change in overall technology use among teachers in the classroom.

Multiple factors influence the amount of technology integration. Factors found to influence teacher levels of technology integration include personal fears, organizational and pedagogical concerns, beliefs about teaching, training, access to equipment, reliability of equipment, technical support, school climate, and culture (Ertmer, 1999;

Ertmer, Addison, Lane, Ross, & Woods, 1999). The National Center for Education Statistics (NCES, 2010) reports school socioeconomic status and teacher demographics such as gender, age, and number of years teaching have a significant impact on technology integration, along with time spent in professional development.

Barriers that influence integration were described by Ertmer (1999) as first-and second-order barriers. First-order barriers refer to obstacles that are extrinsic such as equipment and software. Second-order barriers refer to the intrinsic barriers teachers experience. These barriers hold no experience level, age, or gender boundaries. Each teacher has his/her own personal beliefs on education and how students learn. Ertmer discussed the relationships between the two barriers. Each teacher and classroom is unique. The mindset the teacher has with regard to technology and barriers greatly affects the outcome and experiences the class has with regard to technology.

The lack of technology training for teachers is a constant thread through research. Teachers become equipped and their rooms become ready to use technology. Their students have the proper materials, yet the teachers themselves are not prepared to use the technology they are given. Lin (2005) reported positive attitudes from students when integrating technology into music lessons; yet in their summary, teacher training was an issue. Lin's report showed frustration from teachers when they attempted to learn of new technology products, how/where to purchase them, and how to receive proper training from educational services. Music students were also frustrated with their personal lack of knowledge of new technology and how it worked.

Crawford's (2010) positive study of technology integration into the music classroom presents three scenarios where most schools can be found. Within these scenarios we see barriers to technology integration. The first scenario and the rarest is a

school that has excellent funding, high-quality technology, music technology, and support for all of their technology needs. This type of school has all it needs to implement technology if the teacher is not a barrier to integration.

Scenario two includes computers that are very reliable, but no music technology is available. These schools may even be on a 1:1 ratio of computers to students, but resources have not been allotted to music technology.

The third scenario and the most common, is a school with some computers and little music technology. These schools contain computer labs that are accessible by all, yet there are not enough computers for all students at the same time. These computer labs are typically used by "core" classrooms and rarely available for music class. In most of these schools, the connection between music and technology has not been discovered or there is little to no importance given to the two (Crawford, 2010).

Technology Integration in the Music Classroom

Technology and music date back to the early 1600s as music boxes were created and methods for sound synthesis were made. Webster (2002) placed music technology into five phases. Phase 5 was described to begin in the late 1970s and go to the present. During this phase, the emergence of the personal computer along with the CD-ROM that allowed these personal computers to play audio CDs and thus be used in the music classrooms is found (p. 41). The creation of the MIDI has allowed music educators the ability to create computer generated musical sounds that aid in composition, performance, and listening programs in the music classroom. Software programs such as Practica Musica® were created to aid in instruction of music theory and aural skills. Music writing programs like Finale® can be used in composition classes and with writing/arranging music. SmartMusic® provides students with musical accompaniment

for aid in learning specific pieces, technical training, and personalized activities assigned by teachers. With the popularity of the web, more web-based programs are being developed for teaching and learning of music skills (Webster, 2002, p. 43).

Fears of technology integration stem from the traditional performance-based classrooms such as concert band, orchestra, and choir. With new core music standards, Criswell (2015) suggested that teachers look for those areas in which they have historically struggled to incorporate such as composition and start trying to find small ways to use technology to incorporate these standards. For large ensemble classes, recording technology is the "key to opening the angle into the new Standards" (Criswell, 2015, p. 34).

For successful integration of technology into the music classroom, "teachers need to make a paradigm shift—a new way of thinking about music learning and music instruction" (Kassner, 2010, p. 3). In Kassner's (2010) article, he listed National Music Standards along with music technology options to help meet these standards. This new way of thinking was also studied by Crawford (2010) while investigating technology in the music classroom. Results were positive. Students became investigators while the teacher played the role of facilitator. Crawford noted an important factor in the success of implementation was "necessary pedagogical change to support the effectiveness and impact of such technology" (p. 33). Both studies noted a change needed by the teacher in their approach to teaching music.

Lin (2005) studied student and teacher perceptions of integration technology into the learning process. Student's musical learning experiences were positive when technology was integrated. Results showed students feeling as if they made more progress, enjoyed more satisfaction while learning, and had an overall better attitude

toward learning. Outside of music, Lin found that students enjoyed using music technology because it gave them more opportunities to use technology in general. Students felt as if they were increasing their chances of employability by creating a diversified portfolio of technology experiences.

Not all teachers believe technology is needed and can enhance the learning process. Lin (2005) reported teachers not wanting to integrate technology because of the human aspect that is taken away from the learning process. Those teachers studied believed heavily in technology not being able to replace body language and personal interpretation of instruction. While music can be judged on correct pitch and rhythms, the human aspect or musicality of a piece is subject to personal opinion. Aesthetic feelings cannot be created nor mimicked by a computer program.

Technology in the music classroom can come in many forms. SmartMusic®'s parent company MakeMusic® is also the creator of Finale®, Garritan®, and MusicXML®. Each of these programs can be used in the classroom of any age. Finale® is a music notation software program that allows you to create, edit, print, publish, and playback the score. The program is designed for composers, arrangers, students, and teachers. Garritan® is a collection of virtual software instruments. MusicXML® is designed for sharing sheet music between a wide range of music applications (MakeMusic®, n.d., "About, Who we are").

Dekaney (2003) studied the use of CAI in a choral setting while students studied phonetics and diction. While the CAI group had multiple complaints of the program, the design of the program itself seemed to be flawed. Those in the CAI program who did well on the studies posttest were those who spent the most time with the CAI program and who were older. This brings to question the amount of time spent with CAI

programs and the maturity level of users (Dekaney, 2003).

Other forms of CAI are available and cover a wide range of topics. Programs are available for studying musicianship, music history, theory, composition, and performance. Ability levels vary as styles of programs are aimed for specific ages and abilities of students. Young students may enjoy games while learning a new concept, yet more experienced students may use a drill and repetition program to heighten their musical performance. Students are able to work on their level and at their own pace (Hosken, 2014).

With the emergence of the smartphone and tablet, music apps are available that cover many of the same CAI topics. A variety of apps imitate musical instruments such as Real Piano Pro. Students have a piano on their iPad which produces a realistic grand piano sound. Other instruments can also be found such as a guitar, various percussion instruments, wind, and stringed instruments. Apps for studying music theory are available such as Note Perfect. Multiple apps have been produced for music creation: Garage Band, Improvox, Everyday Looper, Pattern Music and Symphony Pro ("30 iPad Apps," 2014).

Online communities have formed centered around specific instruments, music technology apps, and age/ability levels. The emergence of YouTube® allows for anyone (professional to novice) to post videos of them playing. Many teachers have created online "lessons" in which one can watch a YouTube® video and learn from those who you may never be able to physically meet. The United States Army Field Band has a YouTube® channel dedicated to educating young musicians on how to play their instruments to instrument repairing (U.S. Army Field Band, 2011). Along with videos of ensembles playing, you will find clinics featuring specific instruments and specific songs.

SmartMusic® in the Music Classroom

SmartMusic® has been used in multiple types of music classrooms. Research has been conducted in chorus, band, and general music (Aziz, 2013; Macri, 2015; Myers, 2011). While studying the effects of CAI on beginning instrumental music students, SmartMusic® was used as supplemental instruction. It was hypothesized that beginning students who used SmartMusic® would see an increase in their performance scores due to the features of SmartMusic® such as accompaniment and instant feedback. The hypothesis was not proven to be correct. It was also hypothesized that the length of time spent with the program would increase the students' performance scores. This was also proven incorrect. Recommendations for future studies were given in regards to allowing students who were being studied to have more time with the SmartMusic® program before research was conducted due to the program's complexity (Lee, 2007).

Early research was conducted on the program Vivace®, which later became known as SmartMusic®. While studying 10 college flute students, it was found that Vivace® (SmartMusic®) "transformed these participants' music learning" (Tseng, 1996, p. 149). Attitudes of students who were not familiar with the program soon changed as they learned to master Vivace®. Other findings included previous computer experience not playing a role in the research, positive attitudes toward Vivace® as a teaching tool, and participants learned music as it would be performed in a performance setting. It was concluded that music technology "should not only find its way to fit into the music curriculum but also have the potential to shape the curriculum" (Tseng, 1996, p. 161).

Studies have been conducted on SmartMusic® as on overall product. College brass players who chose music as their major were surveyed on their experience while using the software. Flanigan (2008) looked at the students' overall experience using the

program. Students had on average 9 years of experience on their instrument. While the sample size was small, students showed an increase in performance areas such as intonation, expressive qualities, and tone quality. The researcher noted that even though SmartMusic® was shown to be useful, the human effect still played a role. “Practice effectiveness is largely dependent upon the student” (Flanigan, 2008, p. 105).

SmartMusic® assessment tool. SmartMusic® offers features and benefits such as assessment, documentation, extensive repertoire library, technical exercise, and practice tools. Students may be assigned lessons from their teacher or can choose their own exercises. Once students are logged in and have chosen their exercise, students play along with the built-in accompaniment. As students perform, a microphone worn by the students or placed on their instrument is used to record their performance. SmartMusic® then assesses their performance. The correct music is written in black. Once the student performs and is assessed, correct notes light up green while incorrect notes light up red. Students can choose to have the assessment scored, recorded, saved, and even submitted to a teacher. Teachers can then access their educator subscription and recall recorded performances along with percentage scores obtained by students (“SmartMusic® for Administrators–Individualized Attention for All Students,” n.d.).

SmartMusic® as an assessment tool has been studied with students from elementary to collegiate levels. Buck (2008) conducted a study using SmartMusic® as a teaching and learning tool. The researcher used a control group who were taught by the teacher and an experimental group who used a combined effort of teacher and SmartMusic® assessment. Both groups received five lessons over a 3-week period. Results showed that the “SmartMusic® assessment program reinforce music performance skills, especially in technically oriented music passages” (Buck, 2008, p. 63).

Myers's (2011) results also supported the concept that SmartMusic® can increase the score of students in the areas of intonation, melodic accuracy, rhythmic accuracy, and tempo. In all four areas, students tested consistently better than the control group. The instant feedback given by SmartMusic® allowed students to analyze and make changes right away, resulting in a more accurate performance at home. The amount of feedback to the experimental group was almost 30% more than the control group of students (Myers, 2011).

While the results were positive, the assessment feature did receive some negative feedback and reactions from students. Obstacles such as set-up time affected the amount of time dedicated to the actual lesson which was only 15 minutes per student. Microphone placement is crucial with each different instrument. The volume level of each individual also created inconsistency in microphone placement. Along with technical obstacles from the computer and microphone were individual intonation issues. SmartMusic® reads the pitch of each note to determine if the correct note is being played. Poor intonation could result in a note being "wrong," even if the student technically played the note correctly (Buck, 2008).

Middle and high school students were studied on their perceptions of the effectiveness of SmartMusic® as an assessment tool. Gurley (2012) conducted research on band students, Grades 6-12 (N=147). Through a 10-question prompt, students reported to feel strong towards SmartMusic® assessing their playing and helping them to find their mistakes. Students also felt strongly that SmartMusic® helped them to play more accurately. These results help to support the concept that the SmartMusic® assessment tool helps students self-assess, thus modifying their performance in a positive way (Gurley, 2012).

Not all research has proven SmartMusic® to be a positive method of assessment of students. Astafan (2011) conducted a study with two groups of students: control and experimental. Students worked with and without SmartMusic® over a 4-week period. Astafan concluded there may and may not be validation for SmartMusic® being a useful tool, and SmartMusic® is only useful when it is reliable. While the groups as a whole did not show great gains in their assessment scoring, students within the experimental group showed massive gains. A particular student showed progress of over 30% in their score. Some students actually showed a negative progression.

Astafan (2011) named three areas she felt greatly affected outcomes of student results: time, technology, and human flaw. Time to become acquainted with the program before actually using it was a concern of Lee (2007). Students, who do not know how to open, navigate through, and save/send work can create a variable in the students' overall performance. Technology working correctly can affect the outcome of student performance. Buck (2008) spoke of losing time in his 15-minute lesson to open and use SmartMusic®. While Astafan's lesson was a 30-minute lesson with each student, losing time due to waiting on technology to open and run still affects progress of students.

Astafan (2011) reported that human flaw cannot be controlled by the researcher. While one attempts to eliminate all possible factors that can affect a study, the participants of the study can greatly affect results. The inconsistency of student attendance, lack of instruments, and tardiness were uncontrollable. "Teachers should make tools work for their instruction, not allow the tool to control their instruction" (Astafan, 2011, p. 29).

SmartMusic® as a teaching and practice tool. SmartMusic® offers numerous options in a classroom setting. In order to use the program to its full extent, it is essential

for the teacher to have some form of amplification and a large screen. Interactive whiteboards such as “SMART” boards work well; however, an LCD projector works well also. SmartMusic® offers a tuner, metronome, and digital recorder feature. While working with large groups, SmartMusic® acts as an assistant which allows the teacher to move about the classroom offering individual help. Selections can be placed on a loop to have multiple repetitions for rehearsal. The onscreen assessment gives immediate feedback of group/individual performance. If needed, fingerings for specific instruments can be shown to students. During full ensemble repertoire rehearsals, SmartMusic® allows specific parts to be shown and assessed while a recording of a piece is performed by a professional ensemble. Students can listen to what their part should sound like while viewing the part via the whiteboard/screen (“SmartMusic® for Administrators–Individualized Attention for All Students,” n.d.).

To aide with students’ technical playing abilities, SmartMusic® offers a variety of exercises that can be used in an individual setting or large group. These settings can also be altered to fit the specific needs of the student. Exercises include scales, intervals, arpeggios, twisters, rhythms, jazz scales, blues licks, playing by ear, and various vocal exercises. These exercises can be altered by range and tempo to fit specific student’s playing abilities and needs. All students can benefit from a built-in tuner, metronome, digital recorder, and on-screen keyboard. These can be used during technical exercises or at any time (“SmartMusic® for Administrators–Individualized Attention for All Students,” n.d.).

SmartMusic® has the largest digital sheet music library with accompaniment available. The library includes over 4,000 ensemble titles, 18,000 solo titles, and over 60 method books for band, orchestra, and choir. Over 600 sight-reading and sight-singing

exercise are available. Teachers can also import Finale files into SmartMusic®.

These practice and teaching tools designed by SmartMusic® have been proven to be positive among middle school and high school students. Results show that middle school students, especially beginners, enjoy practicing with SmartMusic® versus high schools students. Gurley (2012) reported sixth graders having a stronger response than high school students to the prompt if a student would rather practice with SmartMusic® or without. Students were shown to have confidence after practicing with SmartMusic®. As before, as students got older, they reported SmartMusic® having less of an effect on how much they practiced. This research showed a definite difference in age and its effects using SmartMusic® (Gurley, 2012).

All ages of students are able to use SmartMusic®. Elementary students have shown success using the program as a supplemental teaching tool and practice aid at home. Beginning band students are just learning their instruments and training their ear to what is and is not appropriate. For a beginner to differentiate what is right and wrong with little to no experience is a great task (Myers, 2011). By using SmartMusic®, students are able to see when they are right or wrong. They also hear professional sounds as the program plays along with students.

Myers's (2011) study of 43 elementary beginner band students was based on the idea that beginning students will progress faster when using SmartMusic® as a home practice tool. Using SmartMusic® effectively eliminates the student's requirement to make an unqualified music judgment while practicing outside of class. Young students must train their ears to what is appropriate for their instrument and ensemble. Myers specifically studied students' evaluation by SmartMusic® in the areas of intonation, melodic accuracy, rhythmic accuracy, and tempo. The researcher used SmartMusic® to

assess students so the human element was taken out of the evaluation process.

Myers's (2011) study showed support for the idea that SmartMusic® is a positive tool for teaching and practice music. Rehearsal at home via SmartMusic® was on average 35+ minutes a week more than students who practiced at home without SmartMusic®. This extra time spent in rehearsal gave beginning students the extra help needed to push them through their first semester. The SmartMusic® group of students' practice time remained higher than the control group for a 7-week period.

Myers's (2011) study also reported an increase in time the director had to help other students in class due to students using SmartMusic® at home. Those students who had SmartMusic® would take their assessments at home versus in the classroom. Myers reported that with just 23 students using SmartMusic® at home, this saved a total of 34.5 minutes a week that could now be spent teaching students in the classroom setting. These results support teachers as they compare time spent assessing versus actually teaching (Myers, 2011).

While studying high school students and their performance abilities, SmartMusic® was used as CAI. Two groups of students were studied: a control group in a traditional setting (n=40) and a treatment group that worked with SmartMusic® (n=40). Pre and posttests were conducted using SmartMusic® and evaluated by three experienced music educators. During a 4-week period, both groups worked on the same musical selection. Results showed that SmartMusic® "is an effective tool in developing music performance skills in high school students" (Perry, 2014, p. 144).

Music Standards and SmartMusic®

Teachers are expected to teach by standards that were written as a guide to give students a complete, comprehensive musical experience. How teachers choose to present

material is dependent upon the teacher. The National Coalition for Core Art Standards released their 2014 Core Music Standards (National Core Arts Standards, n.d.). These standards are centered on four areas: creating, performing, responding, and connecting. SmartMusic® addresses each of these areas (National Standards for Music Educations n.d.).

The "creating" standard is addressed in SmartMusic® through the genre of jazz. The Wynton Marsalis series on SmartMusic® or other jazz method books such as Aebersold are found on SmartMusic®. Through these series and books, students can improvise, learn to read chord changes, practice jazz specific technical exercises and scales, play by ear to prerecorded chord progressions, record their original compositions, and share those with an audience (National Standards for Music Education, n.d.).

The process of "performing" includes selecting, analyzing and interpreting music, rehearsing, evaluation and refining, and presenting (performing). SmartMusic® allows students to select music from an extensive library of over 4,000 ensemble works and 18,000 solo pieces. SmartMusic® allows students to perform independently while listening to the whole ensemble or accompaniment. Analyzing and interpreting music is aided with the SmartMusic® Intelligent Accompaniment. As students perform, SmartMusic® listens and shadows the performer's tempo, pitch, and rhythm. By recording a student's performance then sharing with their teacher, both teacher and student can listen, analyze, and make necessary changes. Unlimited rehearsal takes are available to the student. Audio and visual feedback allow the teacher to assign other material that may aide in the overall performance of the student. After evaluating and refining their product, students then present (National Standards for Music Education, n.d.).

"Responding" to music is the third area presented by the Core Music Standards. The combination of recording and visual assessment allows students to respond, evaluate, and reflect upon their own performance. Teachers may create response assignments for students to reflect upon performances, support their choices of repertoire, and analyze music (National Standards for Music Education, n.d.).

SmartMusic's® extensive repertoire includes music from all time periods. Works from Mozart, Bach, and Vivaldi to contemporary composers such as Copland are found. Information about composers and their composition is available for students. This information allows students to "connect" or draw conclusions to the music and connect music's historical and cultural contexts with the student and audience (National Standards for Music Education, n.d.).

Technology Professional Development

Professional development comes in many forms: informal dialogue, courses and workshops, professional literature, conferences and seminars, professional development networks, research, and mentoring/peer observations (OECD, 2009). Through informal dialogues, teacher's personal experiences shared with others are "living theories of educational quality and should be shared with the wider educational community for the benefit of all involved" (Diaz-Maggioli, 2004, p. 5). Technology can be discussed, researched, and observed; and teachers then can use information to improve their instructional time with students. In 2007-2008, the second greatest need reported by teachers with regard to professional development was information and communication technology (OECD, 2009). Teachers wanted to know more about how to utilize technology in their classrooms.

Technology is ever changing. Hoover (1997) saw a need to look at professional

development for teachers and technology. The Virginia State Board of Education was considering instructional technology standards that would apply to licensed professionals. Hoover saw a need for professional development to address teachers who may be behind in their knowledge of technology and designed a program that others could model. The design was in four stages: basic computer skills, media session, internet session, and integration of applications at a beginner level. Instructional courses in beginner Mac/Windows, HyperStudio, PowerPoint and searching the Internet were examples of courses offered (Hoover, 1997). Today, there are programs and skills far beyond what were offered in the 1990s. As technology changes, so must professional development.

The Educational Training Service (Cole, 1997, as cited in Lauro, 2005) reported that the most crucial aspect in preparing teachers to use technology is allotting enough time for the teacher to become trained. The report suggested using a third of its technology account to fund teacher training. ETS also wrote that school leaders discovered there was a learning curve much greater for teachers than children. The study found that continuous training on an unending basis is what produces key effects. Teachers cannot be introduced to technology and left alone. Only when teachers feel comfortable with technology or a new program will they feel comfortable introducing it and utilizing it to enhance their instruction and classroom (Cole, 1997, as cited in Lauro, 2005).

Lauro's (2005) study took place over a 3-year period in one public school district. The study's goal was to investigate how public school teachers judged the effectiveness of professional development of incorporating technology into their instruction. This 3-year study produced many findings including the importance of technology in classrooms and technical support. With regard to professional development, teachers reported they

preferred professional development to be specific and focused on certain skills and/or pieces of technology. Lauro's study agreed with the OECD (2009) report that teachers appreciated using an open forum discussion as professional development. The open forum allowed teachers to share their integration methods they used in their classroom and reflect upon their methods compared to others.

Perhaps one of the most important findings from Lauro's (2005) study revealed that professional development in technology integration can change the perceptions of teachers in a positive way. There was a strong correlation between professional development and the way teachers perceived their use of technology in their classroom. Lauro suggested research for future specific professional development methods that should be used to help teachers with their technology integration.

Professional development is needed so teachers can effectively model the various applications they want their students to use. Teachers must first appreciate and understand the piece of technology before showing students how to use it. Gurley (2012) stated, "The technology itself must not interfere with the lesson" (p. 39). Through professional development, a teacher can gain knowledge and experience needed to guide his/her students with technology so the technology itself does not slow the instructional process or even hinder it from happening at all. Multiple studies have concluded that if students were more familiar with SmartMusic®, their results would have been more positive (Astafan, 2011; Gurley, 2012).

Self-Efficacy and Technology Integration

Teacher efficacy was first introduced in a 1976 study conducted by the RAND Corporation. The study was based on the effectiveness of the preferred reading program in selected schools of the LA Unified School District. Teacher attitudes were found to

plays a significant role in the reading achievement of students. "The most effective reading teachers had a strong sense of personal efficacy" (Armor, 1976, p. 38). Based on the results, teachers utilized various methods of instructional delivery to reach their students and remained confident in their teaching abilities. The relationship between efficacy and abilities in the classroom contributed to the overall positive atmosphere of the classroom.

Teacher efficacy again appeared in a RAND report to the U.S. Office of Education in which "teacher characteristics had major effects on project outcomes" (Berman, 1977, p. 11). It was through this report the term teacher efficacy was defined as "a belief that the teacher can help even the most difficult or unmotivated students" (Berman, 1977, p. 136). Teacher efficacy was positively related to goals achieved, amount of teacher change, and improved student performance. Through these early studies, we see the significant effects teacher efficacy can have on student performance.

Bandura's (1977) research described how one's personal efficacy may be based on a person's performance accomplishments. Through these personal mastery experiences, success increases one's sense of self-efficacy. A strong sense of self-efficacy is created through repeated positive experiences. Once a strong self-efficacy is created, negative experiences are less likely to impact one's sense of self-efficacy. Negative instances that are met with determination will strengthen the participants' efficacy. Therefore, future obstacles will be easier to master given prior experiences.

Personal mastery experiences appear in many forms. Instructional delivery mastery requires a constant assessment of one's practices and actions. Student assessments are not the sole source of an assessment of a mastery of delivery; however, they could play a role in the assessment of delivery of instruction. In order to build

instructional mastery, one must work to create a positive culture within the classroom by developing relationships with students, communication, creation of routines, and a common language among teacher and students (Balls, Eury, & King, 2011).

Hoy (2000) built on Bandura's work and described another factor that may impact a teacher's sense of self efficacy: vicarious experiences. These experiences occur when teachers observe other teachers using an effective specific method or tool. By observing another teacher using the tool effectively, the teacher feels more confident in his or her own ability to use the tool or method successfully in their own personal classroom.

When placed in the context of the classroom, when a specific new instructional strategy creates an increase in understanding by students, the teacher's efficacy is increased as the students' "performance" has created a positive effect in the classroom. Using Bandura's (1977) theory, teacher experiences with student performance accomplishments using SmartMusic® should impact teacher self-efficacy. Teachers experiencing success with SmartMusic® increase the positive feelings toward utilizing the program as a tool for instruction, thereby increasing the teacher's self-efficacy towards SmartMusic®. It has been determined that as a teacher increases the number of positive performances, their level of efficacy increases as a result (Bandura, 1977).

Examining a case study can be looked upon as a vicarious experience. Through studying others in a similar environment, teachers may find effective teaching practices, thus increasing their own positive personal feelings on using the same effective teaching practices within their own classroom. The case study may present an example of successful performances by others and, following Bandura's (1977) theory, increase the self-efficacy of the reader (Albion, 1999).

When linking teacher self-efficacy to technology integration, as documented in a

study by Borchers, Shroyer and Enoch (1992), it was determined that teacher self-efficacy increases through participation in appropriate professional development. As their self-efficacy increased, they were more likely to incorporate technology into their teaching. Marcinkiewicz (1994) also reported that teacher self-efficacy was directly related to teacher use of technology in their classroom.

By relating these two studies, we see the connection between professional development increasing self-efficacy, thus increasing the integration of technology in the classroom. This idea is supported by Borchers et al. (1992), as the study demonstrated professional development programs over a period of time increase the level of self-efficacy and computer use. Contrary to the above study, Mishne (2012) found that teachers with a high sense of self-efficacy integrated technology less than those teachers with a lower sense of self-efficacy. These teachers may perceive themselves as effective without the use of technology.

Summary

This chapter originated with a brief description of the history of music technology and progressed into a review of literature in the areas of integration of music technology into the classroom. The literature review included music technology history, SmartMusic®, technology in the classroom, barriers to technology integration, technology in the music classroom and SmartMusic®, how SmartMusic® relates to the national music standards, and the effects of technology integration on teacher self-efficacy.

A thorough review of literature around technology and the music classroom shows the progression of technology in the music classroom, specifically SmartMusic®. A connection is made between the use of technology and how it can aid in the instruction

of music. Research is found specifically on SmartMusic® and the benefits of using the program. The review of music standards connect how SmartMusic® can be used to reach current standards while incorporating the technology component that many schools are pursuing; however, studies on the actual implementation of the program are lacking. Research identifies barriers teachers must face when implementing technology in the classroom. Finally, current research on SmartMusic® is focused on student outcome. There is no research on how the teacher implements SmartMusic® in the classroom, what strategies are used when using SmartMusic®, how teachers overcome technology barriers while using SmartMusic® and how the implementation of SmartMusic® affects the teachers' sense of self-efficacy. Through this case study, the researcher sought to answer these questions to help in further implementation of SmartMusic®.

Chapter 3: Methodology

The overall purpose of this qualitative case study was to conduct an in-depth investigation of middle school band directors' implementation of SmartMusic® technology in their classrooms. Chapter 3 consists of the research design, purpose and benefits, research questions, participants and setting, ethical measures, role of the researcher, participant selection, the nature of the data collection and analysis, and the validity and reliability of the research. This chapter also addresses treatment of information and analysis procedures that guided the interpretation of information collected. Research questions driving this study were

1. What processes did research participants employ in implementing SmartMusic® technology in the classroom?
2. How is SmartMusic® technology utilized in the classroom?
3. What do teachers perceive as barriers to implementing SmartMusic® in their classroom?
4. What were strategies used to ensure success while using SmartMusic® in the classroom?

Research Design

McCaslin and Scott (2003) created five questions to aid researchers in selecting a definite method of qualitative research design. Each question related with one of the five major methods as described by Creswell (1998): biography, phenomenology, ethnography, case study, and grounded theory. While one topic may fit into each question, researchers must determine their focus and desired outcome that will then lead them to their specific method of qualitative research.

After reviewing McCaslin and Scott's (2003) questions, the researcher chose the

question/act that best described her desired outcome: “If I could discover what actually occurred and was experienced in a single lived event, that event would be?” (McCaslin & Scott, 2003, p. 450). Using SmartMusic® as the “event,” the researcher aimed to discover the experiences of middle school band directors as they incorporated SmartMusic® into their classroom through the approach of a case study.

Creswell (1998) defined a case study as an “exploration of a ‘bounded system’ or a case (or multiple cases) over time” (p. 61). For this particular study, the researcher looked at three participants who shared the same technology program, SmartMusic®. The researcher chose a collective case study method in an effort to draw conclusions, develop recommendations and implications to enhance, and help others who are interested in SmartMusic® as well. Creswell (1998) preferred to “select cases that show different perspectives on the problem, process or event” (p. 62). The researcher observed, recorded, and interpreted experiences using detailed descriptions to discover themes and similarities among participants. Multiple sources of information were used: observations, artifacts, and interviews.

Purpose and Benefits

Choosing a case study method provided readers with a “rich and holistic” account of each individual (Merriam, 2009, p. 51). Case studies are used to discover the how and why of an implementation process (Yin, 2014). Case studies also give insight and meaning for future research. The researcher aimed for readers to gain knowledge and learn through the cases studied. Once having read the results, the reader could then decide how much or little one could apply the results to their instruction. It was the researcher’s role to simply present information. Merriam (2009) suggested that case studies can be conducted to “bring about understanding that in turn can affect and

perhaps even improve practice" (p. 51).

In this particular case study, research was used to discover the hows and whys of the implementation of SmartMusic®. The researcher hoped readers discovered similarities and differences between themselves and cases studied. From there, readers could choose to take away ideas as needed and wanted. Once results were presented, the researcher hoped to improve the current practice of the implementation of SmartMusic® by directors. Not only can directors benefit from the research presented, but administrators may benefit as they seek to help teachers improve in their implementation of technology.

Research Questions

The review of literature discovered was extensive research with regard to student achievement while using SmartMusic®. Little research had been conducted on the actual process the teacher experienced to implement SmartMusic® into the middle school band room. The approach teachers took to how the program was used, strategies they put into place before the implementation, and barriers they had to overcome was not studied. Research questions were created to fill in the gaps of information with regard to the process to implementation, SmartMusic® usage, barriers teachers found, and strategies for success. The research questions driving this study were

1. What processes did research participants employ in implementing SmartMusic® technology in the classroom?
2. How is SmartMusic® technology utilized in the classroom?
3. What do teachers perceive as barriers to implementing SmartMusic® in their classroom?
4. What were strategies used to ensure success while using SmartMusic® in the

classroom?

Participants and Setting

Middle school band programs that were using SmartMusic® in their classrooms were chosen on a voluntary basis. Criteria included teaching Grades 5-8 or a combination of grades. SmartMusic® must be used in their classroom. Limitations on how the program was used such as whole group/individual, assessment, practice, differentiation, and instructional strategies were not placed. Three middle school band directors were chosen from a variety of socioeconomic areas, school size, director's age, director's time at current school, and past experiences with SmartMusic® including training and/or professional development. Directors were asked, but participation was solely optional.

Ethical Measures

Approval for data collection was obtained through each of the school districts involved, along with approval from the IRB at Gardner Webb University. Participants were sent letters detailing the research process (Appendix A). Approval from each superintendent's office and each individual school's principal was sought via email (Appendix B). Each director involved submitted a consent form for approval in the study (Appendix C). The identity of the school districts and directors remained confidential.

The researcher was not nor is officially affiliated with SmartMusic®. As a band director in middle and high school, the researcher was a subscriber to SmartMusic® but not a current user of the program. Neither the researcher nor the researcher's school would benefit via SmartMusic® from the research study.

Role of the Researcher

The researcher is a full-time instrumental music teacher with an undergraduate

degree in Music Education, instrumental, K-12, and a Master's Degree in Elementary and Secondary Administration. She has 16 years of teaching experience in a band class from Grades 6-12. The researcher began her career in middle school band, Grades 6-8. During this time, SmartMusic® was first introduced via mail-outs from the company. Lack of internet connection in the band room kept the researcher from using SmartMusic® except in the teacher's personal office. The school did not provide practice rooms, student computers, or a SmartBoard®. During year 7, the researcher moved to the high school as Director of Bands. Three years later, the researcher was able to have a practice room equipped with a computer and internet access. SmartMusic® was purchased. The researcher used SmartMusic® within her classroom at various levels. It was used as an assessment tool for students and a practice tool during each student's free time. The program was not used with the whole group because of lack of visual projection, sound, and program access in the ensemble room. The role of the researcher in this study was to gather participants for surveys and collect data from surveys.

Participant Selection

Participants in this case study included three middle/junior high band directors located in upstate South Carolina. Each director utilized SmartMusic® in his/her band room at various degrees and times. Those band directors who met the criteria were spoken to in person and emailed concerning their willingness to participate in this study. Participants were sent a letter explaining in more detail the actual procedures of research (Appendix A). Permission was asked for participation via each superintendent's office and school principal. Consent forms were submitted by each participating director. Confidentiality of all participants and their school and district names were maintained

throughout the study. No particular parameters such as gender, socioeconomic status, ethnicity, or disability were placed on participating directors. No exclusions beyond grades taught (5-8 or a mix thereof) and use of SmartMusic® in some form or capacity were created.

Data Collection

Creswell (2014) identified common, basic characteristics of qualitative research such as the natural setting, researcher as the key instrument, and multiple sources of data. For this study, the researcher observed band directors in their classroom (natural setting). The researcher was the key instrument as she observed the multiple sources of data including the director, oversaw the questioning, and examined artifacts presented. Other characteristics of a case study include reflexivity and holistic account (Creswell, 2014). The researcher reflected on how her personal experiences and background had potential for shaping interpretations of the data. Lastly, the researcher created a holistic, descriptive account of each director's experience while using SmartMusic®. While painting a thorough picture of each experience, the researcher explored all factors involved to create the finished product.

Creswell (2007) viewed the key instrument in qualitative research to be the researcher. Prior to the study, the researcher aimed to create a secure environment which allowed the participants to be authentic. Trust between the researcher and participants was essential in the validity of research. Participants signed a research consent form acknowledging participation was voluntary and anonymous. A general information questionnaire on each director was completed prior to research so as to give a thorough descriptive of each setting and director.

The data collection process involved observations, collection of artifacts, and

interviews. Creswell (1998) identified a series of steps for conducing observations during a qualitative study. The site must be selected and the appropriate permissions granted. Identification of whom or what is to be observed and the length of the observation should be determined. Determining the role of the researcher as participant or observer was key. Descriptive and reflective notes must be taken. Recording aspects such as the setting, particular events, and the researcher's own reactions is vitally important. Creswell (1998) presented a sample observation protocol. In his sample, he suggested dividing the paper between descriptive notes and reflective notes and also including a visual description.

Three scheduled classroom observations were conducted and notes taken during a time in which participants were utilizing SmartMusic®. The researcher was a nonparticipant observer who took notes from a distance on items such as how the program was being used; teacher actions before, during, and after using SmartMusic®; and student actions/reactions to SmartMusic®. During observations, the researcher observed how SmartMusic® was utilized, student reactions, teacher approaches to technology, classroom procedures, and teacher actions while integrating SmartMusic®.

Interviews were conducted one on one with participants the same day an observation was conducted. Creswell (1998) suggested using an interview protocol to aid in data collection. Using a template would help to record date and time of the interview along with the purpose of the study and location of the interview. Creswell (1998) also suggested memorizing the questions to be posed so as to keep eye contact with the person being interviewed. Initial questions were asked to lead the participant to speak on specific topics of classroom management with regard to SmartMusic®, technology professional development, access to technology, and past experiences with

SmartMusic®. Interviews also explored ways SmartMusic® was utilized that may not have been observed. Directors were encouraged to speak freely. Notes were taken and interviews recorded for dictation and transcription purposes. Below are the original research questions followed by the interview questions asked of the participating directors.

Research Question 1: What processes did research participants employ in implementing SmartMusic® technology in the classroom?

1. How was SmartMusic® technology implemented in the classroom?
2. Explain the successful strategies for implementation that you utilized in your classroom.
3. How often have you implemented SmartMusic® into your classroom?

Research Question 2: How is SmartMusic® technology utilized in the classroom?

4. How was SmartMusic® technology utilized in your classroom?

Research Question 3: What do teachers perceive as barriers to implementing SmartMusic® in their classroom?

5. What challenges did you face implementing SmartMusic®?
6. Were the challenges attributed to curriculum, access to technology, personal attitude, or another type of concern?
7. How did your technology professional development assist you in integration of SmartMusic®?

Research Question 4: What were strategies used to ensure success while using SmartMusic® in the classroom?

8. What were some of your main successes while implementing SmartMusic®?
9. What were some strategies used to ensure success while students used

SmartMusic®?

10. To what do you attribute your classroom success while using SmartMusic®?

The last phase of data collection was the collection of artifacts. Hatch (2002) suggested that when conducting school-based research, artifacts may include "school records, official documents, children's work, teachers' lesson plans, parent newsletters" (p. 25). These may include but are not limited to lesson plans, Student Learning Objectives (SLOs); SmartMusic® gradebooks; technology policy and procedures (district, school, or classroom); technology professional development agendas; information sent home to parents with regard to technology and/or SmartMusic®; and the school/district technology plan. Most of the information was gathered from the band director or school administration. District technology plans were found via the district websites and/or district office. Artifacts were collected during the interview process. Descriptions of each artifact and how it related to implementation of SmartMusic® in the band director's classroom were documented.

Data Analysis

When writing a case study, Creswell (1998) instructed one to look at multiple sources of data to create a description of the case and its setting. One should paint a detailed picture to the reader. The researcher must also note her experience with the case and put aside biased opinions before studying others.

Data analysis of information gained during observations and open-ended questions were guided by Creswell's (2012b) description of data analysis of qualitative research. He stressed organization of data collected and organizing themes found in the data. Obtaining multiple copies and backups of data collected was important. All data were read to get a general idea of the participants' thoughts, tone, overall impression,

depth, and use of the information. Notes, thoughts, and ideas were noted as data were read.

Stake (1995) described two strategic ways to analyze data collected. Categorical aggregation occurred until a theme or common thread was found. Direct interpretation was continually occurring even through the observation and interview process as the researcher asked, "Why did that happen?" Drawing a conclusion is not based on multiple instances but on one. By looking at one specific instance and pulling it apart and putting it back together, one can draw meaning (Creswell, 1998).

Stake (1995) described the third and fourth form of analysis as correspondence and patterns. While observing, interviewing, or reviewing documents, the researcher looked for patterns immediately. While categorizing information, patterns were also formed. Correspondence was created when patterns formed consistently within common conditions.

For this specific research project, data were coded or bracketed. Information was put into categories, and patterns were found and labeled by specific terms to identify each category. Predetermined codes were used along with those that developed as data were analyzed. A description of the setting was created based on codes found through data. Patterns in settings were sought and correspondence noted when found. A narrative was written showing the correlation between data gathered and themes.

The final step in Creswell's (2012a) data analysis involves creating an interpretation of the findings, a description or facts about the case. Lessons learned, personal interpretations and findings, and questions for future research were created. Results of the study were shared with participants with the hope of professional gain and further interest in the subject.

Validity and Reliability

From triangulation of data by means of observations, interviews, and collection of artifact analysis, the researcher assured validity for this case study. Creswell (2014) defined triangulation as using multiple data sources of information to create coherent justification for themes. Along with triangulation, Creswell (2014) described other strategies to ensure validity. Member checking was used as the researcher shared the final report with the participating directors to determine the accuracy of themes and major findings. Presenting negative and discrepant information occurred as to ensure the rawness of data. Not all information was aligned with all participants or fell into a specific theme. Therefore, "by presenting this contradictory evidence, the account becomes more realistic and more valid" (Creswell, 2014, p. 202). Presenting bias thoughts and feelings the researcher brought to the study was a fourth way to ensure validity. Self-reflection by the researcher was essential each time she began an observation, interview, or review of an artifact to ensure an accurate description and transcription was made of data.

Gibbs (2008) suggested ways in which a lone researcher can ensure reliability to their readers. Transcript checking was simple yet tedious. The researcher ensured there were no transcription mistakes even when using a transcription service. Gibbs's advice was to simply check, recheck, and check again. While time consuming, it is also beneficial as one becomes fluent in the data recorded. While coding transcripts, ensure there is no change in how you code data over time. This inconsistency can lead to tainted data analysis. As you create codes and themes, Gibbs suggested creating memos on thoughts behind the development of codes so you can revisit the memos as you code your data.

Summary

The research study was designed to study the experiences of middle school band directors as they implemented the technology program SmartMusic® into their classroom. The research method was a case study through interviews, observations, and open-ended questions. In Chapters 4 and 5, the findings of the study are presented with a summary of the study, conclusion, implications, and recommendations for future studies.

Chapter 4: Findings

The purpose of this study was to examine the experiences of three middle school band directors from Upstate South Carolina as they integrated SmartMusic® into their classroom. As a collective case study, the researcher worked to discover common threads in the area of integration, implementation strategies, barriers teachers face, professional development, and suggestions for future success. From observations of participants, interviews, and various artifacts collected, the study provided insight into the implementation process of SmartMusic® in the middle school band room. By discovering commonalities and successful strategies, the researcher aimed to share her discovery which could lead to a more successful technology implementation and recommendations on future professional development needs.

Chapter 4 includes interview transcriptions, three observations of each participant, and a description of artifacts from each participant. Along with information gathered, a general description of each participant is presented so the reader knows the background and setting of each participant. Common themes were identified across each of the participants' responses, observations, and artifacts gathered. These themes are presented and linked back to the original research questions.

Participants

Participants were chosen from middle school band directors in Upstate South Carolina who utilized SmartMusic® in their classroom. In the spring semester of the 2015-2016 school year, three middle school band directors were asked to participate in this research study (Appendix A). Based on the willingness of the participants, school districts were contacted to determine if the researcher would be allowed to conduct the study within their specific districts (Appendix B). Directors then read and signed a

consent form (Appendix C).

A questionnaire was completed by each participating director (Appendix D). Through this questionnaire, the researcher learned approximant ages, time taught, class size, experience with SmartMusic®, and professional development experiences. A description of each participant is below. For confidentially purposes, names are not used. Google Docs were used to acquire information via the questionnaire (Appendix D). Transcripts of each participant's questionnaire can be found in Appendices E, F, and G.

Participant 1. Participant 1 had been teaching between 1-5 years. The participant is a male between the ages 21-30. He has a bachelor's degree in music education and is certified to teach in classrooms K-12. During the school year, he has been assigned to teach 101-150 students on a daily basis with class sizes ranging from 11-20 students. In the classroom, a desktop computer was available for teacher use. There are no practice rooms where individual use of SmartMusic® can be implemented for use. Based on the expectations in his classroom, students are not expected to purchase a SmartMusic® home subscription; however, it was strongly encouraged to both students and parents. Participant 1 has not attended SmartMusic® training; however, he said SmartMusic® was used on a daily bases in his classroom. SmartMusic® was introduced to Participant 1 during his clinical teaching experiences as an undergraduate, and he decided to implement the program into his own classroom. The fact that SmartMusic® allows students to access multiple method books, which the participant found very appealing for the purpose of reaching his students, he chooses to use the program daily. He conveyed that his students enjoy having the visual aide which provides that accompaniment piece and further drives his motivation for use in the classroom setting.

Participant 2. Participant 2 was female between the ages of 31-40 and had been in her current position between 1-5 years. Her current assignment is teaching Grades 6, 7, 8, and 9. She holds a bachelor's degree with 18 hours above her degree in music education K-12. On a daily basis, there are between 11-20 students in each of her classes, totaling between 51-100 students total. The classroom her administration assigned provides access to a desktop computer as well as an iPad. Also located in the classroom are three practice rooms equipped with SmartMusic®. Students in her classroom were not required to have a SmartMusic® home subscription. Participant 2 first heard of SmartMusic® from a colleague but could not afford the program. Participant 2 attended professional development sessions about SmartMusic® at training sessions at the South Carolina Music Educators Conference. Students in the classroom were the primary motivation for the use of SmartMusic® in her classroom.

Participant 3. Participant 3 was a male between the ages of 41-50 and had been teaching between 16-20 years. As an experienced teacher in his current position for 11-15 years, he continued his education and had over 30 hours beyond his master's degree. With an average class size of 21-30, he taught approximately 101-150 students daily. Desktop computers and a SmartBoard® were part of his classroom technology tools. No professional development had been attended with regard to SmartMusic®. Participant 3 used SmartMusic® for 4+ years and used the program every day. He first heard of the program via a fellow director. The assessment feature of SmartMusic® was the primary use of Participant 3. Using the assessment feature ensured objectivity was maintained during the process of determining student capabilities. Administration, parents, and students agreed with the use of SmartMusic® to assess students. Participant 3 had no practice rooms with SmartMusic® available. Students in Participants 3's classroom were

able to use SmartMusic® as a whole group as well as with iPads both before and after school as a practice tool.

Observations

Observations were conducted on each participant a total of three times each. The researcher observed a beginner band class and an advanced band class during each of the three observation days. Observations were conducted a minimum of a week apart of each other. The researcher used Creswell's (1998) suggestions on observation protocol. Taking notes from a distance assured the researcher was a nonparticipant. Observations of how the program was being used; teacher actions before, during, and after using SmartMusic®; and student actions/reactions to SmartMusic® were observed. Based on these observations, the researcher was able to determine how SmartMusic® was utilized, student reactions, and the participant's approaches when implementing technology, classroom procedures, and teacher actions while integrating SmartMusic®. Below is a summary of each participant's observation sessions.

Participant 1 observations. A cart with a laptop and projector stood beside the participant's podium for easy access by the participant. Schoolwide Wi-Fi was used for connectivity to the internet. The front of the classroom contained a white board in which the projector was facing. Using the projector and laptop, the participant was able to access SmartMusic® on his laptop and project onto the board so all students were able to see. Two large speakers where placed behind the director, facing the students, and were connected to the laptop for sound projection. The participant had a small microphone connected to his laptop, and it lay beside his laptop.

Two different classes, seventh-grade brass and sixth-grade beginning woodwinds, were both observed three times. Each time and for both classes, SmartMusic® was

utilized the same way. Each class lined up outside the classroom in the hall and waited until the participant welcomed them into the room. Students did not talk to each other as they entered. Each week began with a silent entry. They earned their privilege to socialize the next day if they entered quietly. Each student gathered his/her needed materials and had 2 minutes and 20 seconds to be prepared to play. A countdown clock was projected on the white board and a buzzer sounded when time was up. Participant 1 welcomed the students with "Good morning. Let's have a great rehearsal." The pacing of the class was fast, and students rarely spoke among themselves. Students were engaged. In the sixth-grade class during each observation, there were two or three students without an instrument. The students participated despite the lack of an actual instrument by counting, clapping, answering questions, and "air" playing their instrument. It was evident expectations had been presented to students, and students were held accountable to them. Students knew procedures with little to no instruction. The methods of instruction were a daily routine and were consistent grade level to grade level, thus creating a cohesiveness and consistent classroom management.

During instruction, SmartMusic® was utilized by using the practice feature with their method book found in the SmartMusic® library. The participant projected each "line" the students were playing onto the white board at the front of the room. Students looked at their instrument-specific book while playing. While instructions were given by the participant, students looked to the board to identify the correct concept being discussed versus looking down at their book. The participant used the white board to write rhythmic counts under corresponding measures as he quizzed students on correct counts. After students counted, clapped, and "tizzled" each line, the class played the line with the SmartMusic® accompaniment. After the teacher was satisfied with correct

pitches, rhythms, and dynamics, he asked or called on specific students to play solos with the SmartMusic® accompaniment feature. Practicing proper concert etiquette, the students applauded after each performance. There were students who volunteered to play by themselves. Other times, the participant called on a student. Between two and three lines from the method book were rehearsed during each class time depending on how well the students were able to perform the given tasks.

The accompaniment feature of SmartMusic® was used as a listening tool for students. The concert literature being rehearsed by students was played via SmartMusic®. Using the accompaniment feature, the participant was able to allow students to hear professionals play each piece of music. The teacher used the listening example to identify style and give the entire class an example of the piece.

During one observation, the participant attempted to use the assessment feature to assess a student's performance. After the student played, SmartMusic® assessed the student and gave a percentage score. The participant did not change the setting from tuba to trumpet. Participant 1 stated the score was not correct due to incorrect instrument selection on SmartMusic® and told the student the grade he would have given the student if he were to assess him.

In the sixth-grade woodwind class, the clarinets struggled with a particular measure of a line. The participant projected the specific clarinet part onto the board. The participant then addressed the specific instrument's notes, rhythms, and dynamics. He then instructed clarinets to view the board and he notated specific instruction onto the white board underneath the corresponding notes and measures.

Evidence of students enjoying their class experience overall were observed when students reacted to the teacher's upcoming absence. They were excited to know the

substitute would allow them to play.

Participant 2 observations. Participant 2 shared a room with the elementary music teacher. The school was grade levels K-8. The room was large; however, there was a mix of equipment and space. The class faced the entrance to the room. The projector and computer with SmartMusic® access were located behind the class. Two large speakers were located to the sides of the screen for audio. One wall was a partition that separated the music/band room from the cafeteria. This partition was not sound proof; therefore, there was a sound bleed from the occurring lunches. Two classes, sixth-grade beginners and seventh-grade advanced band, were observed three times each.

Upon the sixth-grade students entering the room each observation, the teacher had SmartMusic® on the projector screen. For this class to use SmartMusic®, they had to change their seating to face the screen. Students sat behind tables used for elementary students. The projector was mounted high so the teacher could not point to objects on the screen without a laser pointer or yard stick. All students had Chromebooks® that they were carrying with them.

As students entered, the teacher greeted students. Students gathered their things and set up facing the projector. On the screen was the SmartMusic® feature "ear training." The teacher set the example on "loop" so it played multiple times. As students got their instruments and begin to play along with SmartMusic®, students were extremely quiet so as to hear the audio clips playing.

During instruction, the participant then utilized method books found in SmartMusic® to work particular lines with the whole class. Students had their method books in front of them in order to see their particular instrument's part. The participant had random parts projected on the board, one at a time. During method book work, the

participant used a laser pointer to show students particular measures or notes they played incorrectly. Once students "mastered" a line, the participant used the accompaniment feature, and the whole class played along with the SmartMusic® accompaniment. While using the accompaniment feature, the click was turned on to help students with steady beat, and the "my part" feature was on so as to play the melody all students were attempting to play. The participant used this procedure on multiple lines within the method book.

As an instructional strategy, the participant used the rehearsal feature of SmartMusic® but did not have the students play. Students listened and watched. A new concept was being introduced that required students to go back to the beginning of the musical line. Students were struggling with this concept. The participant told students to watch. As the musical line played, SmartMusic® had a green line that moved with the beat of the music. Students were able to follow the green line and see where and when to go back to the beginning.

The participant also used the assessment feature with her eighth-grade class. In order to use SmartMusic®, once again the class had to reconfigure its seating to face the projector. After warming up, students turned in their method books and as a whole group played the assessment line with the SmartMusic® accompaniment. This was their "practice" time before the actual assessment. Once the participant began the assessment, the teacher had one student come up to the computer so the microphone would detect the student. The student who was to go next was to the side "on deck." After each student performed his or her assessment, SmartMusic® gave the student a numerical grade. Students were told they could redo any tests after class.

Lastly, students worked in small groups to prepare for an upcoming solo and

ensemble festival. Many students would be performing with the SmartMusic® accompaniment feature at solo and ensemble. The participant brought a small group to the computer to explain SmartMusic® to them, show them how to operate the program, and rehearse. Once the students performed with the accompaniment feature, they were excited. The teacher addressed tempo and how the program could alter the setting. Students were happy to see they could go slower and progress to the ultimate desired tempo. Students then learned how to "find music" and took time to look for other titles they could perform alone. This brought the most excitement from students as they found pop tunes tailored for their instrument. Students then told the participant they could operate the program independently and asked if they could browse titles. Students were disappointed that they could not access the program on their Chromebooks. The participant explained how to log in at school during their free time so they could practice as time allowed.

Participant 3 observations. Participant 3 had a SmartBoard® located at the front of his room. His desk was to the right with a computer with access to SmartMusic®. A large microphone was by his desk. SmartMusic® was projected onto the SmartBoard®. Two large speakers were set up on both sides of the classroom.

Two different classes were observed: sixth-grade beginner band and seventh-grade advanced band. Both classes were observed three times each. For each of the participant's classes, the teacher walked the students to and from, due to the band room being located in the basement of the gym. Each class began with students entering and gathering their instruments and music. The participant spoke to students as they entered, announcements were made, and that day's class agenda was shared. A warmup began each class.

During the observation process, the participant utilized two functions of SmartMusic® while working with both classes. The first feature to be observed was the assessment feature, and both classes took their weekly assessment via SmartMusic®. Assessments varied from lines in their method book found in the SmartMusic® library or a section of concert literature also found in the SmartMusic® library. Students one by one came up to the participant's desk to take their test. Since the participant only had 10 students in the observed class, no time constraints were placed on the students during their assessment using SmartMusic®. Before taking the assessment, the participant used the practice tool and tempo adjustment to rehearse students. Beginning at a slower tempo, the participant worked to increase the tempo faster and faster then returned to the original tempo. Each student took the test twice. The assessment feature was also being projected onto the board. All students watched when the assessment feature showed red or green notes and when the student's grade appeared.

When using the concert literature feature, the participant pulled up the piece of music the class was playing. When doing so, he used the features of the SmartBoard® and did not have to go to his desk to change music titles. This allowed him to stay in front of the class while maneuvering within SmartMusic®. The participant worked a particular section of music without SmartMusic®, then had the class play the entire piece with SmartMusic®. Each class did not have a full ensemble of instruments. SmartMusic® was used to enable students to hear the missing instruments via the accompaniment feature. After finishing a particular piece, students were eager to request others they enjoyed playing.

In the seventh-grade band, students were struggling with counting measures of rest while the percussion played. The participant pulled up the percussion part via

SmartMusic®. The participant pointed to the particular measures so all students could see what was to be played while they counted their rest. He had the percussion play the part and students watch on the board what was being played. Students only had access to their particular instrument via their music stand. With SmartMusic®, they were able to see another instrument's part. During this same piece, students encountered a *D.C al Fine* (go back to the beginning and stop when you see the word *fine*). The participant played the audio clip without students playing while he pointed to the correct places in music. Evidence of students' enjoyment occurred as they requested playing with SmartMusic®.

The SmartMusic® accompaniment feature was used to rehearse and perform songs they had previously learned. The participant used this option as a reward for performing well on the assessment. Students who scored the highest were able to choose what concert piece or line from their method book they wished the class to play. For easy access, recent pieces used in SmartMusic® were stored in the participants "My Music" folder. However, during student requests, the program kicked the participant out. The students urged the teacher to play without SmartMusic®.

Commonalities in Observations

The implementation of SmartMusic® was similar in each class observed. All participants had access to SmartMusic® via a computer and then used a projection source so all students could see the screen. Each classroom was equipped with proper audio equipment so all students were able to hear SmartMusic® not just when played by itself but while students were playing along with the program. Each participate implemented the accompaniment feature so students could hear missing instrumentation, a click track for timing purposes, and correct parts played. Two of three participants implemented the

assessment feature to assess students versus using a rubric or personal opinion. Finally, all participants implemented the projection of SmartMusic® as a visual learning tool.

Successful strategies observed included using SmartMusic® for the purpose of students hearing the correct sound, style, articulation, dynamic contrast, and correct rhythms. All teachers used this method to train their young musicians what they should sound like. The visual projection aided in reaching various learning styles. When incorporated with playing, students were using visual, audio, and kinesthetic learning styles. The projection of music in front of the class aided in a smaller amount of transition time when students were looking for measures or specific notes the teacher was referencing. Students were able to look up at the measure the teacher was referencing and then find that measure in their music. The assessment feature allowed for instant feedback to students. After playing, the teacher would make suggestions; however, the program showed students where they were correct and where they had made mistakes. Success was evident in using SmartMusic® as student reactions were positive. Students requested to play with the program. Positive words were spoken by students when the participant announced they were going to play with the accompaniment feature.

The utilization of SmartMusic® reflected commonalities across all participants. While not all participants used the same method book, each was able to find their desired book in the extensive library. Participants used the method book to teach technical and expressive musical ideas to students while having the accompaniment feature play along with a click. While using method books in whole group rehearsal settings, each also used the same options for students to play solos with the accompaniment feature. Concert literature was rehearsed via SmartMusic® by two of three participants. Whole group instruction with the accompaniment feature was used. Both of these options allowed for

all participants to use SmartMusic® as a visual teaching tool as it was projected upon a board or screen. The assessment feature was used by two of the three participants. The utilization of SmartMusic® was consistent and very methodical from participant 1. The other participants used SmartMusic® but not on a daily basis as their primary instructional tool.

Observable barriers, struggles, or obstacles varied among participants. Two of the three participants were in school districts that were 1:1 with laptops. This 1:1 program brought about large bandwidth and connectivity which helped in using a web-based program such as SmartMusic®. Connectivity issues during the process of using SmartMusic® occurred in the participant's room in which students did not have their own device. The program would shut down. Variables included but were not directly attributed to smaller bandwidth, location of the classroom (gym basement), Wi-Fi, and SmartMusic®. The program cannot be used if the student does not have his or her instrument. Participant 1's school had one or more students without their instrument in each class observed. While using the assessment feature, all schools struggled with placement of the microphone. The microphone did not pick up the student's sound or the student had to alter their position in the classroom to be closer to the pickup. The location where SmartMusic® was projected was a significant barrier for one participant as students had to move from their normal location in the classroom and also look above a normal eye sight level to see the screen.

Interviews

Participant interviews were conducted on one of the three observation days. Ten questions were asked of each participant (Appendix H). The following tables illustrate themes pulled from interview question responses, which participant cited the theme, and

the frequency of each theme. The frequency states how many times the theme was mentioned regardless of which participant. Ideas that stretched across at least two participants were considered themes. Ideas or statements that were found important to the researcher but not considered a theme are shared below the table.

Interview Question 1: How was SmartMusic® technology implemented in the classroom? Participants explained how they implemented the program SmartMusic® into their classroom. Participants were asked to explain the procedures they follow when specifically using SmartMusic® in its various forms. Below are themes that were found across the three participants.

Table 1

SmartMusic® Implementation in the Classroom

Theme	Person Reporting	Frequency
Student affordability	2, 3	2
Everyday use	2, 3	2
Visual instructional tool	1, 3	2
Classroom instructional tool	1, 2	2

Participant 1 spoke strongly of how students enjoyed the program and how easy it was for students to understand how the program worked. He spoke of how the students were "inquisitive about how it worked." He demonstrated the program for them and "didn't really have to explain too much into it. I just kind of told them how it worked and what they could get out of it." Participant 2 echoed this explaining that her students "work the program without me." She described an event that took place in her classroom a few weeks ago when an administrator entered: "I had a principal come into my class that had to ask me a question a couple of weeks ago, and one of my kids were able to just

to hop up and run it. I didn't know they could do that."

Interview Question 2: Explain the successful strategies for implementation that you utilized in your classroom. Participants were asked those specific things they did that produced success while implementing SmartMusic®. Participants also noted negative experiences while implementing SmartMusic®.

Table 2

Successful Strategies for Implementation Utilized in Classroom

Theme	Person Reporting	Frequency
Projection–visual	1, 2	4
Student enjoyment	1, 2	4

Participant 1 emphasized how he has to pay for the program with his instructional money. This is a reoccurring cost and it would be beneficial if the district could help with the cost. The students did not have any technology integrated in band class prior to SmartMusic®. They are very excited and much is due to simply having something they now can interact with: "they didn't have anything before . . . with the use of technology, seeing how interactive it really was, that automatically hooked them . . . they love anything that's visual and technology bases."

Interview Question 3: How many times have you implemented SmartMusic® into your classroom this week? Question 3 reflected upon Moersch's (1995) levels of technology integration. Interview Question 3 searched to determine the frequency of use as related to Moersch's levels of technology integration. Participant 1 used the program "religiously . . . every day, in all three grades." Participant 2 spoke of using the program more often in her beginner band class as she worked in their beginner band books.

Table 3

Frequency of Implementation of SmartMusic®

Theme	Person Reporting	Frequency
Everyday	1, 2, 3	3

Interview Question 4: How was SmartMusic® technology utilized in your classroom? Participants explained how they utilized SmartMusic® in their classroom. Possibilities included but were not limited to whole group setting, small groups, or an individualized setting. SmartMusic® allows for possibilities such as hearing the accompaniment tracks, technical exercises, viewing of particular parts of works, method book studies, and assessing students. Below are common themes found among directors and their choice of SmartMusic® utilization.

Table 4

SmartMusic® Utilization

Theme	Person Reporting	Frequency
Assessment	1, 2, 3	3
Instant visual feedback	1, 2	2
Visual learning	2, 3	2
Method books	2, 3	2
Concert literature	2, 3	2

All participants spoke of or alluded to using SmartMusic® as an assessment tool. However, Participant 1 spoke of SmartMusic® inconsistency in grading students. He first “guinea pigged” the feature with students. He told the students they were going to try the feature and he explained how it worked. He explained, “We are going to try to have this be the test, that way it’s not me doing it, and you get the feedback right then and

there." They attempted the test. The student was successful; however, the program graded the student less successful than the participant would. Due to this inconsistency, the participant created his own grading scale. He spoke of how the program is "so strict with the tempo rigged in . . . but there has to be a little bit of leeway with younger kids." In order to counter act the "strictness" of the assessment feature, he went to the college grading scale, "90-100 is an A" and it "seemed to work." He concluded with "they (students) felt better about it when I altered the grading scale." Participant 3 also commented on the assessment feature. He stated, "it's really cut and dry. Before SmartMusic® if I tried to give a grade, it's kind of subjective; you kind of did this right and that right." However, with him using the SmartMusic® assessment feature, "It's a cut and dry, red or versus green and here's the grade and parents can't question that." Participant 2 spoke of using the SmartMusic® tool "ear training." This is the only participant who spoke of using the program this way. She noted the ear training option made her kids "listen," thus developing their ear training skills. While listening to the program, they could not talk so they could hear what was being played by SmartMusic®.

Interview Question 5: What challenges did you face implementing SmartMusic®? Interview Question 5 referenced barriers teachers faced while implementing technology into the classroom. Below are themes found through participant answers regarding challenges they faced during the implementation of SmartMusic®.

Table 5

Challenges Faced During Implementation

Theme	Person Reporting	Frequency
SmartMusic® related	1, 2	5
Student related	2, 3	2
Technology equipment	1, 2, 3	5

All participants spoke of the financial challenges faced by students to purchase their own home subscriptions. Participant 2 is working through grants as a way to purchase the program for each student. Their school is also a 1:1 school where all students have Chromebooks; however, SmartMusic® is not Chromebook compatible. "I have kids with this really cool piece of technology (Chromebooks), and I have SmartMusic® as a real cool piece of technology, but they don't work together." Participant 3 was the only one to describe what seems to be either a glitch in the program or district server. The program stops running and one must re-login.

Interview Question 6: Where the challenges attributed to curriculum, access to technology, personal attitude, or another type of concern? Participants described what they believe their challenges were attributed to. Participant 3 restated his challenge with access to technology. He wished the "kids had it at home but because of monetary reason, plus being in the area where we are when internet is not wide spread," students are not known to have the program accessible at home. His connectivity issue is unknown to be a "SmartMusic® issue or an actual server issue we have here at school."

Table 6

Areas to Which Challenges are Attributed

Theme	Person Reporting	Frequency
Student access to technology	2,3	2

Interview Question 7: How did your technology professional development assist you in integration of SmartMusic®? Participants responded to Interview Question 7 with how their technology professional development helped them with the implementation of SmartMusic®. Those participants who have not had professional development described the need for professional development and in what specific areas they would benefit. Participant 3 described his professional development in regards to the SmartBoard® he uses to project SmartMusic® in the classroom as a "Here's how it works and have fun." Participant 1 just "dug in myself and figured it out." He described professional development opportunities that are available to be "not as big and grand as you would like." While Participant 2 attended professional development sessions sponsored by the South Carolina Music Educators Association, she also mentioned meetings of middle school band directors where they would share ideas with each other. A leading SmartMusic® user in the state often led these meetings.

Table 7

Professional Development Assistance

Theme	Person Reporting	Frequency
Not helped	1, 2	5
Other directors	2	2

Interview Question 8: What were some of your main successes while

implementing SmartMusic®? Success while using SmartMusic® comes in various forms. Individuals may have success while the entire ensemble also has success. Teachers found positive notes on their instructional strategies. Participant 2 described moments where students self-evaluated their performance while using SmartMusic®. While using the metronome option and playing, students could tell they were too fast or too slow. "I don't know that without rehearsing it with SmartMusic® with the click function underneath it that they would have felt that pulse." Participant 1 spoke of student reactions to SmartMusic® as signs of success. He stated that students would volunteer: "I want to do a solo (with SmartMusic®)." Or they would shout, "Let's play with SmartMusic® because I want to play with the accompaniment."

Table 8

Successes while Implementing SmartMusic®

Theme	Person Reporting	Frequency
Assessment	1, 2, 3	3
Audio tracks	1, 2	5

Interview Question 9: What were some strategies used to ensure success while students used SmartMusic®? Participant answers showed no themes present across interviews. Participant 1 spoke of how SmartMusic® had become part of his daily instruction. He did not take shortcuts and was very structured. He ensured that he does it "to my best ability, daily. When I do it (use SmartMusic®) I full out do it . . . I'm not just going to show it up on the board and not use it . . . always make it interactive, so that kids see its value." Participant 2 spoke more on how she could have more success. She is in need of more student subscriptions and a projector that is within an arm's reach.

Participant 1 also attributed his successful classroom management to using SmartMusic®. Because of its "structure," it keeps everyone together and on the same page. He stated, "there is no way for you (the student) to not be focused, because you're looking up here, you are engaging with it." Participant 3 spoke of how students enjoyed SmartMusic® and he used it as a reward system often. On Fridays, he "just starts it and goes." He will begin a piece and students will play through without him stopping and giving instruction.

Interview Question 10: To what do you attribute your classroom success while using SmartMusic®? In summarizing the teachers' experience as a whole, participants reflected upon why using SmartMusic® was successful in their classroom. Participant 1 stated, "using it every day and how easy it is to use" along with it having lots of "tools that I still don't even know yet." His students have learned the program and use on their own. "I would just pass my iPad around, and they would sight read." He stated the program is "user friendly" and "straight forward." Participant 2 attributed her success to student enjoyment. She described her students as "they're so plugged into a variety of different things, that it's in a format that they're used to. They're used to the technology." Lastly, Participant 3 attributed his success as being able to use the audio feature of SmartMusic®. "You can hear an actual ensemble playing it well . . . you can always see the visuals . . . and so you are using two, the audio versus the visual and how everybody works."

Table 9

Classroom Success while using SmartMusic®

Theme	Person Reporting	Frequency
Student enjoyment	1, 2	6
Interactive	1, 2, 3	5

Artifacts

Artifacts were collected from each participant. Examples of artifacts include but were not limited to lesson plans, long range plans, SLOs, newsletters, and technology plans. Each participant is listed along with various artifacts gathered.

Participant 1 artifacts. From the school's belief statement, the school believes technology will be used as a "driving force." The district published a technology vision statement in which nine goals are stated. Inside these goals, the district conditions technology will be integrated into the curriculum at all grades, up-to-date network infrastructure will be in place, technology professional development will be offered, and an ongoing process will be established for planning and evaluation of technology (Personal communication, February, 2016).

Among the artifacts were lesson plans submitted by the participant. The participant submitted lesson plans from a week in March. Included in the material list is SmartMusic®. Goals for the week included demonstrating proper playing positions and hand positions as students perform concert literature with SmartMusic®. Student goals also included making corrections and improving their personal scores via the SmartMusic® assessment feature. Daily procedures include working with SmartMusic® to align notes and rhythms across the ensemble and assessing students via SmartMusic®.

The participant shared his SLO template. He used the SmartMusic® assessment feature to gather data during his preassessment of student rhythm reading abilities. He then later used the same feature to give students a postassessment. Data gathered allowed him to analyze student growth. As an instructional strategy, he also used the SmartMusic® library of different method books for rhythm reading and counting.

Participant 2 artifacts. The technology department of the participant's district trains district staff in computer skills and integration of technology into the classroom. The participant's school does not include technology in its mission or vision statements for the school (Personal communication, February, 2016).

The participant submitted weekly lesson plans for all grades she teaches from the first week of February. This included a class that was not observed. Throughout the week, SmartMusic® was used on average two times per class. The SmartMusic® ear training option was used in each class with the objective of training students to differentiate between pitches via audio only. Secondly, method books found in SmartMusic® were used to teach ensemble sound, technique, music vocabulary, pitch, and new notes to beginners. SmartMusic® was also found in the participant's long range lesson plans as a resource in the classroom.

Along with weekly lesson plans, the participant submitted documents via a shared folder on Google Docs. One specific document included instructions on how to access SmartMusic® from home and was shared with students. This document was stored in Google Docs so students always have access to the document when logging into SmartMusic®. The second document submitted from Participant 2 was written to the participant's instructional coach. This document was in reference to the schools 1:1 program and technology use. The participant noted how technology was implemented

into their classroom and how SmartMusic® was utilized daily.

Participant 3 artifacts. The department of instructional technology of Participant 3's district stated via their web page that technology integration is achieved when technology is routine and supports the curricular goals. They work to effectively integrate technology through all grades and across all subjects (Personal communication, March, 2016). While the participant's school goals were not up to date (2014-2015), they did include technology integration for all classrooms (Personal communication, March, 2016).

Participant 3 submitted lesson plans for a week in April. Teachers are to notate their technology use during the week. In this section, the participant entered SmartMusic® in his daily lesson plans. These plans were specifically for sixth-grade band. Every day the participant planned to use SmartMusic® in his lesson. It does not specifically® say how, just that SmartMusic® was his technology use for students.

Triangulation

Through triangulation of data by means of observations, interviews, and collection of artifact analysis, the researcher assured validity for this case study. Creswell (2014) defined triangulation as using multiple data sources of information to create coherent justification for themes. By using multiple sources, one also paints a holistic picture of events. While one may only observe particular events, through interviews and artifacts, one may see other events and identify themes, thus creating a more complete picture of events.

Research questions were used to create interview questions. Themes that were developed via questions become overarching ideas the researcher searched for during observations and analysis of artifacts. Once all three methods of data gathering were

analyzed, detailed themes emerged via overarching themes created by research questions.

Themes were supported through observations, interviews, and artifacts. While artifacts were not as strong of indicators as observations and interviews, they did identify utilization and the amount of utilization of SmartMusic® within the classroom. Themes found in artifacts were supported via observations and interviews.

Summary

The purpose of this study was to examine the experiences of three middle school band directors from Upstate South Carolina as they integrated SmartMusic® into their classroom. Through observations of participants, interviews, and various artifacts collected, the study provided insight into the implementation process of SmartMusic® in the middle school band room. Utilization of SmartMusic® was examined for possible future use. Barriers were described and successful strategies were identified. Data were presented and themes and commonalities identified and aligned with the original research questions.

Chapter 5: Discussions

The purpose of this qualitative case study was to conduct an in-depth investigation of middle school band directors' implementation of SmartMusic® technology in their classrooms. Areas emphasized were the implementation process, barriers teachers may have faced, how SmartMusic® was implemented, and strategies teachers used to ensure success. Through literature reviews, case study research methods involving observations, interviews of participants, and a collection of artifacts, the purpose was to identify common themes among three directors.

As middle school band directors work to incorporate SmartMusic® into the classrooms, directors should understand the implementation process, possible barriers they may need to overcome, options on ways to utilize SmartMusic®, and successful strategies they may be able to incorporate in their own classroom. This chapter looks at a summary of findings, conclusions, recommendations for future research, and recommendations for practice.

Overview

Technology implementation no longer occurs only in academic classrooms such as math and science. Technology has long been a part of the band classroom; however, with the emphasis of creating 21st century classrooms, technology in band rooms has become important to the band director. With administration stressing the use of technology in all classrooms, band directors are looking for ways to implement technology into their classrooms; and SmartMusic® is a potential way to use technology with students.

The middle school band room is a nontraditional setting with students holding various instruments, music stands versus desks, and no limit of pupils per class. As

teachers decide to implement technology into their classroom, a shift in thinking has to occur in how they implement their choice of technology. Barriers must be overcome, choice in utilization of the program, and strategies they choose to follow to ensure success all must be considered.

While research has been conducted on SmartMusic® and its effects on students, limited to no research has been found on the implementation of SmartMusic® from the teachers' point of view. The primary purpose of this collective case study was to discover the experiences of middle school band directors as they use SmartMusic® in their instrumental classrooms. The following research questions were used to guide the study.

1. What processes did research participants employ in implementing SmartMusic® technology in the classroom?
2. How is SmartMusic® technology utilized in the classroom?
3. What do teachers perceive as barriers to implementing SmartMusic® in their classroom?
4. What were strategies used to ensure success while using SmartMusic® in the classroom?

Through the method of a qualitative collective case study, the researcher discovered common threads in the area of implementation, successful strategies, utilization, and barriers. Presented are suggestions while using SmartMusic®. The researcher used classroom observations, interviews, and a collection of artifacts by participants to discover commonalities and themes across cases. By sharing research, the researcher hopes to lead directors to a more successful technology implementation of SmartMusic®.

Discussion

Implementation. Moersch's (1995) levels of technology integration move from a teacher-centered classroom to a learner-centered classroom. Data gathered examined implementation in the context of Moersch's levels of technology integration. Research can help to design future professional development for proper technology integration and aide other teachers in implementation. By identifying how well a teacher has integrated technology, one can then work to further that integration.

Participants each integrated SmartMusic® via a projection device with available, adequate audio for their specific setting. While Participant 2's projection site created obstacles, the participant and students were all able to see the projector. Through submitted artifacts, participants indicated the amount of time SmartMusic® was used in the classroom. While Participant 1 relied on SmartMusic® as a daily instructional tool, the other participants were not as reliant on SmartMusic® daily. This could be due to comfort levels from participants or possibly the specific way the program was utilized. Even with the lack of daily implementation, the program was used frequently so students were comfortable with the program.

Factors found to influence teachers' levels of technology integration include personal fears, organizational and pedagogical concerns, beliefs about teaching, training, access to equipment, reliability of equipment, technical support, school climate, and culture (Ertmer, 1999; Ertmer et al., 1999). From interviews and observations, the success of implementation stemmed from students simply enjoying using technology. Participants' schools and districts stated in their mission and vision statements the importance of technology. The positive responses from students, along with the schools' and districts' change to a technology-driven school culture, helped to create a positive

culture within the classroom and a positive experience for the participant. This new, positive, technology-driven culture helped to eliminate barriers described by Ertmer (1999).

Teachers commented on the instant feedback and interaction students encountered with the program. Students are engaged due to the interaction and instant feedback. As Fioravanti et al. (2012) described, students engage themselves with the web for over 13 hours a day. This desire to constantly be entertained by technology is shown through this study. Students are captivated by technology. While the program captivates students and keeps them engaged through instant feedback, teachers find classroom management to be easier because their students are focused on the task given.

Utilization. SmartMusic® can be used as a practice tool or assessment tool. Individuals may use the program to achieve goals, or teachers may use the program in a whole-group setting. Research has shown SmartMusic® to be successful in various classrooms, producing positive gains in students (Buck, 2008; Flanigan, 2008). Interview Question 4 asked participants to explain the specific ways in which SmartMusic® was utilized in their middle school band room.

Observations, interviews, and artifacts showed participants using SmartMusic® as an assessment device, instructional tool, and an accompaniment feature. Levels of utilization varied from participant to participant.

Each relied on the audio accompaniment features to provide play-along tracks with students so they could hear a full band sound, correct sound productions, rhythms, and dynamics. Participants 2 and 3 used the accompaniment feature as needed while Participant 1 used the feature daily as he worked through method books teaching students technical studies. The audio accompaniment feature is essential with younger students as

they develop their newfound playing abilities. Results align with Myers (2011) as he spoke of young students being unable to differentiate what sounds right and wrong. The accompaniment feature of SmartMusic® supplies correct sounds from each instrument; therefore it is an essential modeling tool for beginner band students.

The assessment feature was used by Participants 2 and 3 more often; however, there were no exceptions to grading. Students received the grade SmartMusic® produced. Gurly's (2012) research showed high school students perceiving the assessment feature to be correct in the assessment of their playing. Participant 1 did not agree with this research. Research has shown that many variables may contribute to accurate scoring of individuals as they play with SmartMusic®. Participant 1 created an optional grading scale when using the program to help with these variables. Myers' (2011) study backed the use of the assessment feature due to its lack of the human element. Participant 3 felt very strongly about the accuracy of the assessment feature, as did Myers.

Barriers. Through the literature review, barriers were described as learning a variety of applications, curricula, content knowledge, the teacher as a facilitator, and responding to individual students (Means et al., 1995). Through interview questions, all three participants agreed barriers were not due to curricula or content knowledge. All participants did agree they had not taken part in professional development to teach the depth of utilization the program had to offer.

Interview Questions 5, 6, and 7 were designed to identify barriers teachers faced, where these barriers stemmed from, and how professional development did or did not help teachers overcome these barriers. During observations, barriers were witnessed such as a lack of an appropriate microphone and the program instantly shutting down. Each of

the barriers was technology-based. Artifacts did not note barriers; however, district and school mission statements indicated a continual goal of working to make technology more beneficial to students.

Due to the increase of technology in schools, all participants were well equipped with computers or laptops and proper connectivity. The 2010 report on technology reporting over 97% of teachers had adequate technology access in the classroom proved to be true. All three participants were well equipped with technology. However, SmartMusic® is a web-based program. One participant indicated via interviews and observations that more than likely, due to restrictions via their district, SmartMusic® would often stop and he would have to reconnect and login again. This lack of "reliability of equipment" as described by Ertmer (1999) became a factor in the participant integrating SmartMusic® consistently in his classroom. The program was unreliable to the participant and students. This negative experience contributed to Ertmer's first order barrier as it was extrinsic in nature.

Student and teacher attitudes, along with music curriculum, did not create barriers. Student attitudes were positive as described in the implementation process. Similar to Lin (2005), students were positive when integrating technology. It was the teachers who were concerned.

Obstacles also included the functionality of microphones when assessing students. Buck (2008) observed these same struggles. Students were being scored wrong when they were correct and vice versa. All three schools that were visited were in low socioeconomic areas. Students were not able to purchase their own subscription to use at home. The school district was also not willing to provide students with a monthly subscription. While barriers of classroom use were noted, participants indicated in

various ways how students could benefit even more if they were able to use the program from home.

Two obstacles were identified via interviews that are related to SmartMusic® directly. SmartMusic® has not created a version for Chromebooks® which one participant's entire district had. The second obstacle identified was the on-screen ability to see two parts or more at one time. Currently, the user can only see one instrument's music at a time. While working with classes that have varied instrumentation, Participant 1 suggested the option to be able to see multiple sources of music at a time. These extrinsic obstacles (Ertmer, 1999) are not controlled by the teacher. However, those with high self-efficacy will work to overcome these obstacles and create learning opportunities for their students (Bandura, 1977).

All three participants had not attended district level professional development aimed at helping them with the implementation or utilization of SmartMusic®. All three participants acknowledged a common colleague in the state who utilizes SmartMusic® daily. He has offered multiple sessions at state conventions and other state band director events that participants have attended. Many of these sessions included other directors also sharing their personal experiences. Diaz-Maggioli (2004) spoke of these informal conversations and how teacher personal experiences should be shared as "living theories . . . and should be shared with the wider educational community for the benefit of all involved" (p. 5). These informal professional development opportunities also may increase a teacher's sense of self-efficacy as they learn and live through vicarious events of other teachers (Hoy, 2000). As they hear confidence and success examples of using SmartMusic®, the unsure teacher may gain encouragement to implement the program in his or her own classroom.

Successful strategies. For successful implementation of technology into the music classroom, Kassner (2010) suggested a paradigm shift in thinking of how students learn music. Before students can succeed, teachers must succeed in understanding the program and appreciate the technology before attempting to implement it into the classroom. Interview Questions 8, 9, and 10 were directed to identifying elements that led to the success of implementing SmartMusic® into the middle school band room.

Success while using SmartMusic® was detected through observations and interviews. Student excitement was observed when students were able to play with the accompaniment feature as a whole class as well as individually. Students were eager to "go next" while using the assessment feature. Students showed excitement while getting prepared to play a concert piece with full accompaniment. Interviews show participants describing success of SmartMusic® to students of the 21st century enjoying technology because they constantly use technology in their free time and during educational settings. Student enjoyment and interaction with technology topped their list.

Student excitement while using SmartMusic® confirms students are engaged in the activity. Prior research shows that students who are excited, show enjoyment, and show enthusiasm are engaged in more learning (Furrer & Skinner, 2003). This level of engagement also aides in the classroom management of students. The more students are engaged, the less likely discipline issues occur. This level of enjoyment, comfort, and confidence will create a learning culture where all students can feel successful.

While SmartMusic® provided an audio tool, it also provided a visual tool. This combination helped to keep visual and auditory learners engaged. Pairing these two learning styles with kinesthetic learning that music instruments provide, a large group of students were reached on their personal learning style.

Summary of Findings and Conclusions

Teachers implemented SmartMusic® in similar ways throughout this study. Projection of the computer screen is essential so all students can see, thus becoming engaged. By using the visual and audio aspects of SmartMusic®, teachers expressed classroom management was easier to control because of the interactive experience SmartMusic® offers. Students were focused on the activity SmartMusic® presented. Implementation of SmartMusic® is only as good as the infrastructure of the district with regard to bandwidth and internet connectivity. A projection and audio source are essential in using SmartMusic®. The placement of the visual projection is not detrimental; however, it can be much more user friendly when the source is reachable by the teacher.

When comparing participants with Moersch's (1995) Level of Technology Implementation, Participant 1 would be viewed as level five: integration. Technology is being used to teach important concepts and even problem solve. In order to move to level six, the participant must use technology to go beyond the classroom and partner with outside sources. Given the program SmartMusic® and its current design, it is unknown if this could be accomplished. Other participants are not using the program to teach concepts. They are using SmartMusic® as a way to "infuse" technology into the classroom. Moersch described infusion as level four of six possible levels with the sixth and final level being refinement. Based on Moersch's writing, now that we have identified the level of technology integration of each participant, we can work to create professional development tailored to meet the need of the specific teacher and attempt to move them to the next level of implementation.

Teachers will then be led through proper staff development on SmartMusic®.

Their understanding of technology and programs being used will grow, thus raising their confidence in using the specific program. A simple introduction to SmartMusic® is not enough. Two of the three participants said they taught themselves how to use the program. As stated in Lauro's (2005) work, when teachers feel comfortable with technology or a new program, they will feel comfortable introducing it to their students and utilizing it to enhance their instruction. Lauro backed this idea up with findings that professional development will change the perceptions teachers have on using SmartMusic® in their classroom. Those teachers who taught themselves how to use SmartMusic® will not have a positive perception of implementing the program into their classroom. The culture of the classroom, with regard to technology integration, will be one that is unsure and timid versus the positive culture one could create with proper staff development.

While the assessment feature is used by all, obstacles tend to create a variable in the amount it is used to assess students. Variables that withhold teachers from using the program as an assessment more often are linked to the program itself or technology in which the teacher has no control. The precisions of grading and a reliable, wireless microphone would heighten accuracy of the assessment feature. As the program advances and technology options advance, teachers may find those obstacles to lessen.

By using the assessment feature, teachers are able to create formative and summative assessments for students. These assessments may be used to track student growth across time and grade levels. Analysis of data gathered from these assessments can aid in instructional changes where needed by teachers. Formative assessments may be tailored to specific students and lead to creation of lessons that are differentiated to meet the special needs of students. As students use at-home subscriptions and take

assessments at home, time may be gained in class for more instructional activities by the teacher. Myers's (2011) study shows the time gained from just half of the class using the assessment feature at home.

Utilization of the SmartMusic® accompaniment feature brought student enjoyment as the researcher observed student reactions of smiles and words of excitement. Student reactions were similar to student reactions in Lin's (2005) study: positive signs of enjoyment and personal satisfaction. Teachers acknowledge these reactions and use them as motivation to continue using SmartMusic®. Bandura's (1977) research on efficacy when applied to these participants tells us that teacher sense of self-efficacy increases through positive performances of students. As teachers see students enjoy and succeed when using the program, they feel confident that their ability helped students achieve their goals using SmartMusic®. As teachers use SmartMusic® and witness positive reactions from students, the teacher's instructional mastery becomes stronger (Balls et al., 2011). They feel confident in their teaching with SmartMusic®. While teacher self-efficacy is growing and student success is evident, the culture is changing to a positive environment where learning is taking place. Routines are established where the teacher is a master at SmartMusic® and students have expectations of success. As Bandura explained, when these teachers do experience negative occasions while using SmartMusic®, because of the strong sense of self efficacy that has been developed, the teacher will be more determined to overcome the obstacle.

In each of the classes observed, instrumentation was incomplete due to scheduling or student involvement. The SmartMusic® accompaniment feature allowed all instruments to be heard by students. Undeveloped sounds need proper modeling by professionals so as to develop proper timbre on their instruments by beginner students.

Myers's (2011) study concluded the accompaniment feature was most beneficial to younger students as SmartMusic® modeled all instruments. It is impossible for a single teacher to model all instruments at once. This feature models correct sounds, dynamics, articulations, and phrasing. These technical and musical concepts are found in national music standards (National Standards for Music Education-SmartMusic®, n.d.).

Utilizing the practice and rehearsal features SmartMusic® provided, teachers were allowed to teach rhythms, dynamics, musical terms, and new techniques. Method books teachers chose were found in the SmartMusic® library. Before SmartMusic®, teachers solely used method books that students placed on their individual music stands.

Reaching all students is the goal of all educators. SmartMusic® provides a visual learning experience through projection of music, an audio learning experience through the accompaniment feature, and a kinesthetic experience while playing an instrument. This combination of learning styles offers teachers the ability to reach many students in a variety of ways. Students were hearing complete instrumentation versions of method book entries along with proper sound production of their instruments. When students struggled, teachers were able to use SmartMusic® as an audio source so students could hear correct versions of the lines they were working in their corresponding books. For visual learners, teachers are able to project music on the screen to show students exactly where mistakes are made or what specific concepts look like. Again, reaching all students and having all students engaged in learning via their learning style equal a positive learning community.

Artifacts reassured the degree to which SmartMusic® was being used in the classroom along with how it was being utilized. However, the degree to which teachers were utilizing the program was not clearly articulated in artifacts. Within lesson plans

and SLOs, teachers simply noted SmartMusic® as an instructional tool or resource. The importance of SmartMusic® was not conveyed in an in-depth manner in lesson plans or SLO artifact documentation. If one only looked at lesson plans, it was not possible to see the value and importance SmartMusic® has in the classroom. It was only through observations and listening to teachers speak about the significance of SmartMusic® in their classroom that one would understand the impact it had on teaching and learning. The concept of "seeing is believing" could be addressed as teachers witness others using SmartMusic®. Hoy's (2000) concept of developing self-efficacy through vicarious experiences could be explained as teachers witness other teachers successfully using SmartMusic® and the impact it has on student learning. If one is not available to witness the implementation of SmartMusic®, one may simply read about the implementation process through a case study such as this.

Of the four areas examined, utilization showed that professional development was found to be insufficient. Each participant spoke of informal staff development created through relationships with other band directors. Although technology staff development is occurring in schools and districts, SmartMusic® specific staff development is absent. From professional relationships and personal initiative, participants learned how to implement and utilize SmartMusic®. This lack of professional development could be due to the inconsistency of using SmartMusic® across districts. The number of potential participants was much less than originally thought. Not only was the number of teachers using the program less than originally thought, the frequency of use was less. Many teachers the researcher spoke with were simply unsure of how to use the program, thus solidifying the need for professional development.

As technology changes, so must professional development. Teachers will climb

Moersch's (1995) levels of technology implementation. With each new level, a different type of professional development is required. As teachers dig deeper into the possibilities of utilization of SmartMusic®, they must be instructed and guided on best practices so as to keep a positive experience for themselves along with their students. If their sense of self-efficacy is not strong in relation to the implementation of SmartMusic®, too many negative experiences may keep them from continuing the integration of SmartMusic® or other technology applications.

Among the three research participants, each had a unique way they utilized SmartMusic®. Between these three teachers, if they were to share their personal experiences and knowledge, they could acquire more tools in their "tool box" of instructional strategies. As a teacher's box of instructional strategies grows, their personal instructional mastery will strengthen, thus becoming a confident teacher. This confidence will transfer to students, and the culture of the learning environment will become positive.

With the push of technology to be used in all classroom and content areas, these participants were examples that SmartMusic® is an easy and effective way to incorporate technology into the music classroom. Administration must be willing to provide proper implementation materials such as a projection source, computer, SmartMusic® subscription, and audio materials. While professional development is not a necessity as proven by Participant 1, seeing the program in action is essential so teachers can fully understand the multiple functions SmartMusic® has to offer in the classroom.

Recommendations for Future Research

Recommendations for future research include specifically how the program is being utilized in the classroom. Teachers may choose to use only the assessment feature,

method book or concert literature, solo literature, rhythm or ear training exercises, or as a visual tool. There are multiple options; and with each option, teachers then can make decisions on the depth of use. While each classroom is different, having knowledge and understanding of the program would give teachers options on how best to utilize the program. Teacher attitudes toward technology in the instrumental classroom could affect the teacher's overall attitude of using SmartMusic® in the classroom. The researcher recommends studying the effects of teacher attitudes toward technology in the music classroom while implementing SmartMusic®.

Through the literature review, many studies were found to research how the program affected students on the individual level; however, through this study, teachers used SmartMusic® in a whole-group setting more often than for individual purposes. It is recommended that research be conducted on teaching with SmartMusic® versus without SmartMusic® in a whole-group setting. The program was originally designed for the individual student; however, teachers were seen using the program effectively with entire classes.

Summary

Findings of this study indicate that SmartMusic® is utilized in the middle school band room at varying degrees and levels. Implementation of the program is similar in all settings due to the requirements of the program. As observed, there are ways to project SmartMusic® in a more "user friendly" way than others. While the program was initially designed as an individual practice tool, teachers use the program in a whole-group setting more often than individually. Cost and technology access play a major role in the utilization of the program as it was originally created. Students enjoy the interaction of the program; teachers acknowledge this enjoyment and therefore use the program more

often. The utilization of SmartMusic® varies from teacher to teacher and includes assessment, whole-group and individual settings, method book and concert literature rehearsal, and ear training. SmartMusic® could be used more effectively in middle school band rooms if teachers were given proper tools and most importantly professional development on how to use the program. Findings suggest barriers while using SmartMusic® are little to none. These barriers change and possibly disappear depending on the actual utilization of the program.

Technology integration has created a revolution in planning, instruction, and assessment. As instrumental music teachers choose which tool to use in their classroom, one must contemplate these areas of transformation. When teachers are not familiar with the tool or even fear it, they will be tempted to use the tool incorrectly or not at all (Callister & Dunne, 1992). This familiarity with SmartMusic® and technology must be overcome before technology is integrated to its full potential. Through this study, we see teachers who are familiar with technology and SmartMusic®. They have chosen to use SmartMusic® as a method to incorporate technology into their classroom. They have incorporated SmartMusic® into their daily instruction. Planning, changes in instruction, and assessment have been altered to meet the needs of students in a 21st century learning environment. Through these teachers, we see what can be accomplished when fear is erased and teachers step out of their comfort zone to embrace technology integration even in the middle school band room.

In conclusion, SmartMusic® brings excitement and engagement to the classroom. Engagement produces an environment where learning takes place. A classroom where learning takes places is a positive classroom culture that all teachers should strive to have. When armed with proper professional development and opportunities to succeed

with proper equipment, teachers will become stronger in their sense of efficacy and aim to become mastery instructional teachers.

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Appendix A

Letter to Participants

Carla Tucker
XXXXXX

Dear Participant,

As a doctoral candidate at Gardner-Webb University, I am conducting a study for my dissertation to investigate band director's experiences with SmartMusic® integration. The overall purpose of this qualitative study was to investigate middle school band directors' experiences with the implementation of SmartMusic® technology in their classroom. I will be examining the processes followed during implementation, the utilization of SmartMusic® technology in the classroom, and the successes and barriers director's experienced throughout the implementation process. The results should be of interest and value to educational leaders and teachers seeking to implement SmartMusic® technology into their district, building or classrooms.

I would like to interview you for approximately one hour and record the interview to help ensure accurate transcription. Recordings will be destroyed after they have been transcribed. I would also like to observe and video a day in which you are utilizing SmartMusic®. Recordings will be destroyed after they have been transcribed. All data reported will utilize pseudonyms for your personally identifiable information such as your name and school district. Participation is voluntary, and you may withdraw your consent from research at any time without penalty. There are no anticipated physical or psychological risks to you as a participant in this study. The results of the research will be analyzed, compiled, and published as partial completion of doctoral requirement.

This study has been approved by the Gardner-Webb Institutional Review Board. On completion of this study, I will share a summary of findings with you. Your input is extremely valuable for future implementation of technology in the middle school band room.

Sincerely,

Carla Tucker

Appendix B

Letter to Participants' School District

Carla Tucker
XXXXXXXX

Dear Superintendent

As a doctoral candidate at Gardner-Webb University, I am conducting a study for my dissertation to investigate band director's experiences with SmartMusic® integration. The overall purpose of this qualitative study is to investigate middle school band directors' experiences with the implementation of SmartMusic® technology in their classroom. I will be examining the processes followed during implementation, the utilization of SmartMusic® technology in the classroom, and the successes and barriers director's experienced throughout the implementation process. The results should be of interest and value to educational leaders and teachers seeking to implement SmartMusic® technology into their district, building or classrooms.

I am seeking permission to use XXXXX as a participant in my research. I would like to interview XXXXXX for approximately one hour and record the interview to help ensure accurate transcription. Recordings will be destroyed after they have been transcribed. I would also like to observe and video a day in which XXXX is utilizing SmartMusic®. Recordings will be destroyed after they have been transcribed. All data reported will utilize pseudonyms for the participants, school, and district. Participation is voluntary, and you may withdraw your consent from research at any time without penalty. There are no anticipated physical or psychological risks to participating in this study. The results of the research will be analyzed, compiled, and published as partial completion of doctoral requirement.

This study has been approved by the Gardner-Webb Institutional Review Board. On completion of this study, I will share a summary of findings with you. Your input is extremely valuable for future implementation of technology in the middle school band room.

Sincerely,

Carla Tucker

Appendix C

Consent Form

You are being invited to participate in a research study about the implementation of SmartMusic®into the middle school band room. This research project is being conducted by Carla Tucker. The overall purpose of this qualitative study was to investigate middle school band directors' experiences with the implementation of SmartMusic® technology in their classroom. I will be examining the processes followed during implementation, the utilization of SmartMusic® technology in the classroom, and the successes and barriers director's experienced throughout the implementation process. The results should be of interest and value to educational leaders and teachers seeking to implement SmartMusic® technology into their district, building or classrooms.

There are no known risks if you decide to participate in this research study. The information you provide will help other directors with implementation of SmartMusic®, administration as they plan professional development and districts as they look to implement technology into band classrooms. The information collected may or may not benefit you directly, but what I learn from this study should provide general benefits to all teachers, administration, and district office personnel.

The research is anonymous. If you chose to participate, no personal information will be published. All names, schools, and districts will have pseudonyms so that no one will be able to determine you or your school affiliation. No one will know if you participated in this study.

Your participation in this study is voluntary. If you choose to participate, please return your completed questionnaire via the google doc link found in the email.

If you have any questions or concerns about completing the questionnaire or about being in this study, you may contact me at XXXXXXXXXX or at XXXXXXXXXX.

I HAVE HAD THE OPPORTUNITY TO READ THIS CONSENT FORM, ASK QUESTIONS ABOUT THE RESEARCH STUDY AND AM PREPARED TO PARTICIPATE IN THIS PROJECT.

_____

Participant's Name Date

_____

Participant's Signature

_____

Researcher's Signature Date

Appendix D

Demographic and General Information Questionnaire

Demographic and General Information

Name

Age

- 21-30
- 31-40
- 41-50
- 51-60
- 60+

Gender

- Male
- Female

Years experience in teaching

- 1-5
- 6-10
- 11-15
- 16-20
- 20-25
- 25+

What grade(s) are you currently teaching? Select all that apply

- 5
- 6
- 7
- 8
- 9

How long have you been at your current position?

- 1-5
- 6-10
- 11-15
- 16-20
- 20-25
- 25+

Chose your highest form of education

- Bachelors
- Bachelors +18
- Masters
- Masters +30
- Doctorate/Ed.D/Ed.S

What forms of technology do your students have available to them in your classroom?

- Ipads
- Bring your own device
- Desktop/laptop

- SmartBoard®
- None

Overall number of students teaching

- 1-50
- 51-100
- 101-150
- 151-200
- 200+

Average classroom size

- 1-10
- 11-20
- 21-30
- 30_{+}

Number of practice rooms available with SmartMusic®

- 0
- 1
- 2
- 3
- 4_{+}

How is SmartMusic® set up to be used in your classroom?

- Practice room
- Whole group instructional tool
- iPads
- home practice device
- before/after school/lunch time practice tool

Are your students required to have an at home SmartMusic® subscription?

- Yes
- No
- Not required but suggested

Have you attended SmartMusic® staff development or training? Describe below

- Yes
- No

How long have you used SmartMusic® in your classroom?

- 1 yr
- 2 yrs
- 3 yrs
- 4yrs+

How often do you use SmartMusic® in your classroom?

- Everyday
- Once a week
- Once every two weeks
- randomly

When and how did you learn of SmartMusic®.

What/who motivates you to use SmartMusic®?

Appendix E

Demographic and General Information

Participant 1

Demographic and General Information

Participant 1

Age
- 21-30

Gender
- Male

Years' experience in teaching
- 1-5

What grade(s) are you currently teaching? Select all that apply
- 6,7,8

How long have you been at your current position?
- 1-5

Choose your highest form of education
- Bachelors

What forms of technology do your students have available to them in your classroom?
- Desktop/laptop

Overall number of students teaching
- 101-150

Average classroom size
- 11-20

Number of practice rooms available with SmartMusic®
- 0

How is SmartMusic® set up to be used in your classroom?
- Whole group instructional tool

Are your students required to have an at home SmartMusic® subscription?
- Not required but suggested

Have you attended SmartMusic® staff development or training? Describe below
- No

How long have you used SmartMusic® in your classroom?
- 2 yrs

How often do you use SmartMusic® in your classroom?
- Everyday

When and how did you learn of SmartMusic®.
- I learned about it while student teaching and decided to implement it in my own classroom.

What/who motivates you to use SmartMusic®?
- Being allowed to easily access multiple pieces of literature as well as many of the most used method books is what attracted me to use SmartMusic® along with being able to group teach different examples of rhythm. The students enjoy having the visual aid as well as being able to play with an accompaniment.

Appendix F

Demographic and General Information

Participant 2

Demographic and General Information

Participant 2

Age
- 31-40

Gender
- Female

Year's experience in teaching
- 11-15

What grade(s) are you currently teaching? Select all that apply
- 6,7,8

How long have you been at your current position?
- 1-5

Choose your highest form of education
- Bachelors +18

What forms of technology do your students have available to them in your classroom?
- Desktop/laptop

Overall number of students teaching
- 51-100

Average classroom size
- 11-20

Number of practice rooms available with SmartMusic®
- 3

How is SmartMusic® set up to be used in your classroom?
- Whole group instructional tool
- Ipad
- Home practice device
- Practice room

Are your students required to have an at home SmartMusic® subscription?
- No

Have you attended SmartMusic® staff development or training? Describe below
- Yes
- I have attended SmatMusic® training sessions at the SC Music Educators Conference.

How long have you used SmartMusic® in your classroom?
- 1 yr

How often do you use SmartMusic® in your classroom?
- Everyday

When and how did you learn of SmartMusic®.
- A fellow director introduced me to SmartMusic® several years ago. I saw the value in the program but could not afford it until this year.

What/who motivates you to use SmartMusic®?
- My students enjoy SmartMusic® and like getting the instant feedback the assessment feature provides.

Appendix G

Demographic and General Information

Participant 3

Demographic and General Information

Participant 3

Age
- 41-50

Gender
- Male

Year's experience in teaching
- 16-20

What grade(s) are you currently teaching? Select all that apply
- 6,7,8,9

How long have you been at your current position?
- 11-15

Choose your highest form of education

Masters +30

What forms of technology do your students have available to them in your classroom?
- Desktop/laptop
- SmartBoard®

Overall number of students teaching
- 101-150

Average classroom size
- 21-30

Number of practice rooms available with SmartMusic®
- 0

How is SmartMusic® set up to be used in your classroom?
- Whole group instructional tool
- Home practice device
- Before/after school/lunch time

Are your students required to have an at home SmartMusic® subscription?
- Not required but suggested

Have you attended SmartMusic® staff development or training? Describe below
- No

How long have you used SmartMusic® in your classroom?

4+ years

How often do you use SmartMusic® in your classroom?
- Everyday

When and how did you learn of SmartMusic®?
- I heard about SmartMusic® from another band director.

What/who motivates you to use SmartMusic®?
- I can take away the "human factor" from grading. Administration, parents, and students can see the green good, red bad and they trust a visual grade. They do not generally trust that a teacher hears and grades with no basis of that grade ven if you have a playing rubric.

Appendix H

SmartMusic® Interview Questions

SmartMusic® Interview questions

Process to implementation- planning and procedures

1. How was SmartMusic® technology implemented in the classroom?

Process to implementation – planning and procedures

2. Explain the successful strategies for implementation that you utilized in your classroom.

Process to implementation – planning and procedures

3. How many times have you implemented SmartMusic® into your classroom this week?

SmartMusic® usage

4. How was SmartMusic® technology utilized in your classroom?

Barriers to Implementation

5. What challenges did you face implementing SmartMusic®?

Barriers to Implementation

6. Where the challenges attributed to curriculum, access to technology, personal attitude, or another type of concern?

Barriers to Implementation

7. How did your technology professional development assist you in integration of SmartMusic®?

Strategies for Success

8. What were some of your main successes while implementing SmartMusic®?

Strategies for Success

9. What were some strategies used to ensure success while students used SmartMusic®?

Strategies for Success

10. To what do you attribute your classroom success while using SmartMusic®?