

Interactive Whiteboard Technology In The Instrumental Music Classroom

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ABSTRACT

Interactive whiteboards, including the popular SMART Board™, are becoming a common component of classrooms. Research indicates the use of interactive whiteboard technology in the classroom enhances student engagement, improves discipline, appeals to a variety of students and learning styles, allows for easy integration of media, and improves teacher productivity. However, the use of interactive whiteboards in music classrooms is much less common and research specifically on the use of interactive whiteboards in the instrumental music classroom is limited.

The purpose of this project is to examine the benefits of interactive whiteboards for students and teachers and describe how interactive whiteboard technology is currently used in instrumental music classrooms. This paper will provide rationale for the installation of interactive whiteboards in instrumental music classrooms and practical applications for instrumental music teachers incorporating interactive whiteboards in their rehearsals.

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CHAPTER 1: INTRODUCTION

Those who have not been in a classroom for a while might not recognize the room where children now spend their formative years. The blackboards, smell of chalk, and the enormous teacher-desk many of us recall from our childhood are gone. Gone too are the filmstrip projectors and scratchy records. A large white screen, otherwise known as an interactive whiteboard, has taken the place of the blackboard, a high-tech pen has replaced the chalk, and even the teacher-desk has been replaced by a computer perched on a high-tech desk streaming with cords. Filmstrips have been replaced by YouTube clips and scratchy records have been replaced by a palm-sized device full of thousands of digital recordings.

Interactive whiteboards, as described above, are quickly becoming standard equipment in classrooms in the twenty-first century. Linked with powerful devices such as iPads along with endless resources from the internet, classrooms around the world are being transformed by technology. As students become technologically literate at an earlier age, these children often described as “digital natives” expect technology to be part of their everyday lives including the time they spend in school. Instead of reading a book about sharks, students can observe live sharks through a webcam in Honolulu, Hawaii. Technology has changed teaching as well. Instead of pointing to a poster of da Vinci’s *Mona Lisa* on the classroom wall, the teacher can project an image of the famous painting on a large screen and use a special pen to highlight what makes this work a masterpiece.

I became interested in interactive whiteboards in 2008 when teachers in my district were encouraged to apply for technology packages available through a district technology referendum. I was most interested in the voice amplification system that was part of the “Intelligent Classroom” grant and applied, not knowing a SMART Board™ was included. After I was awarded the package, I

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did not realize what a transformative tool I was about to receive. During the summer, I began researching how this tool could best be utilized in my middle school band classes.

In 2008, I was the only music teacher in my large school district to have an interactive whiteboard in my classroom. Following the initial training, I needed to know more about how this technology could be most effectively used in my specific situation. I contacted a number of band directors in other school districts but could not find any who had interactive whiteboards installed in their rehearsal rooms. Not satisfied with my research and somewhat panicked about how I was going to use this expensive device, I called the Perpich Center for Arts Education, the premiere resource center in Minnesota for fine arts teachers. I was certain they would have a long list of band directors who were implementing this technology in their rehearsals. I was surprised to learn they didn't know anyone who used one but thought it was an interesting challenge and promised to call me back after they did some research. Several weeks later, a staff member called to report they had searched and could not find any other band directors using interactive whiteboards. Although there are now other instrumental music teachers with Smart Boards, they are not as common in music classrooms as in other academic areas.

Upon realizing there were not any experts in the area, I have learned to incorporate interactive whiteboard technology by observing other educators, adapting what non-music teachers were doing with interactive whiteboard technology in their classrooms and trial and error with other music technology I use on a regular basis. I use the Finale music notation program to compose warm ups and rhythm exercises directly relating to the repertoire my bands are playing and can display them on the Smart Board so the entire band can work on the same exercise. If I want to highlight a section or point out a problem students are having during rehearsal, I can use the interactive pen to write on or highlight the section in the exercise from the front of the class. I can also playback the exercise so the students can easily hear the example through the system's amplification system.

The district-wide adoption of SmartMusic, music education and practice software, has provided a new platform for interactive music education. I can access a variety of pieces the band is rehearsing and bring up a specific part. As with Finale, the software can play a recording of it for the students. I can use the Smart Ink tool and show students the exact markings I want them to write in their parts. This is especially useful when working with young musicians as they have limited musical vocabulary and need specific directions.

Research indicates critiquing performances helps students improve their own performance. I am often able to find performances of music we are rehearsing on YouTube and show them to the class on the Smart Board. The students enjoy watching, listening and critiquing the performances of videos we watch together. I can bring up a music publisher's website on the Smart Board and show students how they can listen to recordings of our concert selections at home. The opportunity to listen to a professional recording during their individual practice time makes a significant impact on both the personal motivation and performance of adolescent musicians.

This research began because I wanted to know more about how interactive whiteboards are being incorporated in band rehearsals. At the beginning of this project, I was sure I had missed a large body of literature which directly related to this subject. After a thorough review of literature, I found that very few articles have been published directly addressing the use of interactive whiteboard technology in secondary music classes or the use of interactive whiteboards in band rehearsals.

In recent years, more schools are investing in technology with the goal of enhancing skills considered important in the twenty-first century. Instrumental music teachers have acquired Smart Boards through grants and district-wide initiatives. Some form of interactive whiteboard technology is becoming standard equipment in newly constructed schools. The recent invention of Apple TV and the use of iPads in many schools have allowed more educators to use interactive technology in their

classroom without the expense of the traditional interactive whiteboard systems. As always, technology is constantly changing. What is considered state-of-the-art quickly becomes outdated and replaced by new technology.

This project will explain what interactive whiteboard technology is with a focus on SMART™ brand technology. Based on interviews with four instrumental music teachers who currently use Smart Boards, it will provide practical application for those who want to implement or further their use of interactive whiteboard technology. It will also explore emerging technology that may provide alternatives to the interactive whiteboard technology platform.

What is an Interactive Whiteboard?

A traditional interactive whiteboard is comprised of several devices. The major components are a large screen, a projector, and a computer. The three components are configured to project the images found on the computer to the large screen which is typically mounted in the front of a classroom. Some systems are mounted on carts so the system may be moved from place to place for shared use. The difference between merely projecting the image from the computer onto the screen and an interactive whiteboard is the ability to directly interact with the images on the screen. Depending on the system, this is done either through the use of a special pen provided by the manufacturer or by using a touch-screen format.

The terms “Smart Board” and “Interactive Whiteboard” like Kleenex and tissue are often used interchangeably. Interactive whiteboard is a generic term used for the technology itself while a SMART Board™ is a commercial product designed and sold by SMART Technologies in Calgary, Alberta, Canada. Six out of ten interactive whiteboards installed in U.S. classrooms are SMART Boards (Why Choose Smart?, 2009). The Georgia-based company Promethean produces the Activeboard™, the second most common interactive whiteboard in U.S. classrooms. Other common

interactive whiteboard products include a device produced by eInstruction which links interactive whiteboards with a voting system technology and other devices produced by Numonics and eBearn. (Del Ray, 2009). Each of these key players in the field continues to change and update their products to meet users' demands.

Although they may not realize it, most people are familiar with interactive whiteboard technology through its use in popular media. John Madden's high-tech version of his classic "CBS Chalkboard" used during broadcasts of football games and Bert Blyleven's "Circle Me Bert" pen on Minnesota Twins broadcasts are two widely viewed examples of the interactive whiteboard technology used on television. CNN used their "Magic Wall" touch-screen system in recent presidential election broadcasts to interact with data and explain results to millions of viewers.

The use of educational technology has been growing since its introduction in the late 1990s (Beeland, 2002). In 2009, one in five classrooms in the U.S. was equipped with an interactive whiteboard while seven in ten British classrooms had the same technology (Curwood, 2009). In 2011, 80% of the respondents in the T.H.E. Journal educator survey reported their schools had at least one interactive whiteboard in place (SMART Technologies, 2011). The rate of growth and breadth of products used continues to expand.

Technology continues to evolve and educators continue to incorporate new technology as it becomes available. Apple is a recent newcomer to educational interactive technology and the emergence of Apple TV has set off a growing debate about whether this combination is a better option for schools than traditional interactive whiteboard technology. Educators have begun to use Apple TV, an iPad, and interactive whiteboard apps to create an interactive whiteboard experience without the traditional dedicated interactive whiteboard technology equipment (Meech, 2011). Whether this technology becomes standard equipment remains to be seen.

CHAPTER 2: LITERATURE REVIEW

A review of literature addressing interactive whiteboards provides examples in two main categories of study. The first is the impact the technology has on student achievement in the classroom. The second is how interactive whiteboards are being used in schools throughout the world. Much of the research focuses on the impact and use of interactive whiteboards in math, science and language arts classrooms. In addition, much of the research comes from Great Britain where interactive whiteboards are more common than in the United States.

Very little research has been published on the topic of the use of interactive whiteboards in music classrooms. Because of the absence of research in this specific area, this literature review includes extensive information about the few seminal articles concerning music and also includes ‘sharing’ websites and message boards used by band directors who use interactive whiteboard technology.

Student Engagement

Extensive research shows instruction using interactive whiteboards enhances student engagement in the classroom, decreases classroom management problems, appeals to a variety of students and learning styles, allows for easy integration of supplemental media, and improves teacher productivity. These areas are often interwoven making it difficult to separate the effects from one another. Furthermore, students attending school now are ‘digital natives’ who have been surrounded with technology throughout their life.

Students are highly engaged in classrooms utilizing interactive whiteboards. They find lessons taught with the technology interesting, relevant, appealing, and involving (Beeland, 2002). Students are excited by the technology. They often think of an activity using the interactive whiteboard as more of a game than learning, and are more willing to participate in classroom activities (Curwood, 2009;

Glover & Miller, 2001; Smith, Higgins, Wall, & Miller, 2005). The use of an interactive whiteboard provides a setting for more student interaction even in predominately teacher led classrooms and allows for a more lively and interactive classroom experience (Wood & Ashfield, 2008). The touch-screen attribute of interactive whiteboards engages students' attention. The use of interactive whiteboards improves student responsiveness to questions both in response time and in students' willingness to answer questions (Wood & Ashfield, 2008; Edwards, Hartnell, & Martin, 2002). Using student response devices often referred to as "clickers" or other "voting" type devices with traditional interactive whiteboards, educators can immediately judge students' understanding while students must stay actively involved in the activity as they know an immediate response is expected. In addition, educators can now use web-based technology such as Poll Everywhere to provide the same real-time feedback through the use of text message, iPad, or Twitter.

Interactive whiteboards allow educators to use Internet resources easily in classroom presentations, which enhance student engagement in the lesson. Students are often excited by the examples used by the teacher and may be motivated to delve deeper into the subject on their own time using websites initially provided in classroom instruction (Edwards, Hartnell, & Martin, 2002). In return, students may find interesting websites and other resources to share with the teacher who is able to easily use that information with the class during future lessons.

One of the most often cited aspects of improved student engagement in classrooms using interactive whiteboards is the quality of presentation. The quality of presentation made using an interactive whiteboard motivates students as they are keenly attuned to visual stimulation and are better able to focus and concentrate for longer periods of time (Smith, Higgins, Wall, & Miller, 2005; Glover & Miller, 2001; Wood & Ashfield, 2008; Edwards, Hartnell, & Martin, 2002). Using a variety of media, educators can use real-world examples to demonstrate ideas presented in class instead of using textbook examples or trying to explain an idea. Educators are able to use interactive whiteboards to

demonstrate a lesson for the entire class instead of asking the class to crowd around a single computer monitor. The ability to demonstrate a set of tasks or experiments lends itself to use in classes such as science where pre-teaching is essential to experiential learning.

Interactive Whiteboard technology as a management tool

The use of interactive whiteboards can also have a positive effect on student behavior in the classroom. Improved instruction and better student focus are important factors in this area. Educators using interactive whiteboards are able to remain at the front of the classroom to maintain control of the class instead of manipulating a program at a desktop computer off to the side of the room (Glover & Miller, 2001). Furthermore, the use of interactive tablets available with some interactive whiteboards allows the teacher to move around the classroom and physically engage with students (Smith, Higgins, Wall, & Miller, 2005). The development of interactive whiteboard apps such as SplashTop provides students and teachers the opportunity to use an iPad to wirelessly project to Apple TV. This enables multiple devices to project on a single screen (Meech, 2011).

All components of a lesson using a Smart Board are preset so teachers are able to move smoothly between activities eliminating the downtime between parts of a lesson when students become less focused. Thoroughly planned lessons hold the attention of students. Lessons using an interactive whiteboard are better planned and more stimulating for students used to an environment full of vivid images and teachers find that students are more interested in the information presented (Glover & Miller, 2001). Students' eyes are focused on a large screen at the front of the room which can eliminate distractions for students (Smith, Higgins, Wall, & Miller, 2005). The pace of instruction is faster when teachers use interactive whiteboards and the quality of the images and materials used are better so students remain more attentive to the information presented (Wood & Ashfield, 2008). All of these factors contribute to fewer classroom management problems and disruptions to learning.

Current educational theory encourages teachers to meet students where their interests and abilities lie. Interactive whiteboards appeal to students with varied learning preferences including those with different learning styles and those with special learning needs. Educators using interactive whiteboards are better able to differentiate instruction providing lessons that appeal to a wide variety of students. Visual-spatial learners are engaged by the powerful visual images and manipulation possible with the technology. Bodily-kinesthetic learners are more willing to engage in learning as they can move around and are better able to recall information they have touched or manipulated (Curwood, 2009; Smith, Higgins, Wall, & Miller, 2005). Students who do not have highly developed fine motor skills are able to manipulate the interactive whiteboard pen or touch screen more easily than a traditional computer and mouse (Smith, Higgins, Wall, & Miller, 2005). Even in classrooms where students weren't allowed to touch the interactive whiteboard, they were more engaged because of the variety of media being used in the presentation (Beeland, 2002). The benefits to all types of learners are clear and the more time students are engaged in learning, the less time a teacher spends managing the class.

Technology is a constant presence in the lives of children and they expect to find the same stimulation in the classroom. Teachers using interactive whiteboards are easily able to incorporate a variety of media in the classroom with minimal distractions. The use of the internet with an interactive whiteboard becomes seamless providing nearly unlimited resources. Teachers can use internet resources to provide real-world examples. Instead of showing diagrams of constellations on an overhead projector and transparency, teachers can embed an interactive astronomy website in the lesson and provide students with dynamic interactive images of the same information. Once a teacher has exposed students to the topic in a stimulating manner such as an interesting website or simulation activity, students are more excited to pursue additional information on the topic and remain engaged in traditional classroom activities (Curwood, 2009; Smith, Higgins, Wall, & Miller, 2005).

Educators often use interactive whiteboard technology in conjunction with PowerPoint to organize important information for students and provide a guide for student note taking. Instead of just showing the PowerPoint on a screen, the interactive whiteboard technology allows teachers to make additional notes on the screen and draw diagrams to enhance the presentation. Teachers often use the interactive whiteboard for activities based on TV quiz shows such as “Jeopardy” or “Who Wants To Be A Millionaire?” to review and reinforce student knowledge prior to a test. Again, the quality of presentation is interwoven in this area. The teacher has embedded the needed technology into the lesson before presenting it to the class and does not need to stop the class to turn on a VCR, play a recording, use a cumbersome flipchart or wait for a video clip to load on YouTube.

Students are not the only ones who benefit from the use of interactive whiteboard technology. Interactive whiteboards are also changing the ways educators prepare, present, refine and archive lessons. Teachers find preparing a lesson using an interactive whiteboard is time-consuming. The hours needed to find appropriate media examples, prepare the presentations, and work out the technical difficulties quickly add up. However, once designed, a lesson can be saved and used for future classes.

One of the great benefits of an interactive whiteboard is the ability to preset work for use in multiple classes. Diagrams, math problems, and notes do not have to be rewritten or markings carefully erased between each class. Especially for a middle school or high school teacher who teaches the same lesson several times a day, this can save incredible amounts of time. Each class period’s lesson can be saved separately including any notes, markings and manipulations so teachers can pick up right where they left off and can easily review prior learning with students without trying to replicate the notes made in prior lessons (Smith, Higgins, Wall, & Miller, 2005; Curwood, 2009; Wood & Ashfield, 2008). Educators are also able to share lessons amongst themselves reducing the amount of time needed for individual preparation and can post the lesson to a website for students who were not in class (Smith, Higgins, Wall, & Miller, 2005).

Educators find that lessons have better structure and are more thoroughly planned when using interactive whiteboard technology (Glover & Miller, 2001). Teachers also can use these saved lessons to reflect on past lessons and plan improvements for future teaching (Glover & Miller, 2001). Again improved teacher planning and presentation is interwoven with student engagement, classroom management and other topics previously addressed.

Emerging technology

The growing inclusion of iPad technology in educational settings along with the emergence of Apple TV have set off a growing debate about whether this combination is a better option for schools than traditional interactive whiteboard technology. In the past two years, many articles have appeared in well respected web-based technology forums. Although not traditional scholarly research or publications, their content cannot be dismissed in this debate.

The proponents of movement toward Apple TV used with an iPad provide several arguments. The first is the cost of this technology compared to a traditional interactive whiteboard technology. While the cost of the components of traditional interactive technology is at least \$3,000, the cost of Apple TV, an iPad, and necessary accessories typically costs less than \$1,000 (Schmid, 2012). With the lower cost per classroom, more students can have access to the technology with the same technology budget. Proponents of the Apple TV/iPad combination also argue that the adaptability and diversity of equipment outweigh the somewhat more complicated set up (Herb, 2012).

Furthermore, anything that can be done with any of more than one million apps available on an iPad can be mirrored to the projector screen and shared with a class providing teachers more options than traditional interactive whiteboard technology (Orilio, 2013). Proponents also argue having students pass an iPad to each other is a more efficient and effective classroom practice compared to asking students to come to the front of the room to interact with an interactive whiteboard (Meech,

2011; Orilio, 2013). The final argument in favor of the iPad/Apple TV combination is the ability to project technology from a variety of sources such as a Mac Book, iPad, iPhone, and iPod (4th generation or greater) to a screen (Regan, 2013).

Interactive Whiteboards in Music Classrooms

The wider topic of technology in the music classroom has been extensively researched (Chan, Jones, Scanlon, & Joiner, 2006; Ho, 2007; Rudolph, 2007; Williams, 2007). However, very little research has been done on the use of interactive whiteboard technology in the music classroom. In a White Paper produced by SMART Technologies in 2006, none of the forty research papers cited studied SMART Board technology in the music classroom (SMART Technologies, Inc., 2006). Even in 2013, only one article in an extensive database of research provided by Smart Technologies related to the use of interactive whiteboard technology for music educators (SMART Technologies, 2013).

Music educators face the same challenges of student engagement, classroom management, varied learning styles and preparation time constraints as other teachers which allow the transfer of research done in other content areas to music. However, the unique nature of music and some particular challenges in music classrooms are not addressed in research done in other curricular areas.

Two seminal articles provide first-person narratives that describe the use of interactive whiteboards in the elementary music classroom, secondary music appreciation class, and choral rehearsal. Jean Baker provides an excellent first-person narrative describing her first use of a Smart Board. She used the device most often in her music appreciation classes while the class studied American popular music and film music (Baker, 2007). Karin Nolan provides extensive information about the impact of an interactive whiteboard in her elementary music classroom stating students are more engaged in class activities with an interactive whiteboard as it can be used with many different technologies stimulating a variety of learning styles (Nolan, 2009).

As previously stated, interactive whiteboard technology allows teachers to more effectively organize their lessons. This is also true for music educators where it is essential to use audio recordings, video clips, and other devices. One of the benefits of interactive whiteboard technology is the ability to embed video and audio clips of music in a presentation so the teacher does not have to “fumble” with a variety of websites and recordings during the lesson (Baker, 2007). In addition, teachers do not have to battle with technological compatibility issues during the presentation (English, 2004).

Teachers often prepare a single lesson which will be used with different groups of students. The interactive whiteboard allows the teacher to use the same graphics and presentation many times without repeating the written work for each class. At the end of the lesson, a teacher can save that day’s examples exactly as they are and open a fresh copy of the lesson for the next class. This is beneficial to a typical music teacher who sees several sections of the same grade and will teach the same lesson to each class. When the first group returns, the teacher can bring up their examples exactly as they left them and continue with the lesson (Nollan, 2009; English, 2007). Interactive Whiteboard Technology also allows a teacher to save and edit lessons so they may be used again in subsequent years (Mackrill, 2009).

Interactive whiteboards help motivate and keep the attention of students in music classes (Mackrill, 2009). The teacher is able to direct the students’ focus to the same information on a screen without handing out a paper copy of music, rhythm exercises, or other materials to each individual (Baker, 2007). Teachers are able to project images of sheet music or song text and show the students how to follow along and read the music. The teacher can be assured all eyes are focused on the same material (Nolan, 2009).

Children learn best in many different ways and interactive whiteboards appeal to a wide variety of learning styles. Students who are visual learners are obviously drawn to the eye-catching visual stimulation while kinesthetic learners are able to come up to the board and manipulate the examples provided by the teacher. Students are more engaged in music class activities and are more willing to come up to the board to participate in learning (Nolan, 2009).

Interactive Whiteboard technology with music software

Music educators often use interactive whiteboards in conjunction with Finale, SmartMusic and other music writing programs (Baker, 2007). Teachers also use it with programs like *Alfred's Essentials of Music Theory* to teach theoretical concepts (English, 2004). Music teachers pull in musical examples from Windows Media Player or iTunes and use Internet resources to enhance instruction (Nolan 2009). Appropriate clips found on video sharing sites such as YouTube can be incorporated into music lessons using interactive whiteboard technology (Mackrill, 2009).

A few internet resources are devoted to the use of interactive whiteboards in the music classroom. A few postings on the National Association for Music Education website forum section discuss their use (MENC: The National Association for Music Education, 2009). Those discussions focused on sharing ideas and lessons using an interactive whiteboard in general music classes. An issue of the *Music Education Journal* included Nolan's article in its *Samplings* section which highlights important contributions to scholarly journals in the field of music education (Samplings, 2009). More recently, the same journal included an Idea Bank article by a middle school band director entitled *How a SmartBoard Changed My Teaching* (McNamara-Cabral, 2012).

Academic preparation

Academic institutions training future music educators are beginning to discuss the use of interactive whiteboard technology in pre-service music education classes. A popular textbook,

Practical Guide to Teaching Music in the Secondary School, includes a small section on interactive whiteboards and provides an excellent introduction to the use of interactive whiteboards in the music classroom (Mackrill, 2009). As more secondary music teachers begin to incorporate interactive whiteboard technology, more specific information on scholarly research should become available. In my experience, pre-service music education students are familiar with a Smart Board but most have not used one during their practicum lessons or other teaching experiences at their universities.

Summary

The research available provides detailed examples of the impact technology has on student achievement especially as it relates to student engagement and classroom management. There are several bodies of research providing specific examples of how Smart Boards are used in classrooms. However, the research available addressing the use of interactive whiteboard technology is limited in several ways. The technology itself is constantly evolving which makes thorough research over extensive periods of time difficult. Finally, there is still very little research available specifically addressing the use of Smart Board technology in instrumental music classrooms.

CHAPTER 3: METHODS

Even though interactive whiteboard technology is becoming more common, it was difficult to find teachers to interview who had enough experience to provide a diverse range of examples to share. It was very difficult to find a sampling. Numerous music educators in Minnesota and Wisconsin were contacted in order to find out if they used interactive whiteboard technology and many indicated they did not due to lack of access. Each teacher selected for the interview uses Smart Board technology on a regular basis, is an experienced educator, well-versed in the use of technology and is part of a well-established music education program.

The interviews took place in March and April, 2013. Two interviews were done in person and two were done by telephone. Each interview was recorded and transcribed for use in the research project. Each teacher interviewed was asked ten questions (see Appendix C). Basic information about the school setting and available technology was provided in the first set of questions. The second group of questions asked the participants to describe their primary application of interactive whiteboard technology and how often they use each of the primary applications. The next four questions asked interview participants to describe the acquisition, adaptation, and implementation of the interactive whiteboard technology. Finally, participants were asked to share their aspirations for future implementation. Those questions were designed as an opportunity to understand whether I could share any of my own interactive whiteboard technology uses with them.

Each interview was summarized in a case study describing the respondent's use of interactive whiteboard technology. The case study includes challenges he or she faced in using the technology and his or her desire for further implementation. In the results section, I provide solutions for each respondent's desired implementation based on my own use and examples found in a variety of sources.

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There were a number of limitations to this project. The first was finding instrumental music teachers who regularly use Smart Boards. Many teachers stated the technology is available in their building but is not installed in instrumental music classrooms. The second limitation was finding teachers who use a range of features available with the Smart Board. Many teachers in a variety of subject areas use the Smart Board as an electronic whiteboard and do not use many of the basic functions of the board. Even fewer teachers use available accessories such as Smart Response devices on a regular basis. Finally, a Smart Board package is expensive and many school districts are exploring less expensive options or reducing the amount of money spent on technology.

CHAPTER 4: RESULTS

Case Study One

Respondent One, Ms. K, is a middle school band director who shares her teaching space with two other colleagues, one of whom has prior experience with a Smart Board. She and her colleague wanted a Smart Board and received it through an in-district grant. This is her second year using a Smart Board in her class. She attended in-district professional development for the use of the Smart Board but has not attended other professional development activities related to Interactive Whiteboard technology.

Ms. K primarily uses the Smart Board as a classroom organization tool. She and her colleagues each use it for the daily class agenda. The respondent reported one challenge in her classroom setting is that multiple teachers use the board and must switch users during the five minute class passing time. To accommodate this time constraint, the three teachers sharing the Smart Board have agreed to use Google Presentation instead of Smart Notebook software because they are able to access it quickly through their email instead of accessing Smart Notebook files through a shared drive. Although this saves time, the respondent states this limits the interactive Smart Notebook features she can use.

The teacher uses the interactive writing feature for two primary uses. The first is a “Rhythm of the Week” exercise. She shows the students a rhythm pasted into a presentation slide and a student will write the counting on the board for the class to see. In addition, Ms. K. uses the Smart Board to write new terms and other information for the students. Her vocal music colleague showed her an interactive game called “Staff Wars” that she would like to use with her students but has not done so. Sometimes she uses the Smart Board to incorporate other technology into her lessons and occasionally uses the interactive whiteboard to show YouTube videos or Discovery Channel videos during class.

She stated it is useful to show younger students what great playing looks and sounds like and also holds the interest of younger students.

Ms. K reported that time is the major factor that prevents the subject from using more features of the board. She learned about many features at in-district professional development seminars but does not use them. She stated that since she teaches performance-based classes, she wants to keep her students playing and not take time away from rehearsals to do other things. In addition, the constraint of multiple teachers sharing a teaching space and the need to save presentations in Google Presentations instead of Smart Notebook files prevents the teacher from using many of the available interactive features. The teacher asserts she could do everything with a whiteboard and a screen.

Case Study Two

Respondent two, Mr. D, is an experienced band director at a large suburban high school. In addition to directing the school's bands, he also teaches a Guitar class, a World Music drumming class and a General Music class. This is Mr. D's second year using the Smart Board which the school district provided for every classroom. The respondent uses the Smart Board daily with the Smart Notebook software and describes it as an "interactive PowerPoint". One of his favorite features is the touch screen interface which allows him to access a variety of software and media directly from the front of the room.

Mr. D uses the Smart Board in conjunction with several other software programs. He also uses the technology to meet the school district's mandated learning initiatives within a music classroom. The respondent uses the Smart Board with "Blackboard" an electronic learning system similar to Moodle or Desire2Learn (D2L). Using the Smart Board, the subject accesses Blackboard on the screen during class where he can show students the assignments, bring up individual students' work to

show and provide feedback to the class. The subject also uses Blackboard with the Smart Board to give quizzes which the students access electronically through laptops provided by the school.

Mr. D's school district has adopted the Cornell Method, a prescribed note taking method for all classes. He has designed a Cornell Notes template for the Smart Notebook software that fits the needs of his classroom while meeting the district mandate. He prints the notes written on the Smart Board Cornell note template and gives them to the students who are absent or require a printed copy. Mr. D reports the use of the Cornell format and reading assignments also support the district-mandated literacy initiative. He also states the Smart Board allows him to provide background information through websites and other media for these activities while still providing a meaningful interactive music experience.

The respondent also uses the Smart Board with SmartMusic during every band rehearsal. He projects the SmartMusic software tuning and metronome features for use during rehearsal. Mr. D also projects individual parts in SmartMusic and uses the Smart Board Smart Ink tool to write directly on the part on the screen. The Smart Ink tool allows the user to write directly on any program on the screen, similar to what one might see on a television sports program. This allows him to point out accidentals, dynamics, and other items in the part to students and visually show the students how he wants them to mark on their part.

Mr. D reports he also uses the Smart Board with Finale notation software. He creates four measure rhythm patterns and projects them on the screen for the class to play as part of their warm up. He typically imports the Finale document as a .jpeg and projects it on the screen. He also turns Finale warm up files into SmartMusic exercises. Finally, he uses Finale to create customized etudes and duets from the literature the students are rehearsing and projects it on the screen for students to play as part of their rehearsal.

The teacher has access to in-district professional development seminars related to the Smart Board but chose to collaborate with colleagues to learn how to use it. Mr. D would like to create some presentations that support the material in Blackboard and states that lack of time is what prevents him from doing this.

Case Study Three

Respondent Three, Ms. A, is an established educator in a small rural district who teaches all levels of Band (fifth grade, sixth grade, middle school and high school) as well as an Exploring Music class for high school students. The subject states she started with just using the Smart Board technology for the agenda and classroom announcements and implemented other activities gradually over three years. The teacher was uncertain about how the technology was funded but stated it was either through Title One money available to elementary schools or the district's technology plan. When asked how the Smart Board was funded, she stated, "I talked enough and I got it".

Ms. A uses in-district professional development opportunities such as early release days to learn more about available technology, develop ideas for her classes, and work with colleagues. She reports that most of her Smart Board knowledge has come from colleagues in her district. She also regularly attends her state's annual school music association conference and states she participates in every technology session available at the conference.

The subject uses the Smart Board daily for the rehearsal schedule for each group as well as any announcements. In addition, she writes rhythm exercises on the Smart Board to use as warm ups and tailors each day's warm ups to the specific pieces the group will be rehearsing. One of the Ms. A's favorite features is the ability to save information written on the board. She states this is useful for classroom organization and gives students a sense of responsibility for the information discussed and decided in rehearsal. She uses the board to brainstorm with her ensembles about programming and

concert ideas. Because she is able to save the information, she can access it at any time and remind the students of the decisions they made as an ensemble.

One of the respondent's favorite uses of the Smart Board is with her beginning band students. Ms. A teaches the beginning musicians in small, like-instrument groups and uses the Smart Board to project the SmartMusic music education software during their lessons. The lesson book series she uses is available on SmartMusic. She starts her beginning instrumentalists in group lessons with SmartMusic even before they get their lesson books so they can focus on one exercise at a time on the large screen in the front of the room. This helps her to be assured that all students are learning the same idea. She says it is easier for students to visually follow the cursor on SmartMusic on the Smart Board than find the correct place in the lesson book. Students can also touch the Smart Board to see fingerings for notes they need to review.

The respondent's use of the Smart Board helps her students to meet the National Standard for Music Education standard four (Composing and arranging music within specified guidelines) and allows her to document their work. As stated earlier, she regularly uses the Smart Board to write out warm up exercises based on the day's rehearsal plan. In addition, she asks students to compose their own warm up exercises and share them with the ensemble. These are simple four measure rhythm compositions written by beginning band students as well as more complex warm up exercises written by the older band students. She is able to save the exercises students have written on the Smart Board and save or print them for later use or as assessment data.

Ms. A uses SmartMusic in conjunction with the Smart Board with her high school students. SmartMusic has a large library of music available so students are able to explore pieces not currently in the school's music library and play their part along with the SmartMusic recording. When done on

a Smart Board, several students are able to look at the same part and play along as well as use all the features of SmartMusic with a touch of the screen at the front of the room.

The teacher also utilizes the Smart Board to expose students to music related internet resources. She can project websites such as JW Pepper and YouTube to introduce the students to opportunities to listen to and watch performances of music they are rehearsing. Ms. A encourages students to share what they have found with her and their classmates. Finally, the use of the Smart Board as a quality projection system cannot be ignored. The respondent states her students enjoy watching their concert performances on the big screen connected to a quality sound system.

When asked what else she would like to be able to do with the Smart Board technology, Ms. A responded she would like to be able to compose easily on the Smart Board. She reports the graphics available with the Smart Board are cumbersome and it is difficult for students to “drop and drag” the notes into a staff. She also wishes the Smart Board had a playback component so students could hear their compositions. Finally, she says her students would prefer their compositions look like “real music” instead of handwritten exercises.

When asked what keeps her from further implementing Smart Board technology, Ms. A responded the lack of time. She states she has many great ideas from her colleagues and the professional development opportunities in which she has participated but lacks the time to develop and implement the ideas. Ms. A attended a seminar about the Smart Response system and is excited to implement it in her classes but is not able to do so at this time because there aren't enough response devices available for the number of students in her class.

Case Study Four

Respondent Four, Mr. C, is an experienced band director at a large suburban high school. The high school building was constructed in the past five years and, in addition to being the band director,

Mr. C was a part of the building's design team. He and his choral music colleague are considered leaders in the use of technology in the school district. The respondent's classroom has a large Smart Board, connections for audio and video accessories, and a built-in voice projection system which were part of the building design requirement for every classroom. The teacher uses the Smart Board daily to present the plan for each class period using PowerPoint software. He uses links in the PowerPoint presentation to show YouTube videos or audio recordings of performances approximately twice a week.

The respondent has participated in several professional development opportunities related to the use of the Smart Board. Mr. C states the school district brought in trainers from Smart Technologies the year before the building opened to work with teachers who would be teaching in the new school. He has also attended seminars at various music association conferences related to technology.

The adaptation period for Mr. C was minimal. He states that he is doing many of the same things he did before he had a Smart Board but wasn't as efficient prior to its implementation. The teacher says it is easier to plan using the software program instead of writing everything in chalk or marker before each class. He has used YouTube and audio recordings for many years but now uses the touch screen feature of the Smart Board instead of going to the computer to access the links. He uses the "freeze" function of the board to leave the class agenda projected on the screen while taking attendance on the same computer.

The teacher says he would like to change the placement of the Smart Board in the rehearsal hall. Currently it is directly behind the podium and is difficult for students to see while the conductor is on the podium. Mr. C would like to install a larger screen higher in the room and use a Smart Tablet or iPad to manipulate the software instead of using the touch screen function. He states he wishes the

Smart Board was more compatible with iPad technology. The subject is currently exploring the use of Apple TV or similar software to use the Smart Board screen with other devices.

Summary

Despite their years of experience, there were a number of similarities among all four respondents. Each of the four teachers who were interviewed uses their Smart Board for classroom management. In particular, each teacher uses it to outline the class agenda every day. All four teachers use the Smart Board with other technology, particularly to show You Tube videos or listen to recordings. Each of the teachers recognized the limitations of the technology and their use of it in their classroom at this time. All four are interested in expanding their use of interactive whiteboard technology in some way whether that is using more of the available features or adapting new technology.

CHAPTER 5: APPLICATIONS AND CONCLUSION

Interactive whiteboard technology is becoming an integral teaching tool in schools. Like teachers of other subjects, many band directors are very excited about the potential for using Interactive Whiteboards in their classrooms but have not found the time to fully implement the new technology. In addition, interactive whiteboards are expensive and in some cases administrators are reluctant to provide funds for the installation and teacher training needed to successfully incorporate the technology. For band directors who want a Smart Board, providing data and examples of the positive impact an interactive whiteboard can have on an instrumental music program may convince administrators to provide the necessary resources. For band directors whose classrooms are equipped with Smart Boards but haven't had the opportunity to work with the technology, having a few examples of successful lessons to get them started may be an impetus for them to devote the time and energy to adapt their lessons to the technology.

As previously stated, very little formal research has been published in the use of Smart Board technology in the instrumental music classroom. The following will provide practical applications for band directors who are interested in obtaining a Smart Board and want specific ideas about how they will be able to use the technology in their classrooms. In addition, the information will be applicable to teachers who have a Smart Board and wish to more fully implement the Smart Board capabilities in their classrooms based on the experiences of the project's respondents.

Ideas for Implementation Based On Case Study One

As with many newer teachers, Ms. K seemed overwhelmed by the numerous tasks involved in daily teaching and it seemed learning more about the technology added to her long 'to do' list. At this point, she is a relatively new Smart Board user and is simply using the Smart Board in her classroom as an electronic whiteboard, utilizing very few of the interactive capabilities. All four of the

respondents stated they began using their Smart Boards as simply as Respondent One is and gradually implemented other capabilities over time.

One of the main difficulties Ms. K has with using her Smart Board more effectively is directly related to sharing the rehearsal room and computer with several colleagues. As a group, they have decided to use Google Presentation software in an effort to save time switching between users. To more effectively utilize the full capabilities of the Smart Board, the subject could design her class agenda using the Smart Notebook technology and save her files to a flash drive. By doing this, she can design her files on any computer loaded with the Smart Notebook software and then quickly plug in the flash drive before rehearsal begins. This step would allow her to utilize the capabilities of the Smart Board technology and still allow staff to quickly switch between users.

Ms. K stated that she wants to keep the pace of her class moving to keep the young learners' attention. By using the Smart Notebook software, Ms. K could embed the links to YouTube videos, Discovery Channel videos or recordings she uses and access them more efficiently using the touch screen capabilities of the Smart Board. This simple step saves time switching between the class agenda file and an Internet browser. Currently the subject is drawing a staff and rhythm on the board or composing the "Rhythm of the Week" on Finale and copying it into the presentation software. The subject could use the built-in Smart Board images to preset the rhythm instead of drawing it by hand during class or pasting it in from another program.

Ideas for Implementation Based on Case Study Two

Respondent Two, Mr. D, is currently using Finale to create warm up exercises for his students. At this time, he creates the exercise, makes a .jpeg of the file and imports it to the Smart Notebook file. The subject could project the exercise directly from Finale to save time and eliminate a step in the planning process. In addition, he could then use the Finale playback function so students can hear the

rhythm played correctly. Using the Smart Ink function, he could write counting or arrows directly on the Finale score to help students better understand the rhythm. Since he is already doing this with SmartMusic, it would be an easy step for the subject to implement.

Currently the subject is using the Blackboard on-line learning system on a regular basis in his classes. Although there are some limitations to using a system such as Blackboard, he is using the district-mandated program effectively. In addition to his current uses, he could upload the Smart Notebook files he has presented in class to Blackboard. By doing so, students would have ongoing access to the notes and presentations for study at home. In case of absence, students can also print the Smart Notebook files they need from Blackboard or review them on-line.

The subject stated he knows the Smart Board can do a lot of things but he hasn't discovered them yet. Users who are as comfortable with technology as this subject is often prefer to investigate and learn how to use new technology on their own instead of attending professional development seminars. Independent learning is a great way for users to get exactly what they need but they often miss some simple information and sequential steps at training sessions that would make using the Smart Board more effective and user friendly.

Idea for Implementation Based On Case Study Three

The respondent, Ms. A, said she would like to compose more easily using the Smart Board. Using Finale notation software with the Smart Board, the teacher could satisfy that request, have a playback option, and provide professional looking scores to save for assessment. Ms. A could set up a single staff in Finale and have the students can use the simple entry palette to drop and drag notes directly into the score from the Smart Board. She can also use the playback feature in Finale so students can hear their compositions. Furthermore, Ms. A can save the exercise as a Finale file or use

the Smart Board screen shot option to save the composition as a Smart Notebook slide. Both options give her the opportunity to use the data for assessment and use it again during later classes.

The teacher has already implemented many classroom procedures for students to share their opinions and values student decision making in the classroom. The teacher expressed an interest in using Smart Response devices which she could use to collect and record data from the students (i.e., voting on a particular piece for a concert). To eliminate the need for each student to have a ‘clicker’, the Smart Response questions can be set to receive multiple answers from each device and students could pass them around. Another option is to set the questions for single response but set up multiple copies of the identical question. A third option is to use the Smart Board with a web-based program such as Poll Everywhere to obtain student responses. These responses can be made through text message, iPads, or laptops and projected directly to the screen. This would allow every student in the class to have a voice in the decision making process.

Ideas for Implementation Based On Case Study Four

How Respondent Four, Mr. C, could more effectively use the available Smart Board technology is difficult, as it has more to do with the physical layout of the classroom than the technology itself. This is particularly troublesome as he teaches in a new building where the technology is one of the identifying characteristics of the school. His school’s website states:

“21st century learning is here... Every classroom is equipped with a SMART Board and trained staff who engage students with interactive lessons and activities. The staff integrates technology into all curriculums by using a variety of tools. To enhance learning, students often check out laptops and netbooks from our media center.”

Materials for the school also state the school is a “State of the Art Facility” with “21st Century classrooms that include a SMART Board in every room, wireless access, projectors, voice

amplification systems for every classroom, and a 3:1 student to computer ratio”. The school has made a very public commitment to the community about how the technology will be used and Mr. C must consider this strong stance before requesting new technology.

One of the problems with technology is how quickly it changes and the remarkable speed with which “the latest and greatest” becomes outdated. When Mr. C’s building was planned five years ago, Interactive Whiteboard technology and Smart Boards were in their infancy. Few educators in the area had access to it and even fewer schools had installed it in every classroom as was planned for this building. Whereas Smart Boards were “the latest and greatest” less than five years ago, many schools who have not installed them are bypassing Smart Boards and are implementing other technology which has been developed in recent years.

One of the fastest growing trends is the use of iPads as educational devices. Some schools are even funding programs that provide an iPad for every student. The emergence of Apple TV enhances this trend in educational technology. As cited in the Literature Review, there is growing debate among educators and educational technology specialists about whether Smart Boards are a thing of the past. Many schools are now choosing to use Apple TV instead of Smart Board technology since it is less expensive and more compatible with iPads. Mr. C and his choral music colleague are considered leaders in technology and even they could not anticipate their needs would change in less than five years.

With the desire for better screen placement and use of other software, the implementation of Apple TV for Respondent Four’s classroom is a good solution. However, abandoning an expensive and, until recently, state-of-the-art technology is fraught with difficulties. Funding is an ongoing crisis for many districts and spending money on technology while cutting teachers and programs is often unpopular.

The current cost of Apple TV is less than \$1,000 so the change to Apple TV is relatively inexpensive and would enhance his teaching in several ways. Apple TV allows the teacher to interface with the screen through an iPad which allows screen placement that is visually more accessible to students as this teacher desires. Accessing media such as YouTube or audio recordings through the iPad/Apple TV/screen combination allows the teacher to start and stop media from any location in the classroom. The teacher can also move quickly between applications remotely. Finally, this combination also allows students to participate from their own seats instead of moving around the classroom to manipulate the screen.

In districts such as Mr. C's which recently provided all teaching staff with a MacBook Pro, the move has already been made away from the Windows based software, which is compatible with Smart Board technology and toward the Apple platform. Respondent Four and his colleagues have experienced a variety of compatibility issues between Mac Book computers and Smart Board technology. The Apple TV/iPad combination allows teachers to use more applications without the compatibility or proprietary software issues involved with Smart Boards.

Implementation of Smart Response System with Smart Board

None of the educators interviewed use the Smart Response System with their Smart Board at this time. Each of them is aware of the technology, have some devices available in their building and have considered the possibilities. It may be more difficult for instrumental music teachers to use the Smart Response system because of the number of students in a typical band class is typically larger than the number of response devices in a standard set. Although it is possible for students to share the voting devices, it is less than ideal for numerous reasons including classroom management and data collection.

The response devices can be set up as anonymous data collection devices or assigned to a specific student for assessment purposes. Teachers whose schools place a priority on collecting formative and summative assessment data could benefit from the use of Smart Response devices. In addition, the data can be stored for review by the teacher and shared in real time with the class.

Smart Response devices can be used to record answers to a variety of types of questions depending on the device. The most advanced device allows responses to six question types – true or false, yes or no, multiple choice, multiple answer, numeric, and text response. The Smart Board Response system software has templates with a variety of question types that teachers can use with the information they want to assess. They are relatively simple to set up ahead of time and can be used with multiple classes. Data can be saved and used for review by the teacher at a later time or shared with students in real time. In addition, the Smart Notebook files have a feature that allows a teacher to ask a spontaneous question during class and record the student responses immediately.

The Smart Response system can be used in instrumental music classrooms in many ways as either formative or summative assessment activities. A music teacher can use the response system to assess student knowledge of note names or note values. With the simpler response systems, it can be set up to record answers to multiple choice questions. For instance, a teacher can set up a response quiz to assess students' understanding of note names instead of doing a traditional paper and pencil multiple choice quiz.

The devices can also be used to record responses to ear training quizzes or music theory activities. A teacher could play an interval or scale and record the student responses. Depending on the type of device used, each student could respond to a multiple choice quiz or a short answer response. As with all response types, the device can be used anonymously as a formative assessment to understand how well the class as a whole understands the material or as a summative assessment

with each response device registered to an individual student. The following are two examples of multiple-choice questions (figures 1 and 2), which could be used in an instrumental music classroom.

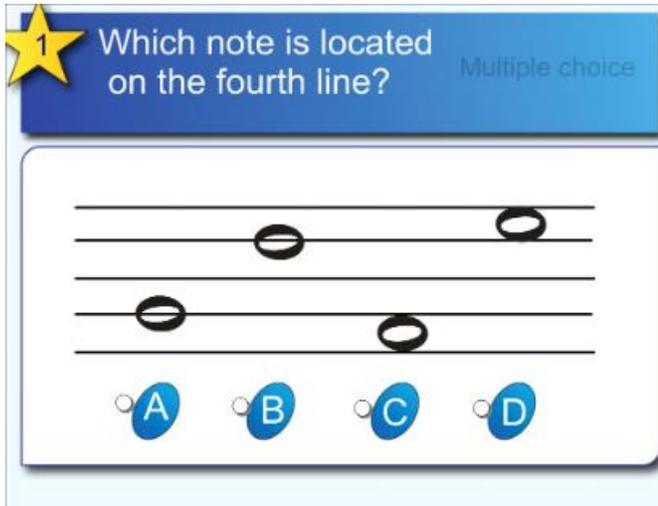


Figure 1
Source: <http://exchange.smarttech.com/>

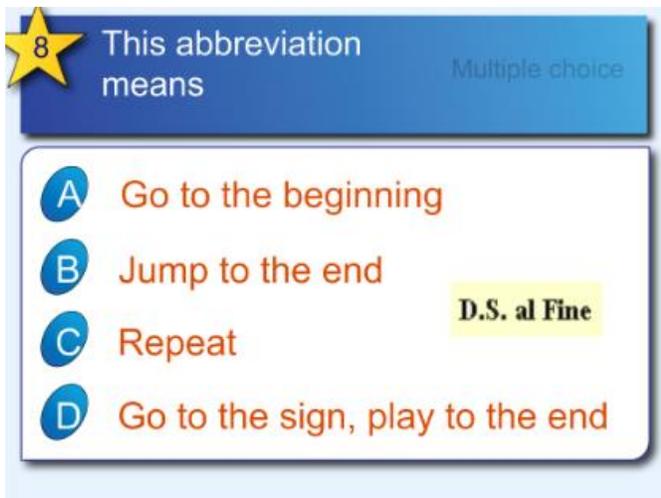


Figure 2
Source: <http://exchange.smarttech.com/>

The response systems could be used effectively by educators in a small group or single-instrument class to review or assess students' knowledge of fingerings. The teacher can use the preset quiz templates to develop a series of questions and potential responses for students. For instance to

assess how well a group of saxophone players knew the fingerings for their notes the teacher could set up a quiz with multiple choice responses as shown in figure 3 and 4.

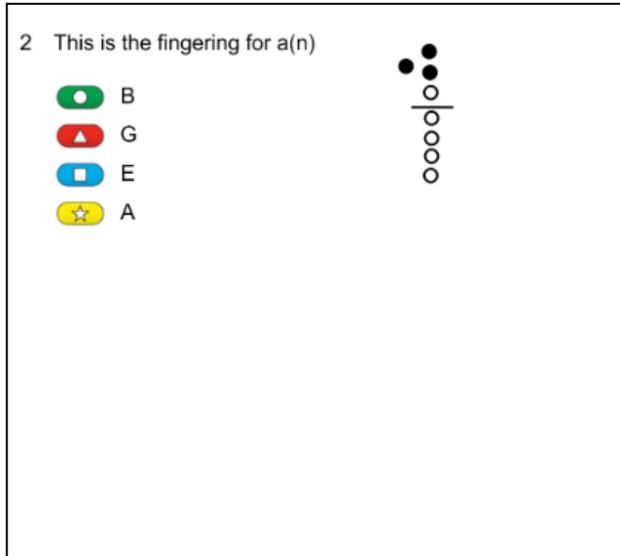


Figure 3

Source: <http://exchange.smarttech.com/>

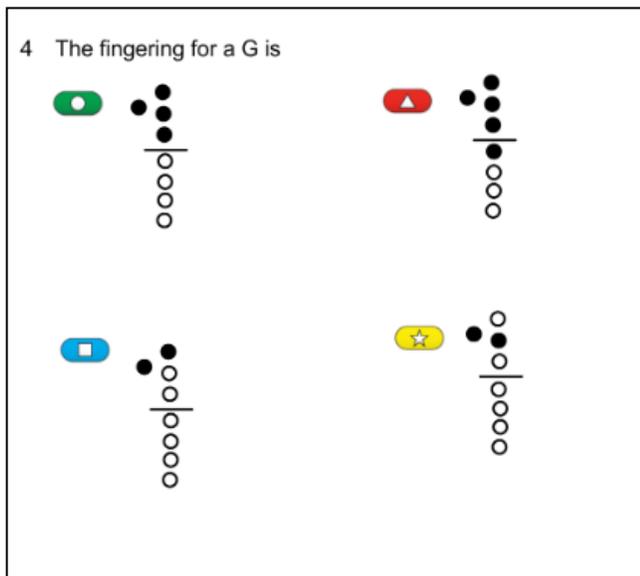


Figure 4

Source: <http://exchange.smarttech.com/>

While a teacher could walk around the room and check whether each student is playing the correct fingering on their instrument, the Smart Response system allows a teacher to record student

answers accurately. This gives the teacher the opportunity to review the data at a later time and share it with others as needed. It could even be used to create an electronic portfolio for each student. With the emphasis on data and assessment in education at this time, using the response system is an effective tool for educators in any discipline. It is especially useful for music teachers who often have difficulty quantifying results in a performance based class.

Educators can use the Smart Response system to assess student knowledge “on the fly” during a class. With the click of a key on the Smart Board, a teacher can ask the students a question and get a real time response from the students. Instead of asking students to raise their hand if they understand a particular concept or need further explanation, a teacher can use the response system. This may elicit more honest answers from a class. An instrumental music teacher could use it to assess whether students feel they have learned a particular passage in music or need to continue rehearsing it. For instance, the teacher could ask students to respond with “A” if they feel they know it well, “B” if they understand it but need more time to work on it in the next rehearsal or “C” if they need it explained again.

Implementation of Smart Exchange Activities

The number one reason the interviewed teachers gave for not doing more with the Smart Board in their classroom was time. SMART Corporation has designed SmartExchange, a free website that provides teachers access to a wide variety of Smart Board lesson plans and activities. All of the activities are designed by teachers, educational publishers, and SMART Corporation. The exchange is searchable by subject and grade level. In addition, users can search by file type such as Smart Response quiz, notebook applications, and manipulatives.

As of April, 2013, there were over 1600 results for a search for ‘music’ as a subject area. Nearly half of these results were Smart Notebook lessons. Of those 800 lessons, approximately half of

them are game-type activities that can be tailored to review a wide variety of music concepts. Some games are based on TV game show formats such as Smart Board Jeopardy and Classroom Feud. Other Smart Notebook activities are based on board games and formatted to look like familiar games such as Connect 4 or Battleship. Many have creative names and interesting sound effects that make review activities fun for students. Finally, some of the Smart Notebook lessons for music use manipulatives such as touching the screen to get a mystery question or throwing a koosh ball at the Smart Board to choose a question.

A number of the activities shared on the Smart Exchange website could be used by instrumental music educators “as is” or could be used as a template to design similar activities for other instruments. Although it takes time to learn how to create these types of activities, the completed product can be used in many ways and the same template can be used for many activities. These activities could be used in conjunction with a Smart Tablet which would allow students to manipulate the screen from their seat instead of moving to the Smart Board.

The following are two examples available on Smart Exchange that could be used by instrumental music teachers with group lessons of inexperienced players:

INTERACTIVE WHITEBOARD TECHNOLOGY

1) An activity entitled “Fingering Practice for Beginning Band” allows students to manipulate parts of the screen to practice fingerings for a variety of instruments. Students use the touch screen function to drag a dot to cover the correct keys or an arrow to indicate valve combinations.



Figure 5

Source: <http://exchange.smarttech.com/>

2) Another activity called “Slide By Slide” allows students to practice the note names and slide positions for the trombone.

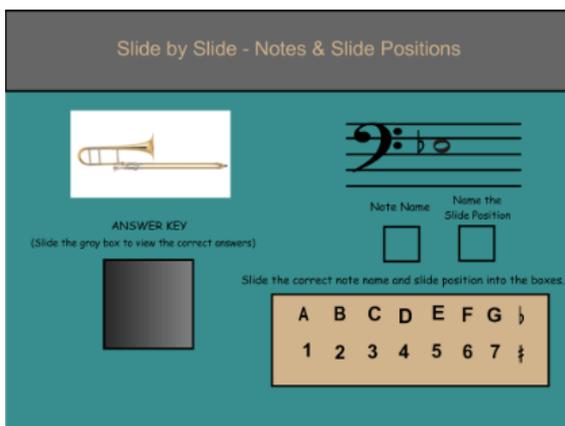


Figure 6

Source: <http://exchange.smarttech.com/>

Implementation of the Smart Board as an Organizational Tool

Since the Smart Board is often a focal point of the classroom and can be manipulated by touch, it can be used as a classroom management aid. As students come in the room, they move their name to the 'here' column so the teacher can quickly take attendance at the beginning of class (see figure 7).

Attendance could also be taken by projecting a seating chart on the board and having the students sign their name, initial or cross out their name as they enter the room.



Figure 7

Source: <http://exchange.smarttech.com/>

Since Smart Notebook files can be made ahead of time and links embedded in the Notebook files, the teacher can have everything prepared for class ahead of time. This would be especially helpful in designing an effective lesson plan for a substitute teacher. The regular teacher could save the lesson to a flash drive and the substitute would be able to access the class agenda as well as manipulate the links to audio recordings, pre-screened video links, or appropriate websites.

Implementation of Finale Notation Software with the Smart Board

Two of the interviewed educators use Finale with the Smart Board in their classrooms. There are many ways these two components can be used together. Teachers with a traditional projector and screen can use Finale to write exercises, warm ups, or rhythm patterns for the students to play but the Smart Board technology allows the teacher and students to interact with the material. Teachers can use Finale notation software to write out a rhythm and project it on the Smart Board screen. Using the Smart Ink palette within Smart Board, the Finale document can be written on. This is useful in many situations such as introducing a new rhythm, writing in the counting for a difficult rhythm, or pointing out the whole step-half step relationship in scales.

Anything a user can do with a mouse in Finale can be done by touch using the Smart Board, such as entering notes with the simple entry palette. The teacher can open a blank Finale document and drop & drag notes into the score by touch directly in Finale using the touch screen. Using the dynamic or articulation menu in Finale, a teacher can demonstrate how dynamics or articulations can change the sound of the music. The teacher can pre-write a melody using Finale. Then they could open menus to add dynamics or articulations to the passage and play it for the students. Additionally, the teacher can simply use the erase function in Finale to change the dynamics or articulations and play it again.

Finally, the touch screen aspect of the Smart Board is useful when demonstrating how to use Finale software to a group of students. The teacher can use a finger on the touch screen in place of a mouse on a traditional computer screen to demonstrate for the class. This would be useful for someone teaching students how to use Finale, Finale Notepad, or other notation programs.

Implementation of SmartMusic Music Education Software with the Smart Board

Two of the educators interviewed use the Smart Board with SmartMusic music education software. Teachers with a simple projector and whiteboard can project a part of a band arrangement or a lesson book exercise in SmartMusic and have the students watch the part and listen to the playback. However, SmartMusic combined with a Smart Board can be used in a variety of ways. Using the Smart Ink palette or the Screenshot feature, a teacher or student can write on a part in SmartMusic. Instead of verbally directing students to circle a dynamic or mark an accidental in a particular measure and hoping they followed the directions correctly, the teacher can show the class exactly what to do. This feature is especially important for visual learners and less experienced musicians who may need reminders of what a particular music symbol looks like. Orchestra teachers could effectively use this feature to have students write bowings in their parts instead of the teacher marking all the parts or having the students do it with inconsistent results.

With a Smart Board, the teacher has complete control of SmartMusic from the front of the room instead of walking over to the computer to manipulate SmartMusic. For instance, if a teacher is using SmartMusic to introduce a new page in the lesson book to the class, the touch screen function can be used to scroll to each exercise from the front of the room. The teacher can also start and stop the program with a touch of the screen. This is useful to point out aspects of the music to the students and quickly continue playing the recording. The teacher can use the tuner on SmartMusic instead of using a handheld tuner or tuning website. To remind students about the correct fingering, the teacher can touch a particular note on the screen and show the class the fingering on the screen directly from the Smart Board. This helps with the flow of the lesson and class management.

Conclusion

For better or worse, digital technology is a part of living and learning in the twenty-first century. Digital natives are growing up surrounded by electronic devices and expect technology will be a part of their education as well. They crave the visual stimulation and may feel lost without it. The installation and use of a Smart Board in an instrumental music classroom benefits both students and teachers. There are many simple ways a music teacher can incorporate a Smart Board that allow for better flow to a lesson and visual appeal to students. Student work can be saved for future use or assessment purposes. Although the board itself is simple to use, it is even more powerful when used in conjunction with other programs that many music teachers use already such as SmartMusic or Finale. Even though they are time consuming to create, music educators who effectively design and implement lessons with the Smart Board technology are able to save the information and use it many times, providing new opportunities for student learning. When used in conjunction with Smart Response systems or other components available with the Smart Board, teachers can assess students in a purposeful manner and maintain interest in learning by students who are digitally connected in all other aspects of their lives.

After interviewing the teachers for this project and gaining a better understanding of how Smart Boards are used by others, I realize I am implementing interactive whiteboard technology quite well. I regularly use it with Finale and SmartMusic and am comfortable using many features of the board. My school district emphasizes formative and summative assessment and I would like to pursue the use of the Smart Response system in my classroom to meet this district initiative. In addition, the district's strategic plan includes the implementation of personal digital technology to enhance student learning. As part of this plan, the district is providing personal mobile devices for all students in several schools this year and hopes to garner enough community support to provide an iPad to every student in the

near future. By the time this happens, I hope the Smart Board technology will be more compatible with iPad technology and I will be able to use them effectively with the Smart Response system.

Whether moving from chalkboard to whiteboards, typewriters to computers, or notebooks and pencils to iPads, technology in education is constantly evolving. What is now state of the art will eventually seem outdated to students and teachers. However, when teachers have time and the tools necessary to use what they have available effectively, technology can be a powerful classroom tool.

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NOTICE OF ACTION – PROTOCOL APPROVAL
Institutional Review Board (IRB) for the
Protection of Human Subjects

University of Wisconsin – River Falls

Principal Investigator: Susan K. Berg-Williams
Sponsor/Support: J. Michael Roy
Protocol Title: SmartBoard technology in the instrumental music classroom
Protocol Number: H2013-W028
Committee Action: Approved on 13 March 2013, Expires on 12 March 2014

Dear Susan K. Berg-Williams,

The Institutional Review Board of the University of Wisconsin – River Falls has reviewed your proposal and **approved** your study for a period of one year. Approval is based on identification that the study has met federal regulations set forth in 45 CFR 46.111.

Review of the project has identified that:

- Risks to subjects are minimized.
- Risks to subjects are reasonable in relation to anticipated benefits, if any, to subjects, and the importance of the knowledge that may reasonably be expected to result.
- Selection of subjects is equitable.
- Informed consent will be sought from each prospective subject or the subject's legally authorized representative, in accordance with, and to the extent required by §46.116.
- Informed consent will be appropriately documented, in accordance with, and to the extent required by §46.117.
- The research plan makes adequate provision for monitoring the data collected to ensure the safety of subjects.
- There are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of data.

Conditions for approval:

- Any changes to the protocol, consent, recruitment, or data collection materials must be approved by the IRB before they are implemented.
- The IRB should be contacted immediately if there are any problems, adverse events, or new information that affect the risk to subjects.
- The study is approved for one year (365 days), starting from the date of approval. If the study is to continue beyond the expiration date, a request for renewal must be submitted to the IRB. This approval needs to be acquired before the current expiration date.

Office of Grants and Research, 101 North Hall, 410 South Third Street
 University of Wisconsin – River Falls, River Falls, WI 54022
 Phone: (715) 425-3843, Fax: (715) 425-0649

- Subjects taking part in the research should be provided with a copy of the consent form unless the requirement for a consent form has expressly been waived by the IRB.
- Consent documentation and IRB records should be retained by the researcher for at least 3 years after the completion of the project.

Good luck with your study.

Rich Wallace, Ph.D.
Chair, Institutional Review Board for Human Subjects

cc: IRB File

APPENDIX B**Subject Consent Form for Participation of Human Subjects in Research****University of Wisconsin-River Falls**

Project Title: Interactive Whiteboard Technology in the Instrumental Music Classroom

Researcher: Susan K. Berg-Williams, MSE-Fine Arts Candidate, Instrumental Music Teacher – Cottage Grove, MN, 651/554-0425

Description: The purpose of this project is to examine the benefits of interactive whiteboards for students and teachers in an instrumental music classroom, how interactive whiteboard technology is used in classrooms today and how the same technology can be incorporated into instrumental music classes/rehearsals. This paper will provide rationale for the installation of interactive whiteboards in instrumental music classrooms and practical applications for instrumental music teachers incorporating interactive whiteboards in their rehearsals.

Data Collection: As a research subject for this project, you will participate in a videotaped or digitally recorded interview based on a series of pre-determined questions. You will receive the questions at least one week in advance of the agreed upon interview. You may opt out of any question as you desire. The interview will be conducted at a mutually convenient time and manner either in person or through mutually available technology. The recording will only be used as a resource to aid in the compilation of the results. Any recordings will be destroyed after use in the analysis. It will not be used for broadcast or presentation. The interview will be 30 minutes or less.

The results of each individual's participation will be strictly confidential. The results of your participation will be recorded by group only. A summary report and explanation of the results will be made available to you when the study is completed if you so request.

Authorization: I have read the above and understand the nature of this study and agree to participate. I understand that by agreeing to participate in this study I have not waived any legal or human rights. I also understand that I have the **right to refuse to participate** and that **my right to withdraw from participation at any time during the study will be respected with no coercion or prejudice**. If you have any concerns about your treatment as a participant in this study, please call or write:
Rich Wallace

Director, Grants and Research, UW-River Falls
River Falls, WI 54022 telephone: 715/425-3195

This research project has been approved by the UW-River Falls Institutional Review Board for the Protection of Human Subjects, protocol # H2013-W028.

Participant Signature

Date

APPENDIX C**Smart Board Interview Questions**

1. Basic information – Description of teaching setting
2. What technology is available to you?
3. What are your primary uses of the Smart Board?
4. How often are each of the uses mentioned in Question 3 done?
5. How was the technology acquired?
6. What was your adaptation period? Did you create completely new units/projects built on the technology or did you revise and implement the technology as you went along?
7. What are your primary sources for Smart Board lessons or implementation ideas?
8. What professional development activities related to Smart Board technology have you been involved with? Have you participated in any content-specific professional development activities?
9. What would you like to be able to do with your Smart Board that you are not already doing?
10. What prevents you from doing what was stated in #9?