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A Preliminary Study of the Effects of *Nia* Movement on Collegiate Female Choral Singing

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The purpose of this pretest-posttest experimental study was to examine the effects of Nia (a sensory-based movement exercise) on female collegiate choristers' singing. Participants enrolled in a choral ensemble at a large mid-western university were separated into one control group (n = 23) and one experimental group (n = 14). After making pretest recordings, the experimental group participated in two Nia sessions, while the control group rested. The groups then made posttest recordings. Singers' perceptions of the effects of Nia on their own performance were examined based on data collected from participant questionnaires. While the repeated-measures multivariate analysis of variance (MANOVA) did not show any statistical significance ($p > .05$), participants who experienced Nia reported enhanced breath control, more relaxed posture and increased energy compared to those who did not. Suggestions for future research on Nia in the choral rehearsal include a longer treatment protocol and a deeper analysis of the effects on singing.

Researchers have investigated the incorporation of movement into the choral rehearsal as a way to improve singing. Multitudes of rehearsal movements exist, which are intended to enhance singers': (a) vocal technique, (b) musical expression, and (c) understanding of musical concepts, such as pitch and rhythmic accuracy (Bailey, 2007; Briggs, 2011; Chagnon, 2001; Hibbard, 1994; Jost, 2011; Luck & Toiviainen, 2008; McCoy, 1989; Manganello, 2011; Menehan, 2013; Peterson, 2000; Rohwer, 1998; Wis, 1993). Because such a large number of rehearsal movements exist, Chagnon (2001), Hibbard (1994), and Wis (1993) compiled databases of specific movement activities, each with its intended musical objective listed, as a tool for conductors to use when planning their own movement-based choral rehearsals.

Hibbard (1994) found that the most common technical faults, correctable with movement, are posture, breathing and tone. In addition to vocal technique, some authors identified the improvement of expressive elements when using movement (Bailey, 2007; Hibbard, 1994; McCoy, 1989; Manganello, 2011). Expressive elements include dynamics, phrasing, internalizing rhythms and realizing sound, and choral directors can use movements such as students mirroring, rowing a boat, walking a rhythm, and moving for dynamic contrast as

methods for addressing these elements (Peterson, 2000). These research findings show the goals of incorporating movements to enhance vocal technique but do not address the singers' perceptions of using movement.

Literature pertaining to the perspectives of singers regarding the use of movement is limited. In existing studies, participants reported that moving in rehearsal allowed them to (a) have fun (Bailey, 2007; Briggs, 2011; Peterson, 2000); (b) take ownership of their musical choices (Peterson, 2000); (c) be confident in making musical decisions (Bailey, 2007); and (d) be actively engaged during rehearsal (Peterson, 2000). After her observation of several movement-based choral rehearsals, Bailey (2007) noticed a raised confidence level of the singers. This perceived mastery of singing skills and musical expression could be a result of multi-modal learning—using kinesthetic, aural, and visual activities in the choral setting (Hibbard, 1994). Therefore, adding kinesthetic elements to typical aural and visual activities in a rehearsal could enhance singers' engagement and confidence, in addition to fixing technical and musical problems. However, a director simply adding movement to the rehearsal routine may not be well received by students unless they establish a welcome environment for movement-based activity.

Researchers have found movement activities most effective when the choral conductor created a rehearsal environment conducive to movement and kept a positive attitude and firm belief in movement as a teaching tool (Briggs, 2011; Jost, 2011; Hibbard, 1994). Other aspects that positively influence students' level of participation and efficiency of rehearsals include maintaining a respectful classroom (Jost, 2011), and establishing a repertoire of movements with specific musical objectives understood by students (Hibbard, 1994; Peterson, 2000). If the choral conductor does not implement these strategies, students may not fully reap the benefits of movement activities used in rehearsal.

Beyond kinesthetic movement, some directors incorporate exercise and wellness strategies into the choral rehearsal (Menehan, 2013). Physical and mental wellness have been linked to achieving optimal performance in singing (Carman, 2004; Edman, Kondrad, & Rakel, 2011; Gregg, 1996; Moliterno, 2008). In her article regarding the effects of tension on singing, Deeter (2005) recommended five types of physiological therapy for building a strong body and developing physical awareness for singing: (1) therapeutic massage, (2) yoga, (3) Tai-chi, (4) the Alexander Technique, and (5) the Feldenkrais Method. Other authors have discussed these therapies as well. Massage therapy may help eliminate excess tension in singers' bodies, which aids in the onset of phonation, breath, and resonance (Deeter, 2006). As a mental benefit, massage may also relieve performance anxiety in singers (Deeter, 2005, 2006). Yoga has been suggested to align the mental aspects of singing along with the physical (Carman, 2004; Moliterno, 2008). Specifically, directors who used yoga noted a more relaxing breath, a freer sound, and a deeper understanding in singers of the physical commitment needed for singing (Menehan, 2013). Breath awareness and aligned posture are commonly identified benefits for singers who practice

yoga (Carman, 2004; Moliterno, 2008). The Alexander Technique and Feldenkrais Method have also been cited as ways to improve posture and the overall efficiency of the voice (Hudson, 2002; Nelson & Blades, 2005; Paparo, 2011). These movement-based strategies focus on the embodiment of music as a way to teach singers to most efficiently use their bodies while singing. Body-mapping has also been a strategy used by singers to increase awareness of how their body functions best (Conable, 1998).

Research findings support positive outcomes when directors use kinesthetic movements or exercises separately with their choirs (Bailey, 2007; Briggs, 2011; Carman, 2004; Deeter, 2005; Jost, 2011; Hudson, 2002; Moliterno, 2008; Nelson & Blades, 2005; Paparo, 2011; Peterson, 2000), but does not show any direct correlation between movement and improved singing beyond director and student positive opinion. To collect more specific data, we chose to examine one movement that simultaneously employs both exercise and kinesthetic movements in response to music, called *Nia*. *Nia*, “a sensory-based movement that draws from martial arts, dance arts and healing arts...empowers people of all shapes and sizes by connecting the body, mind, emotions and spirit” (Nia Technique, 1983-2015). *Nia* comprises 52 principles including elements from Alexander Technique and Feldenkrais. The purpose of *Nia* is to gain awareness of how the body moves and feels, which allows participants to freely and creatively express themselves to music. *Nia* routines consist of 52 different moves that give participants structure in exploration of space, energy, and personal comfort. Additionally, *Nia* has a large improvisatory element where participants explore space and movement in their own way. For more information on *Nia* visit nianow.com.

Although the types of exploratory movements used in *Nia* align with those documented in existing literature (Bailey, 2007; Briggs, 2011; Carman, 2004; Deeter, 2005; Jost, 2011; Hudson, 2002; Moliterno, 2008; Nelson & Blades, 2005; Paparo, 2011; Peterson, 2000), *Nia* is meant to be used as a response to music, and is not intended to impact singing directly. However, many of the central focuses of *Nia* routines, such as breath, release, and core, align directly with the desired outcomes of other movement strategies used in choral singing. This could potentially improve technical and musical aspects of choral singing, increase self-confidence in singers, and improve the overall performance of an ensemble.

The purpose of this study was to explore the effects of *Nia* on female collegiate choristers' singing by comparing the scores of audio recordings done by a control group and an experimental group who participated in *Nia*. We will also examine the singers' perceptions of *Nia*, both positive and negative, as it related to their singing experience. The following questions guided this research:

1. What effects does *Nia*-based movement have on the quality of choral singing in a women's ensemble?
2. How do singers perceive *Nia*-based movement in relation to their own singing technique?
3. How do singers perceive *Nia*-based movement in relation to other factors related to singing?

Method

Sample

Participants for this study were 37 collegiate female singers enrolled in a choral ensemble at a large mid-western university. Before group assignment, each singer filled out a schedule availability form. Based on matching availability, we divided the participants into control and *Nia*-experimental groups ($n = 23$ and 14, respectively). While all participants initially volunteered to participate in the study, we had uneven groups due to fewer women who were able to participate due to scheduling conflicts. We gained approval from the Institutional Review Board (IRB) prior to conducting this research.

Data Collection

Each group met on two separate days for a thirty-minute rehearsal during which they learned a 30-measure excerpt of "*No Time*" arranged by Susan Brumfield. The excerpt was chosen because it seemed to be a piece that would be quickly learned and sung with ease. The texture within the excerpt is homophonic and remains in a comfortable tessitura for each voice part. In addition, the conductor leading the rehearsal did not need to include instruction on musical elements, and only aimed to briefly teach each group the correct pitches. Using a Zoom handheld recording device, each group was audio-recorded singing the excerpt at the end of the rehearsal.

To collect data from the student's perspective, after the initial rehearsal and recording session, each group responded to an initial questionnaire. The participants were instructed to answer the following items:

1. Please describe any issues/problems your body experiences when you sing.
2. Please describe your prior experiences with movement while singing.
3. Please describe your prior experiences with exercise and its impact on your singing.

The participants were asked to distinguish between movement (question 2) and exercise (question 3) experiences in order to elicit more specific responses regarding the types of body movements used while singing, such as moving

their arms or marching, versus their perceptions of how specific exercises, such as yoga or running, may have impacted their singing. The impact of specific exercises on singing has been examined in extant literature, but question 3 was designed to provide further insight for this study as well as future research.

After the first recording session the *Nia*-group participants immediately took part in a one-hour *Nia* class, led by a certified *Nia* instructor. The participants in the *Nia* group returned the following day and participated in an additional one-hour *Nia* class. After the class, the participants briefly reviewed the musical excerpt and were instructed to experiment with the aspects of *Nia* that could potentially allow them to sing better such as centered posture, deep breathing, or freedom of movement. The participants were then recorded for the second time. Finally, the members of the *Nia* group were asked to fill out a post-study questionnaire. They were asked to provide the following information:

1. Please describe your reaction to the *Nia* movement classes.
2. Please describe any immediate effects of the *Nia* movement experience on your singing. If none, please state.
3. What potential effects do you think *Nia* movement could have on your singing? If none, please state.

The non-treatment control group was dismissed after their initial Friday recording, told not to practice the music, and met for a second time the following Monday. After a brief review of the music, the participants were recorded as a group singing the same excerpt sung in the first session. Since there was no treatment administered to these singers, they did not fill out a follow-up questionnaire.

Recorded Data Analysis

Using a Latin-square design to help avoid order effects, fifteen different choral director judges scored the recordings. Judges were selected by convenience from a list of members of the state choral directors association. Each judge received the audio recordings with corresponding rubrics and directions. The judges rated the excerpts on a scale of 1 (low) to 10 (high) in the categories of tone, intonation, rhythm, diction, interpretation, and ensemble. Judges were also asked to provide an overall rating. Researchers modeled this rubric (Figure) after a state choral contest judge form, and chose the categories based on the musical elements improved through movement in prior research (Bailey, 2007; Briggs, 2011; Chagnon, 2001; Hibbard, 1994; Jost, 2011; Luck & Toiviainen, 2008; Manganello, 2011; McCoy, 1989; Peterson, 2000; Wis, 1993).

<u>CATEGORY</u>	<u>POINTS</u> 1 (Low) – 10 (High) (Please use only whole numbers)	<u>COMMENTS</u> (optional)
TONE Support, vitality, quality, color, flexibility, control, beauty		
INTONATION Chords, melodic line.		
RHYTHM Precision, accuracy of time values, time feel and pulse, attacks and releases		
DICTION Consonants, vowels, projection of text		
INTERPRETATION Expression, phrasing, style, tempo, dynamics		
ENSEMBLE Balance, blend, attack, Release		
OVERALL RATING		

Figure. Scoring rubric used by judges.

Researchers independently coded the initial and post-study questionnaires, and then met to compare and discuss common themes. This process provided greater opportunities to analyze data and lent to greater validity of the themes (Patton, 2002).

Results

The results of the repeated-measures multivariate analysis of variance (MANOVA) comparing overall ratings with groups (experimental, control) as the between subjects variable and pre/post-test as the repeated measures resulted in no significant main effects or interaction ($p > .05$), which indicated that participants' experience with *Nia* had no discernable effect on the judges'

ratings. To establish inter-judge reliability across judges, we ran two, one-way ANOVAs, one comparing all fifteen judges' overall ratings for the pre-test, and one for the post-test. Both analyses yielded no significance differences among judges' scores ($p > .05$).

Pre-Study Questionnaire Results

Participants in both groups completed a pre-study questionnaire. For the first item on the questionnaire, the participants were asked to describe any issues or problems they experience in their body while singing. Participants from both groups reported problems related to breath, posture, fatigue, and body tension. In regard to tension in particular, one participant from the experimental group indicated that she had a, "tight feeling when trying to breathe deeply (occasionally)." Another participant from the same group located the source of her tension in "the center of my stomach, right between the ribcage." Despite many detailed descriptions of problems experienced while singing provided by both groups, eight participants in the control group stated they had no problems at all.

The next item on the questionnaire asked participants to describe their prior experiences with movement while singing. Responses from both groups indicated that everyone had at least some prior experience with using movement while singing. Most commonly stated examples included: arm movements or gestures, swaying, and walking or marching to the beat of the music. One participant in the experimental group had experience with the Alexander technique and another participant of that group referenced using Dalcroze and eurhythmics to help with their singing.

The final task of the pre-study questionnaire required participants in both groups to describe their prior experiences with exercise and the impact it had on their singing. While most participants in the control group did not list specific exercises, they did indicate that exercising in general helped them increase their lung capacity/stamina, breathe easier, establish better breath control, and release tension. The majority of the participants in the control group explained how exercise impacted their breathing in some way. One participant indicated that, "When I'm in better physical shape I feel like I have better stability and breath support which helps with my tone." Another participant provided a similar response: "When I am more active outside of choir, I have better breath support than when I am not working out outside of choir." Four participants in the control group indicated that they did not notice an impact of exercise on singing.

Participants in the experimental group listed many of the same positive aspects of singing as the control group, but also gave many negative effects of exercise on singing. Some reported exercises such as swimming or volleyball cause tension, resulting in shallow breathing habits, which negatively impact singing. However, many participants agreed that exercise such as running increased endurance. One participant said that her lungs were, "more open on running days than on non-running days," which allowed her to breathe more

efficiently for singing. Another participant, who said she practiced yoga and Pilates, agreed that it helped her become more aware of tension in her body with the possibility of release, which improved her singing. She explained, “Yoga helps me learn how to breathe and relax/isolate muscles. Pilates helps strengthen my core and become aware of its positioning/whether it’s contracted/relaxed, etc.” The responses to this question were varied among all participants in both groups, but valuable insight was gained into their perspectives regarding exercise and singing.

Post-Study Questionnaire Results

Participants in the experimental group were asked to respond to a post-study questionnaire after they had experienced the *Nia* sessions. The first question asked participants to describe their reaction to the *Nia* classes. All of the participants listed positive feedback in regards to *Nia*. Many participants said they loved taking part in *Nia* and that they wished it could be offered at a local fitness establishment. One participant stated, “I would love to take *Nia* classes at the rec center!”

Some participants especially enjoyed the many aspects that *Nia* encompassed such as yoga, tai chi, martial arts, and dance: “I enjoyed all the different aspects that were incorporated.” Several comments related to the *Nia* experience labeled it as one that heals the mind and body, referencing it a “cleansing experience,” and a “physical and spiritual experience.” *Nia* also left some participants feeling freer, relaxed, energized, and “in-tune” with their bodies. No one provided negative feedback about *Nia* as a form of exercise.

When asked about any effects *Nia* movement had on participants’ singing, the themes of breathing, posture, tension and musicality emerged. Participants felt that *Nia* helped them breathe more freely and more deeply, and one participant admitted to having, “nearly twice as much breath support” when singing immediately after participating in *Nia*. Others stated that their bodies felt less tension, particularly in their shoulders, cores, and backs, which helped their singing. In addition to being more aware of their bodies, many participants felt that phrasing became more natural after experiencing *Nia*. One participant expressed, “I felt more in touch with the musicality of the music.” Another stated, “I thought it helped me move my breath better—phrasing was more natural.” Overall, the answers to this question indicated that singers felt more connected to their bodies while singing after experiencing *Nia* movement classes.

The final question on the post-study questionnaire asked participants to list any potential effects they thought *Nia* movement could have on their future singing if they were to continue participating in *Nia* classes. The answers to this question provided further insight into the participants’ opinions of *Nia* as a possible long-term activity. A majority of the singers responded by stating that they felt making *Nia* a routine exercise could potentially help them breathe better and have a more relaxed posture for singing. For example, one participant

stated, “I think that because it made me relaxed, I would be able to breathe easier. I also wouldn’t feel so tense when I sing.” Becoming more in touch with one’s own body was another emerging theme among responses. One singer wrote, “It’s a good experience to get you in touch with your core and your breath. It’s also good because it allows you to feel more free and expressive.” Similarly, another singer stated, “I think that because it made me relaxed, I would be able to breathe easier. I also wouldn’t feel so tense when I sing.”

Only one participant admitted to not perceiving any particular benefits of continued *Nia* practice on future singing. In regards to identifying specific benefits, she stated, “I’m not sure. If I do *Nia* just before singing, I feel freer. I love *Nia* as an exercise program!!” She was the only respondent who could not identify a specific benefit concerning *Nia* and singing, although she admitted that *Nia* helped her “feel freer,” which could indicate that her posture and body tension were actually improved from the *Nia* experience.

Discussion

While this study did not show any statistically significant effects of *Nia*, the survey data reported that participants felt that partaking in *Nia* yielded many positive influences on their choral singing. Participants perceived that *Nia* generally helped with the musical concepts of breathing, posture, energy, and expression, which changed both their individual sound and the sound of the group. These responses show that participation in *Nia* could counteract problems singers reported they generally feel related to singing, such as tension, fatigue, and poor posture. The literature on movement supports these outcomes, stating that when directors use movement, technical and musical aspects improve (Bailey, 2007; Briggs, 2011; Hibbard, 1994; Peterson, 2000).

The research also states that movement activities work best when students know the intended outcome (Briggs, 2011). While participants related concepts from *Nia* to choral singing, they were never offered any direct instruction or given correlations between the movement and desired musical outcomes. This contributes to the vagueness of answers provided, stating that students felt more individualized self-expression and release, but did not explain how this manifested, or how and where in the music this expression increased. The lack of explicitly expressed connections between *Nia* and singing might also offer an explanation as to why the judge’s scores did not show significant improvement. Because the singers were not guided specifically to transfer *Nia* movement beyond individual self-expression, their ensemble singing was not affected.

Students did recognize the relationship *Nia* aims to draw between the mind and body, and in their written responses, release of tension emerged as a theme. From this study, the link between *Nia* and the elements of the healing and martial arts, such as yoga or Tai-chi, became apparent. This supports the current research that shows singers may benefit from the healing arts (Carman, 2004; Deeter, 2006; Moliterno, 2008). Since most of the participants did not talk about their prior experience with the healing arts, it is impossible to determine if *Nia*

on whole, or just single elements of the *Nia* experience, made the difference. Singers who had participated in yoga before said they felt it helps with tension release, and continued to assert that claim in these data. They did not make any comparisons between yoga as its own exercise and yoga as part of *Nia*. Additionally, since many of the pre-questionnaire answers included tension as a problem singers experience, the release of tension resulting from *Nia* should be investigated further. Notably, singers did not think all forms of exercise provided tension release and thought some exercise could also create more tension.

In a future study, results might be more significant if the researchers make direct connections between the movement and musical concepts to help students transfer *Nia* both individually and in an ensemble setting. For example, singers could be guided to use improvisatory movements to improve phrasing as individuals, and then decide on a common movement for enhancing expression across the ensemble. Singers need guidance to lead their understanding of how certain movements can impact singing.

Limitations of the study

While this study offers a preliminary examination of the effects of *Nia* on choral singing, its size and scope presented many limitations. One limitation of this study was the short amount of time available for the singers in the experimental group to participate in *Nia*. Not only were the singers new to *Nia*, they were also new to incorporating the aspects of *Nia* into choral singing. While singers overwhelmingly had positive perceptions about *Nia* and its influence on choral singing, two, one-hour sessions were not enough to fully formulate a judgment.

The time between the pre- and posttest for each group was not equal, which was problematic in terms of attempting to make comparisons between the groups. The control group had four days between recording sessions while receiving no treatment, and the experimental group had one day between recording sessions. Therefore, direct comparisons between the two groups might not reveal true differences due to the inconsistent manner in which time was used. If this study were to be replicated in the future, researchers should strive to schedule the pre- and post-tests so they occur an equal number of days apart for both groups if the recordings are to be an appropriate tool for measurement. Also, a judge's rubric with more clearly defined criteria than the one used for this study is suggested for future studies of this nature as a way to increase reliability of the recording scores.

In addition to conducting a more focused study with longer exposure to *Nia*, a larger sample size of more carefully assigned groups may have more accurately revealed the effects of *Nia* on choral singing. The sample size used in this preliminary study was quite small due to a lack of willing and able participants.

Conclusion

Although the quantitative results of this pilot study were not statistically significant, the highly positive feedback received from participants regarding *Nia* suggests that the incorporation of *Nia* into choral rehearsals could increase the enjoyment of the singers. The data collected from this preliminary investigation are intended to inspire further research with the hopes of revealing the true effects of *Nia* on choral singing.

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Effect of Differing Levels of Presentation Technology on Student Learning and On-Task Behavior in Music Classrooms

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The purpose of this study was to investigate the presentation of academic information using differing levels of technology and its effect on indicators of student learning and on-task behavior. The experimental design involved twelve intact classes (3 classes at each of two grade levels from two schools with notably differing SES levels). Three different music lessons were taught to one classroom at each school using no electronic technology, to a second class at each school using electronic technology, and to a third class using electronic technology controlled through a tablet computer. Each lesson was taught to second and fifth grade levels at each school, and the technology conditions were counterbalanced. Results of lesson content growth measures indicated no differences by School SES or Technology Condition, but there was a significant statistical interaction. Behavioral measures showed no differences in off-task behavior with regard to grade level or lesson, but did reveal a significant interaction between schools by technology condition. Contemporary mobile technology was concomitantly linked to lower off-task behavior in the low SES school, but to higher off-task incidence at the high SES school.

Advancing technologies in the public schools have been touted for almost 40 years as the panacea of our educational system. While many people tend to discount technologies that do not work on electricity, anything developed from any scientific inquiry is “technology”, including classroom tools, ranging from chalkboards and pencils to tablet computers. Since the personal computer shifted the paradigm in 1975 (Gladwell, 2008), “technology” conjures up images of the newest electronic gadget or simply anything that functions like a computer.

Research findings over the past four decades tends to support the benefits of technology in the classroom. A second order meta-analysis of 1055 studies revealed that the inclusion of technology in the classroom had a significantly positive effect and that technology designed to be supportive of instruction was more effective than direct instruction technology (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). However, the simple inclusion of technology does not automatically translate to academic success. In order to be effective, these technologies must be aligned with student needs and abilities

(Cohen, 2001) and adaptive to larger societal changes (Okojie, 2011). Additionally, implementation of technology in the classroom has contributed to positive outcomes on academic success as well as negative effects on behavioral outcomes (Waxman, Lin, & Michko, 2003). Some educational findings have indicated that in the larger context of technology with differing instructional methods, technology is of secondary importance to each student's preferred learning methodologies (Young, Klemz, & Murphy, 2003).

Although the benefits and interest of technology have been consistently noted, the level of technology in classrooms still varies greatly (Bauer, 2007; Dorfman, 2009). For some teachers, implementation is resisted due to their lack of comfort with the technology (Cuban, 2001; Liaw, Huang, & Chen, 2007; Ross, Ertmer, & Johnson, 2001; Smith, 2006), while for others the hindrance is their attitudes towards technology in the classroom (Brinkerhoff, 2006), such that teachers implement it only when they recognize its usefulness (Hutchison, 2006). When teachers attain a certain level of comfort with technology, their attitudes tend to improve. Consequently, technology availability and training are primary factors in the technology implementation into classrooms (Agnew, 2009). Though many have viewed unavailability of technology as a major limiting factor of implementation, the concepts of teacher comfort, teacher training, and support are critical (Rogers, 2007; Rutkowski, Rutkowski, & Sparks, 2011). Without effective implementation, technological infusion will only meet minimal expectations of effectiveness (Rashotte, 2005; Webster, 2002; Whitacre & Peña, 2011). However, teachers who possess a vision of the benefits can use technology in a way to enhance the learning environment, despite the barriers (Ertmer, Addison, Lane, Ross, & Woods, 1999).

As mobile technologies continue to evolve, the implications and benefits for the classroom have been shown to be positive. One aspect of having technology readily and handily available has been the advent of increased interaction through social media. These interactions have been shown to increase engagement of both students and instructors as well as promote higher academic success in some research (Junco, Heiberger, Loken, 2011). The use of mobile phones to supplement student learning has also shown positive results in student engagement (Looi, Zhang, Chen, Seow, Chia, & Norris, 2011) and enhanced learning (Hwang, Wu, & Ke, 2011). Mobile phone usage has also increased positive perceptions of learning (Shin, Shin, Choo, & Beom, 2011). However, a void exists in the research on the use of mobile technology by teachers in the classroom setting and its effects on both academic and behavioral outcomes.

The use of desktop technology in the classroom can potentially have a negative effect on teacher mobility and proximity to students, which has long been acknowledged to have positive effects on student success (Peterson, Cox, & Bijou, 1971). In order for the teacher to use the computer, for example, s/he must stand and stay at the front of the room to access the keyboard. This limited mobility is an issue. The ability for teachers to interact with students and thus create an environment conducive to learning is important for student success (Fisher, Waldrup, & den Brok, 2005). The influence and proximity of teachers

positively relates to both cognitive and affective outcomes (den Brok, Brekelmans, & Wubbels, 2004). In addition to proximity, increased student learning was observed the closer a student was to the center of a teacher's field of view (Bailenson, Yee, Blascovich, Beall, Lundblad, & Jin, 2008). Further, technology integration also leads towards an increased potential for teacher distraction because, if not used efficiently and effectively, teachers run the risk of being distracted or of having to wrestle with equipment. This, in turn, often leads to student behavioral problems (Mainhard, Brekelmans, & Wubbels, 2011).

The purpose of this study was to investigate the effect of differing types of technology use on student behavior and learning – types of technology being defined as: (a) non-electronic, (b) electronic, but not portable, and (c) mobile technological tools. To that end, two research questions were investigated:

1. Will there be any difference in academic gains dependent on the level of technology used in the delivery of the lessons?
2. Will there be any difference in on-task behaviors dependent on the level of technology used in the delivery of the lessons?

Method

Participants

Participants for this project were intact classes of second grade and fifth grade students at two elementary schools ($N = 245$). Each school had three classes at each grade level. Class sizes at each school were similar. Student enrollment ranged from 17 to 22, with a mean size of 20.4 ($SD = 1.38$). The free and reduced rate at the higher SES school was 16.5%. The free and reduced rate at the lower SES school was 97.5%.

Music Lessons

The three lesson topics were chosen specifically because both school districts represented in this project had the same second and fifth grade goals and objectives regarding three subject matters: notes on the staff, instruments of the orchestra, and reading rhythms. The two teachers met and wrote lesson plans for the (first) introductory lesson for each of the three topics at each grade level. As the two school districts also had identical learning standards and the same length of time for music lessons, the lesson plans for both locations were able to be identical without any need for modification. These common lesson plans were intended to provide consistency in instructional content and student involvement with the materials across instructional conditions. Therefore, all six classes at each grade level received the same lesson content on any particular lesson, and all six classes received the same academic assessment.

However, each lesson was grade specific, so the six second-grade classes did not get the same “rhythm” lesson as the six fifth-grade classes.

Students took a pre/post test prior to the instructional unit. The teachers at each school then taught the team-constructed lesson on the topic, delivering the instruction using the technological tools called for based on the design of the investigation, ending in time for the students to complete the brief pre/post test again prior to departing.

Independent Variable

The independent variable for this project was the type of technology incorporated into the delivery of instruction. The first condition was the most traditional approach, utilizing instructional modalities with technology that did not require any electricity. The teacher taught the class, generally anchored by the instructional tools in the front of the room.

The second condition was designed to present the same information to the students. This time the teacher used technology that was primarily stationary, but only that which was widely available in the last decade. These lessons featured PowerPoint presentations, utilization of SmartBoards, electric keyboards, and compact discs. All of these resources were used to their best effect, but generally required the teacher to again be centered in front of the class.

The third condition of lesson presentation used the same technologies featured in the second condition, but added the use of a tablet computer. This portability freed the teacher from being anchored to the equipment in the front of the room, and permitted him/her to circulate among the students and (theoretically) individualize instruction, correct mistakes, and coach improvement using individual teaching techniques at close proximity to the student. It also allowed for students to use the technology in context with the lesson, as the technology could be passed around the room.

Dependent Variable

There were two dependent variables for this project; (1) an academic measure of student achievement, and (2) a measure of students’ on-task behavior. The academic measures were lesson and grade specific. The teaching team, in consultation with the researchers, designed each measure. Content validity for the academic lessons was established by analyzing the content of the questions involved, and was confirmed through viewing video of the actual lessons and reviewing the questions asked. All assessments were designed such that students would be able to answer some questions correctly, but also difficult enough that there was not a significant ceiling effect.

Two observers independently observed 35 of the 36 lessons taught using the Group On-Task / Off-Task Form (Madsen & Yarbrough, 1985). (The thirty-sixth lesson video was lost in a computer transfer error.) On-task behavior was defined as the student directing their attention to the instructor or where

the instructor wanted them looking, and only engaging in appropriate verbalizations and movements for the activity. The observers counted the number of students who were on- and off-task during three 15-second time intervals every minute. Reliability of observations was computed using the following formula: total number of agreements divided by the number of agreements plus disagreements ($a/a+d$). Reliability between these observers was .93.

Design

The two schools were matched on the basis of each having three classes of second and fifth grade students. They were also paired on the basis of contrasting levels of free and reduced lunch data, a commonly relied upon measure of SES. The high SES school had a free/reduced rate of 16.5%; the other school had a free/reduced rate of 97.5%. Each class at each grade level at each school received instruction for all three lessons. The conditions for the lessons were counterbalanced so that each class received a different condition on each different lesson. A visual portrayal of the experimental design is illustrated in Table 1.

Table 1. Counterbalanced Experimental Design

School SES	Grade & class	Lesson 1 notes	Lesson 2 instruments	Lesson 3 rhythm
Low	2a	Low Tech	Med Tech	High Tech
Low	2b	Med Tech	High Tech	Low Tech
Low	2c	High Tech	Low Tech	Med Tech
Low	5a	Low Tech	Med Tech	High Tech
Low	5b	Med Tech	High Tech	Low Tech
Low	5c	High Tech	Low Tech	Med Tech
High	2a	Low Tech	Med Tech	High Tech
High	2b	Med Tech	High Tech	Low Tech
High	2c	High Tech	Low Tech	Med Tech
High	5a	Low Tech	Med Tech	High Tech
High	5b	Med Tech	High Tech	Low Tech
High	5c	High Tech	Low Tech	Med Tech

Procedure

Prior to the delivery of instruction, all students completed the pretest for the upcoming instructional unit. The participating teachers set up a video camera focused on the students and began recording prior to commencing the lessons. Each lesson lasted for most of the time allotted for each class session. Each teacher followed the design of the project and taught each lesson in the scheduled condition. Videotaping was stopped at the end of the instructional period. The students then completed the posttest, which was not video recorded.

Results

The purpose of this study was to investigate the effect of differing levels of technology use on student behavior and learning. In order to examine whether or not there was any difference in academic gains dependent on what level of technology was used in the delivery of the lessons, a univariate ANCOVA was completed on all posttest scores. This test examined any differences attributable to the instructional condition, with the added fixed factor of school SES. Pretest scores were entered as the covariate. There were no significant main effects for condition or school SES; however, there was a significant interaction, $F(2, 724) = 3.09, p = 0.046$. Students at the high SES school scored best in the low technology condition and worst in the medium technology condition. Students at the low SES School scored best in the high technology condition and worst in the low technology condition. This interaction is shown in Figure 1.

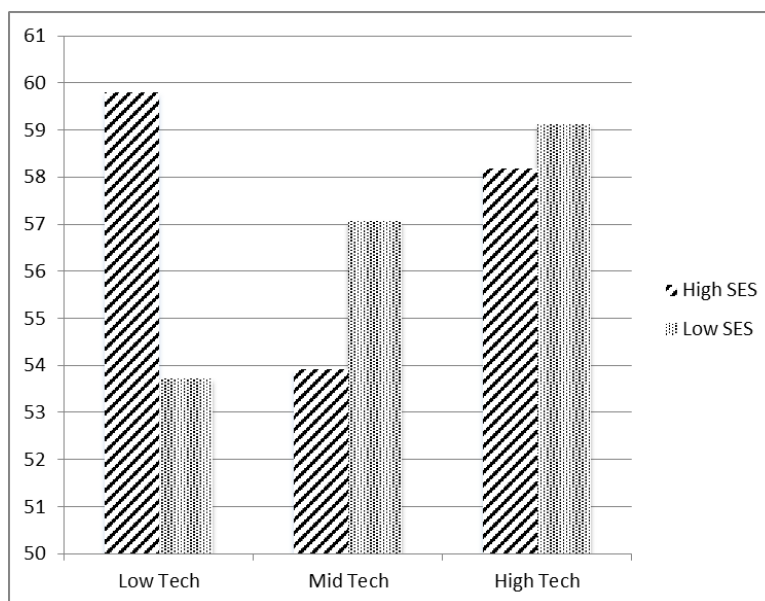


Figure 1. Posttest Score Statistical Interaction (Academic Data).

The second research question considered whether or not there were any differences between on-task behaviors dependent on what level of technology was used in the delivery of the lessons, taking into consideration all of the control variables (grade level, lesson content, or student SES). Because of the low N (35 lessons observed), running a complete UNIANOVA was not advisable (Winer, Brown, & Michels, 1991). A one way ANOVA completed for on-task behaviors between grades found no differences, $F(1, 34) = .055, p = .816$. Likewise, a one way ANOVA completed for on-task behaviors between lessons found no differences, $F(2, 34) = .455, p = .638$. A UNIANOVA

was completed for school SES and condition (level of technology). A two-way interaction was found, $F(2, 29) = 5.55, p = 0.009$. With the high SES school, the highest level of technology was accompanied by the highest level of off-task behavior. Conversely, with the low SES school, the highest level of technology garnered the lowest level of off-task behavior. These results are illustrated in Figure 2.

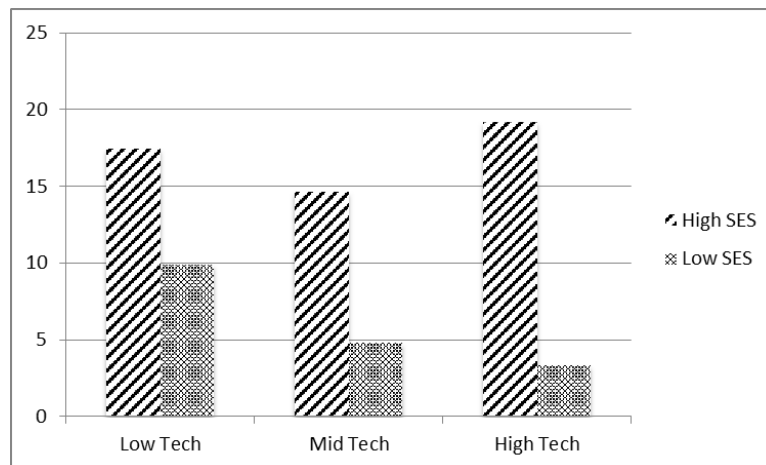


Figure 2. Percent of Off-Task Student Behavior - Statistical Interaction (Behavioral Data).

Discussion

Results of academic measures showed no main effect differences, but the students from the different schools did not score in a parallel fashion in the three conditions. Students in the low SES school scored better when portable technologies were used in the presentation of the academic material. In contrast, students at the high SES school scored highest in the low technology condition, followed closely by the portable technology condition, and lowest in the stationary technology condition. Reasons for these results are not immediately obvious, but there are two mitigating variables that could account for these results. The first aspect is the differences between the delivery of the material or teacher differences. The second aspect that should be discussed is the differences between the students.

Though the teachers at both schools had the technology delivered at the same time, and practiced with the equipment thoroughly before the implementation of the study, the teacher at the high SES school was never extremely comfortable with it. Neither teacher had the portable technology before the project, but the high SES teacher did not seem to adjust to it as naturally as the other teacher. There is a substantial amount of research that would indicate that comfort with these tools does change the effectiveness of

their use (Cuban, 2001; Liaw, Huang, & Chen, 2007; Ross, Ertmer, & Johnson, 2001; Smith, 2006). Prior to this project the teacher at the higher SES school did not use a lot of technology in her teaching, and was most comfortable and familiar with a low technology environment. Since both technological conditions took her out of her comfort zone, it is possible that the portable technology was easier and more fluent for her to work with, which might have yielded better results than the stationary technology condition.

The other aspect that is different between the schools was the SES level of the students. Previous data on educational differences between students of high SES and low SES backgrounds is still inconclusive (Du, 2002; Kemker, 2007; Rollins, 2011). While there is ample data to suggest that students from low SES backgrounds are less able to use technology at home than students from wealthier backgrounds, and that that availability has been linked to some long-term academic differences, data on classroom use of technology and links to learning considering SES levels is not clear. Certainly, extant research findings do not explicate nor refute these results. We are not certain, but it seems that there was a novelty effect with regard to the tablet technology when it was introduced. While this novelty effect was probably not the sole reason for the differences in academic performance of the lower SES students, it certainly seemed to have an impact. However, all of the academic results should be viewed with the students' social behavior results in mind.

By contrast, results of behavioral measures indicated no differences when considering grade level or lesson taught. Though the *N* was substantially lower in these tests (increasing the probability of a type 2 error), the similarities of these numbers makes it fairly unlikely that these measurements would change if the *N* were increased. Conversely, differences found with regard to the differing school and technology conditions were persuasive. In both schools, the highest level of off-task behaviors occurred in the moderate technology condition, but in the low SES school, off-task was lowest for high levels of technology, while the converse was true at the high SES school. One possible reason for this difference was the teaching situation. While a variety of factors between schools and classrooms could have influenced the results, we observed that the teacher in the low SES school used the tablet computer to move about the classroom and interact with the students quite a bit. She was able to move among students and coach individuals, while still maintaining group activities. Her movement alone could have helped the students stay on-task, as her proximity created a higher level of contingency in the room and increased her ability to individualize instruction. At the high SES school, the music teacher did some traveling among the students with the tablet computer, but this travel was limited, and this should be considered, when interpreting these findings. Though she was still energetic and enthusiastic, she did not teach at the same energy level. If this is indeed the reason for the differences in on-task behaviors, then this project would suggest that "ideal use" of the high level of technology (and its resultant increase in teacher-student proximity) does indeed increase

student on-task behavior, while simply using new technology to teach essentially in the same manner (i.e., in a stationary fashion) is not effective.

However, while the on-task behaviors provided by the new levels of technology does match with our original hypothesis, there are other possible explanations for these results. Because students at the school with the lower SES demonstrated increased on-task behaviors with the use of the tablet computer, research would indicate that there might have been a novelty effect (Bracht & Glass, 1968). It is unlikely that students at the high SES school experienced anything new with the tablet computer being in the room. It is likely that many of these students either have one, or there is one in their home. That is less likely with the students at the low SES school. There may have been an element of awe involved in this on-task behavior. It is even more likely that both the proximity of the teacher and the novelty factor figured into the study results. This need not be an either/or situation.

One observation from the results of this project was that technology functions best when the operator is knowledgeable and comfortable working with it. This observation is consistent with previous research in this area (Smith, 2006). If the teacher is moved outside of his/her comfort range, part of the teacher's attention is going to be on the delivery method of the instruction, instead of on the learners' attainment of knowledge. Technology itself will not solve issues of proximity – teachers must know how to use and practice teaching with the technology, if it is to function as promised under ideal circumstances.

Another possible consideration when viewing these results is that the lessons taught were extremely brief. This length had some advantages—it allowed for more control on the part of the teachers with the content and testing. It also allowed the teachers to fit three extra lessons into an already full curricular schedule. However, the brevity also makes it more difficult to cover any particular instructional unit thoroughly. Further, if the instructional units had lasted longer, more facets of the technological advances and classroom interactions could have been explored with the students. This is not to say that, if the unit had been longer, additional academic gains would have been realized in the more technological environments; there is no evidence here to support such a statement. However, this is not an area of investigation that has been completely explored, and merits further investigation.

Research regarding the use of portable computers in educational settings has indicated that, in many cases, it can be a great tool (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). The results of this study show that, when portable computers are used as a device to allow a teacher to individualize instruction and maintain proximity with students, students are more on-task than when the teacher stays positioned in front of the classroom. It is suspected that, with this increased ability to individualize instruction, while still teaching the group and having students stay on-task, long term effects are bound to be realized. Even with these equivocal results, further research into this area of instruction is warranted.

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The Illinois Soldiers' Orphans' Home Band: 1898-1934

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The purpose of this study was to chronicle the history of the Illinois Soldiers' Orphans' Home (ISOH) Band of Normal, Illinois, from its origin through the tenure of the ensemble's first long term conductor—Herbert O. Merry. I examined the band's (a) origin and operation, (b) service to the home and surrounding communities, (c) instructors, and (d) resources. The state of Illinois established the ISOH in 1865 to provide care and education for the children of servicemen who did not return from the Civil War. An act of the Legislature in 1875 amended the purpose of the institution to include any children of veterans who had died or become incapacitated since their service in the military. The ISOH organized a band in 1898 to provide recreation for male residents and service to the school and community. Herbert O. Merry assumed the bandmaster's position in 1908 and improved the instrumentation and musicianship of the ensemble. The group appeared frequently at the orphans' home and throughout Illinois at civic events and meetings of the Grand Army of the Republic and other veterans' associations. Merry left the ISOH in 1934. However, the band remained active under his successors and continued to provide members with a sense of identity and worth through a close-knit organization that served their school, city, and extended community of veterans throughout the state.

The American Civil War (1861-1865) was the bloodiest conflict in the history of the United States. Of the approximately 3,200,000 men who fought in the war, over 620,000 died in combat or from disease or other non-battle related circumstances (Leland & Oboroceanu, 2010). President Abraham Lincoln (1865) acknowledged victims of the war in his second inaugural address and emphasized the need “to care for him who shall have borne the battle and for his widow and his orphan” (p. 4). Little political pressure existed to insure that the government kept this commitment until the Grand Army of the Republic (GAR), a powerful organization of Union Army veterans, began championing the rights of these individuals.

Benjamin F. Stephenson founded the GAR in Decatur, Illinois, on April 6, 1866, for honorably discharged veterans of the Union Army, Navy, Marine Corps, or Revenue Cutter Service who had served between April 12, 1861, and April 9, 1865. The purpose of the organization was to foster camaraderie among members, care for widows and orphans of the war, and encourage patriotism throughout the country. Because the GAR was limited to Union veterans of the Civil War, the organization encouraged the formation of affiliated groups to help

them in their work. As a result, the Sons of Veterans of the United States of America, the Woman's Relief Corps, and the Ladies of the Grand Army of the Republic became associated with the GAR (Knight, n.d.; McConnell, 1992).

Soldiers' Orphans' Homes

In response to Lincoln's address and the influence of the GAR, many public (e.g., Doe, 1900; Hughes & McCracken, 1963; Pittman, 2004) and private (e.g., Moore, 1968; "Patriot Orphan Home," 1864) state and local agencies established soldiers' orphans' homes for the dependents of servicemen who did not return from the war. The main goal of these institutions was "to prepare the orphans for usefulness in the future, and make useful citizens and not tramps and beggars" (Banta, 1889, para 9). In addition to necessities and a family environment, children received an education through the eighth grade and vocational training at an institutional farm or in various workshops located on the premises. Probably inspired by musicians from the Civil War, bands were established at several soldiers' orphans' homes during the mid to late 1800s, including facilities in New York, New York ("Amusements," 1873; "City and Suburban News," 1873); Baltimore, Maryland (Moore, 1968); and Knightstown, Indiana (Banta, 1889).

The purpose of this study was to chronicle the history of the Illinois Soldiers' Orphans' Home Band of Normal, Illinois, from its origin through the tenure of the ensemble's first long term conductor, Herbert O. Merry. I examined (a) details surrounding the origin and operation of the band, (b) service to the school and surrounding communities, (c) instructors, and (d) resources. Data included annual reports of the institution, newspaper articles, photographs, programs, and other primary and secondary sources found at the Bloomington Public Library, the University of Illinois Library at Urbana-Champaign, and the ISOH archives housed at the McLean County Historical Museum in Bloomington, Illinois. Although the ISOH Band was established at least 20 years before similar organizations became common in public schools (Keene, 2009), details concerning the operation and success of this group might illustrate the value and potential of music instruction in residential institutions serving at-risk youth today.

Illinois Soldiers' Orphans' Home

Organization

Legislation by the Illinois General Assembly initiated plans for the Illinois Soldiers' Orphans' Home (ISOH) in 1865. A bill passed two years later appropriated \$70,000 from the state treasury and \$30,400 from the Deserters' Fund for the construction of the institution. In the meantime, dependent children lived in temporary housing until the permanent facility opened on June 1, 1869, in the city of Normal. Although originally intended for orphans whose fathers

lost their lives during the Civil War, an act of the Legislature in 1875 modified the purpose of the ISOH to include any children of veterans who died or became incapacitated after their service in the military. Children remained at the institution through the age of 14 unless a relative or guardian made other arrangements for their care. In special cases, trustees could retain a resident up to the age of 16 if the individual was unable to provide their own support (De Motte, 1893).

Mrs. Virginia C. Ohr served as the first Superintendent of the ISOH until 1887, when Harvey C. De Motte, then President of Chaddock College at Quincy, accepted the position. De Motte also served as principal of the school, which was a role previously filled by a regularly appointed teacher. The academic year at the ISOH lasted 40 weeks with seven teachers instructing children through the eighth grade. Boys also participated in manual training, beginning in 1895 (Bassett, 1896; Clements, 1898), and the girls learned domestic science, beginning in 1899 (McCauley, 1900). Teachers maintained detailed records of student progress and reported them every five weeks to the superintendent. De Motte (1893) stated that, “The character of the work accomplished here will not suffer in comparison with that done in the best graded schools of the State” (p. 14).

A three-member board of trustees supervised operation of the ISOH until 1917 when the newly established Department of Public Welfare assumed control of the home, and Illinois State Normal University (ISNU) began supervising the school (Palmer, 1950; Thorne, 1919). Between 1907 and 1924, officials sometimes assigned orphans who were not children of veterans to the institution when space was available. The department also placed students in foster homes or other childcare facilities as deemed appropriate by staff of the Division of Child Welfare working at the school.

The name of the ISOH changed to the Illinois Soldiers’ and Sailors’ Children’s School (IS&SCS) in 1931. The Department of Mental Health assumed administration of the facility in 1961, but transferred responsibility to the newly created Department of Children and Family Services (Illinois Archives, n.d.) two years later. This agency operated the institution until it closed in 1979 (Branson, 1981).

Vocal Music

The first evidence of music instruction at the ISOH appeared in the 1878 *Annual Report*, which listed *Mrs. Humphrey’s Method for Music* among the textbooks used for instruction (Reid, 1878). Students regularly demonstrated their musical skills during Sunday worship, where “singing [was]...made a prominent part of the services—an exercise in which the children greatly delight[ed] and heartily join[ed]” (De Motte, 1890, p. 19). Public performances included girls’ choruses singing for local GAR posts on Memorial Day (e.g., McCauley, 1906, 1908) and juvenile cantatas such as “A Visit to Grandpa” by Charles Hutchinson Gabriel (McCauley, 1912).

Classroom teachers taught vocal music (Schaeffer, 1902) until 1916, when ISNU began supplying teachers and administrators for the ISOH. According to Claggett (1916),

Students from the senior class of the University are being sent out to teach [several] grades as per the plans of Dr. [David] Felmley, the President of the University, and special teachers in art and music in addition to the grade teachers. (p. 8)

These plans became final the following year when the university assumed control of the entire educational program at the home. Felmley's efforts to align academic work with the teacher training program at ISNU was recognized in 1935-36 when the junior high at the IS&SCS was named in his honor (Russell, 1936).

Illinois Soldiers' Orphans' Home Band

First Decade: 1898-1908

Instrumental music instruction at the ISOH likely began in the early 1890s when officials formed a drum corps to support daily military drills by the students. According to financial records, the institution purchased nine drum heads and twelve drum belts between fall 1893 and spring 1896 (ISOH, 1894, 1896). Administrators organized the ISOH Band (ISOHB) in the winter or spring of 1898 when they obtained twelve brass instruments at a cost of \$119.40 and hired instructors to direct the ensemble (ISOH, 1898). The GAR, the Women's Relief Corps, and other organizations connected with veterans of the Civil War helped expand the program over the next several years by donating money for additional equipment (McCauley, 1904, 1906). Although the low cost of the instruments acquired in 1898 suggests that they probably were purchased second-hand, the Women's Relief Corps donated over \$170 worth of new equipment to the band in 1907 (McCauley, 1908).

The ensemble often performed during routine activities of the institution. One former employee, for example, recalled that, "the home band assembled in the east end of the [dining] room and played marches as the children marched in to their respective tables" (Palmer, 1950, p. 3). Beginning around 1899, the ISOHB also appeared in daily military parades with the newly established cadet corps and performed "The Star Spangled Banner" as the American flag was lowered at sundown (McCauley, 1900).

The ISOHB also appeared at meetings or reunions of the GAR and other veterans' groups (e.g., "Darling Calls Lee Traitor," 1910). Early examples included the Southern Illinois Soldiers and Sailors Reunion in Centralia, Illinois, in September 1898 ("Southern Illinois Soldiers Reunion," 1898) and a similar event in Wapella the following year ("Dwight Veterans," 1899). Richard N. McCauley, superintendent of the home from 1899-1913 (Palmer, 1950), encouraged appearances at these meetings and stated that,

The music furnished by them at such places is a constant reminder to the veterans of th[e] days when they stood shoulder to shoulder with the fathers of these children, and though years have passed, their interest in the welfare of the children of their comrades appeals to them, and their coming with sweet music is the only way wherein they can show their appreciation for their generous contributions. (McCauley, 1904, p. 9)

Organizations sponsoring these meetings usually paid the band's travel expenses. In May 1908, for example, veterans at the Illinois Soldiers' and Sailors' Home in Quincy raised \$112 to cover transportation costs for the ensemble to perform at the GAR encampment held in that community (McCauley, 1908; see also, 1904).

By July 1902, the ISOH band program consisted of a trained group of 17 players as well as "a class of understudies" (McCauley, 1902, p. 11) preparing to take their place in the top ensemble. By this time, the band had appeared at county fairs and GAR encampments throughout Illinois. Local performances included a morning concert and parades honoring the 50th anniversary of the City of Bloomington on May 10, 1900 ("Bloomington's Half Century," 1900) and annual Memorial Day exercises in Bloomington and Normal (e.g., McCauley, 1906, 1908). Although the band received many invitations to perform, school officials "were obliged to decline several...which would have interfered with their school work" (McCauley, 1902, p. 11).

Prior to 1902, instructors for the ISOHB were not regular employees of the institution and did not appear by name on the annual payroll. Financial records from the 1902-1904 *Biennial Report*, however, indicated that J. A. Larison and John Routon taught for short periods during the 1902-03 academic year and were succeeded by H. A. Hall from 1903 to 1905 (ISOH, 1904; 1906). George Daniel Barnard (1857-1933) assumed leadership of the band in early 1906 (ISOH, 1906, 1908; McCauley, 1906). He also worked as a music dealer for Lyon and Healy of Chicago, served as band instructor at the Odd Fellows' Orphans' Home of Illinois (OFOHI) in Lincoln (OFOHI, 1906, 1908), and published numerous compositions and arrangements with the Carl Fisher Music Company. Barnard left the ISOH in 1908 to direct the Calumet and Hecla Band in Michigan's Upper Peninsula. He moved several times over the next 15 years and eventually settled in Maysville, Kentucky (ISOH, 1910; Edwards, n.d.).

Herbert O. Merry: 1908-1934

Herbert O. Merry served as bandmaster of the ISOH beginning in the summer or fall of 1908 (ISOH, 1910). Merry was born in Farmer City, Illinois, on January 7, 1872, and moved to Lincoln while in his teens. Following his graduation from Lincoln High School, Merry attended Illinois Wesleyan University in Bloomington where he earned a Bachelor of Music degree in 1893 and later attained a master's degree. In 1895, he began teaching at Lincoln

College and eventually became director of the school of music and conductor of the orchestra before retiring in 1930.

In the early 1900s, Merry organized a six-piece orchestra consisting of members of his family that performed throughout the United States on the National Chautauqua Circuit. He also directed French's Military Band, the Lincoln High School Band and Orchestra (1919-1941), and the Lincoln Civic Orchestra (early 1920s-1941), as well as several other ensembles throughout central Illinois. Merry taught woodwinds in the Bloomington Public Schools from 1920 to 1921 (Bloomington High School, 1921) and served as Secretary and Treasurer of the Illinois Music Teachers Association for 24 years ("H. O. Merry, Prominent in Music," 1941; Beaver, 1982). Other members of the Merry family also worked as music educators including Herbert's brother, Harry F., who served as high school band director in Deland and Weldon, and son Paul, who conducted the band at Elkhart (Illinois) High School (*Bandmasters' Meeting*, 1931).

Although Merry was not a member of any veterans' organization, he had a special interest in serving disadvantaged children. He taught music at the Illinois Asylum for Feeble Minded Children in Lincoln from 1905-1907 (IAFMC, 1904, 1906, 1908) and, in addition to his work at the ISOH, assumed Barnard's position at the Odd Fellows' Orphans' Home beginning in 1908 ("H. O. Merry, Prominent in Music," 1941; OFOHL, 1908). Merry's affinity for helping those in need probably stemmed from his membership in the Odd Fellows Fraternity, which was established in England during the mid-1700s "to visit the sick, relieve the distressed, bury the dead, and educate the orphan" (as cited by Independent Order of Odd Fellows, n.d., para 1).

Merry built the ISOHB into a 22-piece ensemble that reached "its highest point of efficiency in the history of the home" (Claggett, 1916, p. 16). During the summer of 1916, the group traveled throughout central Illinois to appear at the GAR encampment in Decatur, the Spanish American War Veterans' encampment in Woodlawn, the German American Society's convention at Springfield, evening concerts in Lexington and El Paso, and other events in the area. Perhaps the most notable experience of the summer occurred on July 4, 1916, when the ensemble competed in a contest against juvenile bands from Heyworth, Wapella, and Carlock. This event began at 2:00pm on the lawn of the McLean County Courthouse with a performance by the Bloomington City Band and a mass band concert of all groups in the contest. Each band then played three selections for adjudication. Judges included H. V. Miller, J. C. Goforth, and W. A. Peterson—local musicians and business leaders—who scored each group on musical talent, execution, and general appearance. The ISOHB earned first prize (\$75), followed by Carlock (\$50) and Wapella (\$25). Although the Heyworth band did not place, the *Pantagraph* acknowledged that it was "composed largely of young boys, and considering their age and the small number of members they made a creditable showing" ("Day Fittingly Celebrated," 1916, p. 7). Merry also introduced Sunday evening concerts on the front lawn of the ISOH during the summer of 1916, which attracted as many as

1,000 residents from the area. These performances fostered good public relations between the institution and the community by “bring[ing] the Orphans’ home into closer connection with the people of Normal and Bloomington than [had] ever been known before” (Claggett, 1916, p. 16).

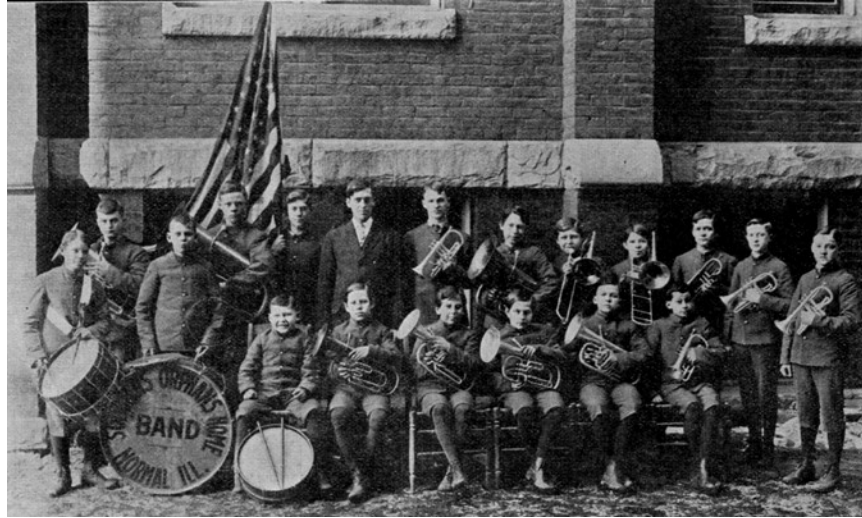


Figure 1. Herbert O. Merry and the ISOHB, circa 1912 (ISOH, 1912, p. 18).

The ISOHB was equally busy the following summer and presented two concerts on Memorial Day, played for the annual commencement at the school, and made numerous appearances at a three-day encampment of the GAR in Bloomington (McAlvin, 1917). The group also traveled to Streator to take part in a four-day encampment of Spanish-American War veterans. A member of the band described this trip in the July issue of the ISOH monthly newsletter, *The Echo*, and stated that,

We left Normal [by train] at 1:42 and went as far as Wenona where we had to lay over two hours. From there we went to Streator. We stayed at the Y.M.C.A. while we was [sic] there and in their pool we enjoyed several good swims.

The last day we was [sic] there we led a big parade and at the end the commander of the U.S.W.V's. give [sic] us \$75 for the services we had given them.

We visited the American bottle factory where there was a flag raising exercise. After the exercises were over we went through the factory. We saw the machines making bottles and also how they were cooled and inspected.

On our way home we had to lay over for about 2 hours in Dewight [sic] and while we was [sic] there we serenaded Col. Dustin, the founder of the band[.] (“The Band,” 1917, p. 8)

Colonel William G. Dustin of Dwight, Illinois, served as a state and national officer in the Sons of Veterans, U.S.A. (Herringshaw, 1907). This organization began in 1879 as an affiliate to the GAR (Meader, 1905) and provided support to the home (McCauley, 1904). It is possible that boys referred to him as the founder of the ISOHB because he helped secure donations for the purchase of the group's first set of instruments.



Figure 2. Illinois Soldiers' Orphans' Home Band, early 1920s.

Veterans and other friends of the ISOH continued to show their appreciation and support for the band during the 1920s. After hearing the ensemble perform several selections at a luncheon for the Young Men's Club of Bloomington in 1923, for example, one observer remarked that,

Their playing compares quite favorable with bands made up entirely of seasoned musicians, and it is truly remarkable when their age is taken into consideration. Some of them are scarcely large enough to carry the instruments they play, but nevertheless they play them, and play them well. ("Supt. Spafford Tells of Home," 1923, p. 16)

In 1925, the Illinois American Legion gave \$1,000 for the purchase of new uniforms, and Dr. Woods of LaSalle composed a march titled "Illinois," for the band. That same year, the American Legion Auxiliary donated two pianos, a number of violins, and a cello to the ISOH and financed the private instruction of eight pupils, thus establishing a basis for a school orchestra (Palmer, 1950). By the late 1920s, Merry was leading this ensemble rather than the band at the annual commencement exercises (ISOH, 1929).



Figure 3. Illinois Soldiers' Orphans' Home Band, circa 1925.

The ISOHB maintained its relationship with veterans' organizations in the state. In the summer of 1927, for example, the ensemble marched in the opening parade of an encampment of Spanish-American War veterans in Kankakee ("Spanish War Veterans," 1927), performed concerts at a reunion of soldiers in Monmouth ("Local Illinois Volunteers," 1927), and attended the American Legion convention in Joliet, which featured competitions for Legion post bands, and drum and bugle corps. Judges for the contests included Victor J. Grabel, former director of the Western Electric Band in Chicago; George Gault of the Dixie Music House in Chicago; and A. R. McAllister, director of the Joliet Township High School Band. The ISOHB participated in this event as an exhibition group ("Gallagher is Boosted," 1927) and attended similar contests sponsored by the American Legion throughout the 1930s (e.g., "Over 2000 in 48 Units," 1939).

After H. O. Merry: 1934-1967

Letta Margaret Schwartz began teaching piano and strings at the IS&SCS in 1932 and eventually assumed responsibility for the orchestra (ISNU, 1932; IS&SCS, 1933a, 1933b). Merry left the institution at the end of the 1933-34 academic year ("H. O. Merry, Prominent in Music," 1941) and was succeeded by Henry O. Herbert, a graduate of Butler University of Indianapolis, Indiana (Russell, 1935; ISNU, 1935). Merry continued to direct the Lincoln High School Band and Orchestra as well as the Lincoln Civic Orchestra until his death from a heart attack on Monday, September 15, 1941, at 69 years of age. He was a prominent conductor and music educator in central Illinois for over 50 years.

The IS&SCS Band (IS&SCSB) existed for the next several decades. The 1936 *Annual Report* stated that the ensemble performed throughout the area and participated in several radio broadcasts over stations WMAQ in Chicago and WJBC in Bloomington. By this time, the instrumental program had expanded to include a band, drum and bugle corps, and orchestra that were all “in popular demand” (Russell, 1936, p. 14). On December 24, 1941, the IS&SCSB presented a concert at the Governor’s Mansion in Springfield for a children’s Christmas Eve party hosted by Governor Dwight Green and his family. The 34-piece ensemble performed next to the large Christmas tree on the front lawn and from the portico before they enjoyed a special dinner at the mansion (“Over 2000 Children,” 1941).

Appearances the following academic year included parades for Halloween and Memorial Day, a bond rally, and a music festival (“Music Organizations Give Many Performances,” 1943). On July 4, 1944, the band presented a special concert during Independence Day celebrations at the home (“Fourth of July at Children’s School,” 1944). Directors of the IS&SCSB during the late 1930s and early 1940s included Charles Newton (1937-1943), Barney M. Thompson (1943-1946), and Professor Wayne F. Sherrard (1946-?), who served on the faculty at ISNU (1937, 1943, 1946).

Individual instruction in both vocal and instrumental music continued at the institution in the 1960s. However, other activities gradually overshadowed the band as the number of students with serious emotional and cognitive impairments increased (IS&SCS, 1966; R. Cobb, personal communication, August 4, 2006). Although I found no evidence of the IS&SCSB after June 1967 when they played at the annual graduation ceremony (IS&SCS, 1967), the group might have existed until the facility closed in 1979.

Summary and Conclusion

The ISOH organized a band in 1898 to provide recreation for the male residents and service to the school and community. Herbert O. Merry assumed the bandmaster’s position in 1908 and improved the instrumentation and musicianship of the ensemble. The band appeared frequently at the home and throughout Illinois at civic events and meetings of the Grand Army of the Republic and other veterans’ associations. Merry left the ISOH in 1934 and was succeeded by Henry O. Herbert. Although the ISOH Band remained active throughout the 1940s and beyond, it appears that other activities gradually overshadowed the ensemble.

The ISOHB provided its members—who often had little connection to family or place—with a means of finding identity and worth through a close-knit organization that served their school, city, and extended community of veterans throughout the state. Officials probably also regarded the band as a means of vocational training through which students could one day earn part or all of their living. Although not stated directly in data connected with the ISOH, leaders in music education often promoted school music as preparation for future

employment during the progressive era (e.g., Carr, 1923; Giddings & Baker, 1928).

Details concerning the success of the ISOHB illustrate the potential and value of music education for at-risk students today. Researchers should also examine instrumental music programs in other residential homes and schools for dependent (e.g., Shansky, 2014), impaired (e.g., Sheldon, 1997), and delinquent (e.g., Hash, 2007) youth during the nineteenth and early twentieth centuries, as well as those supported by modern facilities and organizations that serve these populations. El Sistema (i.e., The System), for example, has offered music instruction for children in Venezuela since 1975 and inspired comparable programs around the world (Lesniak, 2012). Other initiatives to develop bands and orchestras among disadvantaged students include the Meru Music Project in Kenya (Felts, 2011), the Landfillharmonic in Cateura, Paraguay (Landfillharmonic, n.d.), and the Jefferson Parish Sheriff's Office Band of Excellence in Jefferson Parish, Louisiana (Willie, 2011). This line of research will inform current pedagogy and advocacy for music instruction among underserved populations and add to the historical record of music education in the United States.

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The Impact of Instrumental Music Instruction on the Academic Achievement of Students

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The purpose of this study was to examine the effects of fourth grade compulsory strings and subsequent fifth grade pullout strings courses on students' standardized test performance through the MAP (Missouri Assessment Program). I hypothesized that students who continued in the string pullout program would perform at or above the levels of peers who were not pulled out for the string program and that the longer students participated in any music program, the more positive the impact on student achievement. The results are compelling in that students who were pulled out of the regular academic classroom for the 5th grade pull-out string instruction did not suffer negative effects in their academic performance, as measured by the MAP. Furthermore, students who were excused for string instruction scored significantly higher in the Communication Arts and Math sections of the MAP than students who remained in the classroom, and the longer these students participated in instrumental music classes, the better they did as compared to their peers.

One of the most far-reaching statutes governing the federal government's role in education was known as "No Child Left Behind" (NCLB) (NCLB Act of 2001, 2002). In January 1992, the National Council on Education Standards and Testing presented a need for voluntary national standards and assessments in math, English, history, geography, science, and other subjects, especially including the arts. Responding to the *Goals 2000: Educate America Act* (1994), stakeholders in some academic disciplines developed a set of standards that all students should meet. This legislation was later overhauled in 2001, when bipartisan leadership focused on standardized test scores to measure students' proficiency levels. While the law identified English, Language Arts, Mathematics, Science, Foreign Languages, Government, Economics, the Arts, History, and Geography as core subjects, its primary focus was a goal for all students to score on grade level proficiency in Math and Reading by 2014. Individual states were to decide what the proficiency levels would be and to develop a measuring system to evaluate students (NCLB Act of 2001, 2002).

In Missouri, as in many American states, these standardized tests became the mark of measuring student success. The Missouri Assessment Program (MAP) assesses students' progress toward mastery of the state's interpretation of national educational standards. The Grade-Level Assessment is a yearly standards-based test that measures specific skills for each grade level. As of 2013, all students in grades 3-8 in Missouri take the grade level assessment.

Communication Arts and Mathematics are administered in all grades, while science is administered in grades 5 and 8 (DESE, 2012). Teachers know they will be held accountable, if any of their students fail to meet these minimum competencies. As a result of the NCLB legislation, schools were held accountable if students as a whole did not make adequate yearly progress from year to year on state standardized assessments. The No Child Left Behind Act of 2001 required all schools, districts, and states to show that all students are making Adequate Yearly Progress (AYP) that will result in all students and student subgroups scoring at or above the proficient level on the state's assessment. Justifiably, teachers want to be certain they are given sufficient instructional time to meet these expectations.

One of the difficulties educators encounter when scheduling at the elementary school level is providing a balance of educational opportunities that prepare students for educational success. Pullout classes (such as student council, performing music, special or gifted education classes), that remove students from the regular classroom on a regular basis, are sometimes seen as the culprit if students are not meeting desired proficiency levels, especially in math and reading (Kvet, 1982/1983). These "pull outs" require special attention from the administration and can often be seen as disruptive to classroom learning (Cowden & Klotman, 1991, p. 203). Parents share this concern. If instrumental music students' grades fall below standards, for example, parents are likely to remove their child from the program (Henry, 1978). English (1984), Superintendent of Northport-East Union Free School District, Long Island, New York, who was opposed to pullouts, defined them as such:

the practice of withdrawing certain elementary school students from their self-contained classroom, usually for special instruction, field trips, assemblies or school projects. The rest of the class stays with the regular teacher, who presumably does something worthwhile until the whole class is together again. Pull-outs have become almost a nightmare for many elementary school principals, who view the practice as a kind of pernicious anemia that attacks whole-class instruction time. Once pull-outs take hold in a school, there appears to be no end to them, and no way to rid the instructional program of their debilitating impact (p. 32).

Hennessey (1984) is an elementary teacher who stated in her article "Pull-outs Disrupt Class Teaching" that:

In the final analysis, students still must know how to read, do math, have attained writing and thinking skills, understand basic scientific concepts, and have an awareness of the world, in order to function in our changing world. With the current state of the pull-out syndrome, such proficiency is in severe jeopardy as eager classroom teachers wait for students to return to the classroom so that the teaching process can resume (p.18).

The federal mandates for special instruction in reading via Title I, PL 94-142, and for special education and gifted and talented students, have all contributed to friction between parties within the school competing for students' time (English, 1984). In light of the more rigorous Common Core State Standards in Literacy and Math (CCSS, 2012), the promise of Next Generation Science Standards (NGSS, 2012), and the movement to standardize the assessments students take from state to state, the effects of pullouts on academic achievement come under critical scrutiny. These new assessments are being created by the Smarter Balanced Assessment Consortium (SBAC, 2012) and the Partnership for Assessment of Readiness for College and Career (PARCC, 2012). Nearly all states have accepted one of these assessment developers for determining students' progress toward mastering these new rigorous standards. As schools ready themselves for these next generation standardized tests, programs perceived as not contributing to improved academic achievement may be discontinued.

Since 2006, Missouri elementary students in grades 3-5 have taken the Missouri Assessment Program (MAP) assessment measuring students' mastery of grade level expectations in communication arts and math (DESE, 2012). The purpose of this study was to examine the effects of the fourth-grade compulsory strings and subsequent fifth-grade voluntary pullout program within a large suburban school district on students' MAP performance. The reason I chose to focus on the elementary string program was because the program was being considered as a source of budget cuts. Some classroom teachers failed to see the need for the program, and representatives for these teachers suggested this as an option during union contract negotiations. They argued that pulling these students out caused disruption in the learning these students would have gotten had they not left for strings class, thus requiring more of the teachers once they returned.

Review of the Literature

Although there has been increased attention to students' performance on standardized tests related to increased rigorous standards in math and literacy, few studies have measured the effects of pullout programs on proficiency test scores. Wallick (1998) examined the effects of a pullout string program on student achievement in the writing, reading, mathematics, and citizenship sections of the Ohio Proficiency Test. His work focused on 148 fourth-grade string students and 148 fourth grade non-string students from a southwestern Ohio city school district who were ability-matched according to their performance on the verbal section of the Cognitive Abilities Test. His study involved a two-group, static-group comparison design. A two-sample independent t-test analysis revealed a significant difference in favor of the string students who had two 30-minute string lessons per week as compared to the matched group who remained in class on measures of reading achievement and citizenship. Wallick found no significant difference between the two matched

groups in the writing and mathematics sections of the Ohio Proficiency Test. While these string students showed improvement in reading, but not writing, students in another study were found to have improved their writing skills (Mickela, 1990). Eye-hand coordination and motor skills developed by playing a musical instrument seem to transfer to writing skills.

While studies examining the effects of pullout programs are somewhat limited, those examining a relationship between instrumental music study and improved academic performance are many. For example, music study results in improved spatial intelligence, which transfers to high-level math and science (Rauscher et al., 1994) and may develop perceptual skills necessary in many academic areas (Dryden, 1992). Mickela (1990) found that the rhythm of music transfers to the rhythm of reading. The learning and performance of rhythm develop eye-hand coordination necessary in other academic areas. Mickela also found that auditory discrimination developed by instrumental study helps develop phonetic skills. Memory training, listening, recall, and concentration are all skills developed in music study that seem to transfer to academic areas.

Some studies have focused directly on whether students are benefited or harmed academically when pulled out of the regular classroom for instrumental music instruction. Robitaille and O'Neal (1981a) examined 5,154 fifth graders' scores on the Comprehensive Test of Basic Skills (CTBS) in Albuquerque, N.M., in 1979 and of 5,299 different fifth graders in 1980. Of these groups, nearly one-fourth of all participants were enrolled in the instrumental music program during both years. Music students scored higher in all areas of the CTBS than the total group. Research findings showed that the longer pupils were in the music program, the higher their achievement was in comparison to the non-music students. This study was replicated in 1981 and similar results were found (Robitaille and O'Neal 1981b). In 1992, a group of 270 fifth graders were selected from a Kansas school district to determine the effect of instrumental music instruction on academic achievement. The Comprehensive Tests of Basic Skills (CTBS) subtests of reading and math were used. The study's results indicated that time out of regular classes for instrumental music instruction did not negatively affect academic achievement (Dryden, 1992, p. 65). Dryden also found that the ability to solve problems necessary in some branches of mathematics is facilitated by experience in music study. Musical instruction techniques that have been used for teaching mathematics have met with great success (Dryden, 1992).

More recently, Johnson and Memmott (2006) found that elementary students ($n = 1,119$) scored higher on both English and mathematics standardized tests when they participated in exemplary music education programs as opposed to their counterparts who did not have high-quality instruction. Additionally, when analyzing data of middle school students' performance ($n = 3,620$), students of exceptional music programs and deficient instrumental programs scored better than those in no music classes or deficient choral programs on English and math standardized tests.

Thornton (2013) noticed that an emphasis on standardized testing in certain subjects negatively impacted the amount of time left for students to take music classes. But when looking at how nearly 7000 students in grade levels 5, 8, and 11 scored across her state on the standardized assessment, Thornton found that significantly higher scores were earned by students involved in music compared with students not involved in music. She concluded that music students were not disadvantaged on the state test, despite the time that they spent in music classes.

In a study of public high school students in one urban district, Fitzpatrick (2006) found that instrumental music students earned statistically significantly higher standardized assessment scores than did their non-instrumental peers within matched free or reduced-price lunch statuses. Fitzpatrick noted, however, that this advantage also was present in younger grades, before the instrumental music students began studying instrumental music. Kinney (2008) extended the Fitzpatrick study by adding additional controls for student mobility and family composition. He found that band students tended to score higher than did non-band students on standardized assessments. Similar to Fitzpatrick, Kinney found that an achievement advantage in favor of the band students existed prior to their initial enrollment in band. However, Helmrigh (2010) found small (partial $\eta^2 = .02$) but statistically significant advantages for choral and instrumental music students on the ninth-grade Maryland Algebra/Data Analysis High School Assessment when compared to their non-music peers. More recently, Baker (2011) found that fifth- through eighth-grade music students earned higher mean scores in English/language arts and math components of the Louisiana Educational Assessment Program than did their non-music counterparts.

The results of one study indicated that the inclusion of core materials within the arts classroom improved student achievement on standardized tests (Teaching Music, 1999). When compared to a control group, math and reading scores improved substantially for first graders at Powderhorn (Minneapolis) Community School in a year-long study of the impact of Kodaly music instruction on student learning. Control group students only received the school's usual fifty-five minutes per week of Kodaly music instruction from a music teacher without the classroom teacher present; the experimental group received an additional thirty minutes per week of Kodaly music instruction from the music teacher with their classroom teacher present. In the experimental classes, the classroom teacher then applied skills from the music classes to math and reading concepts, while the music teacher, in turn, reinforced concepts from the students' other classes.

Leon Burton (2001) wrote:

All curriculum programs should lead students to discover connections:
(a) to learn to ask the correct questions to find connections; (b) to value independent thinking, finding their own solutions to problems;
(c) to develop sequential understandings in separate areas of knowledge and skills; and (d) to establish thought patterns or mind-

sets that lead them to look for linkages and connective relationships across all areas of learning. (p. 17)

Integrated teaching gives students more opportunities to make connections that lead to deeper understanding (Wiggins, 2001). The human mind seeks patterns (Costa, 1993) and does not easily assimilate information that is fragmented and presented in isolation. Costa noted that knowledge is learned more quickly and remembered longer when presented in a meaningful context in which connections among ideas can be made. Music educators maintain that music is as basic as math, science, and reading, and can serve as an excellent conduit.

We talk a great deal about the need for mental disciplines, in math and science and in foreign languages. Isn't music a discipline, too? Actually, it's a science, it's mathematical, it's foreign language, and it's an art-all rolled into one. There's one thing that music is not -- it is not a "frill." It is not an "extra," to be cut and trimmed when money gets tight. It is an integral part of the total school program and deserves to be treated as such. (Christian, 1966)

While many studies within this review of the literature indicated a correlation between the choice to play a musical instrument and higher academic performance on standardized tests, only the Wallick (1998) study looked at students with matched-ability before the treatment on the experimental group. To avoid the potential of spurious correlations resulting from the idea that students who perform well on standardized assessments often happen to choose instrumental music, the decision was made to complete a matched-pair study design.

The purpose of this study was to examine what effects the compulsory fourth-grade strings and subsequent fifth-grade voluntary pullout program in this school district had on students' MAP performance. I hypothesized that students who continued in the string pullout program would perform at or above the levels of their matched peers who were not pulled out for the string program.

Methodology

In this study, the academic achievement of students who continued in music classes were compared with matched-ability students who did not continue with pull-out music classes, as measured by the MAP. The focus of this study is then narrowed to the same questions with students who took specifically the stringed instruments class – that is, orchestra as opposed to other instrumental music. The following questions were examined:

1. Is there a significant difference between students who continued in music classes and those who did not in their later scores on the Communication Arts section of the MAP?
2. Is there a significant difference between students who continued in music classes and those who did not in their later scores on the Mathematics section of the MAP?

3. Is there a significant difference between the sub-group of those who continued in stringed instruments study (Orchestra) and students who do not in Communication Arts scores on the MAP in subsequent years?
4. Is there a significant difference between the sub-group of those who continued in stringed instruments study (Orchestra) and students who do not in Mathematics scores on the MAP in subsequent years?
5. Is there a significant difference between the sub-group of those students who continued into the 5th grade string program but changed to other music offerings in the 6th grade and students who did not continue past the compulsory 4th grade string program in Mathematics scores on the MAP in subsequent years?
6. Is there a significant difference between the sub-group of those students who continued into the 5th grade string program but changed to other music offerings in the 6th grade and students who did not continue past the compulsory 4th grade string program in Communication Arts scores on the MAP in subsequent years?

Participants

I compared the academic achievement of string students (SS) and matched-ability non-string students (NS), as measured by the MAP. This study utilized a matched pair design in which students who began study on an instrument as a 4th grade student and continued were matched on their tests scores with students who did not continue. String-class students were matched with non-string-class students with equal or closely equivalent scores (never more than four points of difference) on the MAP assessment in Communication Arts ($n = 487$ pairs remaining in the final year) and Mathematics ($n = 477$ pairs) completed as 3rd graders in the Spring of 2007.

Students were paired with peers within the same grade level from among 19 elementary schools in this large suburban district. All of these students attended a compulsory Suzuki-inspired violin class for 45 minutes twice per week as a part of their regular schedule during the following year as fourth graders. When looking at every student who participated in the fourth grade compulsory program, each student who continued into the fifth grade elective program was paired with a student who did not based on their 3rd grade MAP scale score. These pairs of students were then tracked through the years, comparing scores on their MAP Math and Communication Arts grade level assessments deployed in the Spring of each year. Of the students who continued into either orchestra or band in the 6th grade, further comparisons were made with sub groups who decided to continue into 8th grade and those who dropped out.

The school district selected for participation in this study is a large suburban district in the Midwest and is recognized for Distinction in Performance with High Achievement by the Missouri Department of Elementary and Secondary

Education, serving more than 22,000 students in 19 elementary schools, six middle schools, and four high schools (RSD, 2012).

One of the district's elementary pull-out programs offered in each of the nineteen elementary schools was an elementary string program. All students learned to play violin in a modified Suzuki-inspired class meeting twice per week for 45 minutes during the fourth grade. When in fifth grade, students chose whether or not they would continue into 5th grade orchestra as a pull-out from the regular classroom twice per week for 45 minutes. Teachers and administrators in this school district were concerned that fifth-grade students who left the regular classroom for string instruction may have suffered negative effects in their MAP achievement. Further, this group of teachers and administrators felt that the year of fourth-grade compulsory violin instruction impeded all students' progress when measured on the MAP test.

This public school system serves students from diverse cultural and socioeconomic backgrounds. Over 1,700 students are served from the St. Louis city Voluntary Student Transfer program. This program was established to increase racial integration in the metropolitan area under a Settlement Agreement approved by the federal court in 1983. The Agreement allows African-American students residing in the City of St. Louis to attend participating school districts in St. Louis County. (RSD, 2013)

Instrument

The Missouri Assessment Program (MAP) assesses students' progress toward mastery of the Show-Me Standards (the educational standards in Missouri). The Grade-Level Assessment is a yearly standards-based test that measures specific skills defined for each grade by the state of Missouri. All students in grades 3-8 in Missouri take the grade level assessment in Communication Arts and Mathematics. Science is administered in grades 5 and 8. The Grade-Level assessments are made up of multiple-choice, machine-scored items, as well as "constructed response" items. These items require students to supply (rather than select) an appropriate response. In addition, the Grade-Level assessments include some items from TerraNova, a nationally normed test developed by CTB/McGraw-Hill, so that Missouri student achievement can be compared to groups of students who take the same test in other states. (DESE, 2012). The MAP assessments are required under Senate Bill 380, often referred to as the "Outstanding Schools Act," the state school-reform law enacted by the legislature in 1993.

Data Collection and Analysis

First, a new spreadsheet of scores provided by this school district's data department organized by student identification number was created by copying and deleting unneeded variables, so that only the variables of interest would be included. Then, the column with the test scores to be matched was put in

ascending numerical order, so that the cases were all now in order from lowest test scores to highest test scores. The purpose of this was to put scores in sequential rows so that matches were easy to find, and the rows could easily be manipulated from top to bottom. The column that designated which case was a music-class student, designated "1", meant the row stayed where it was, and the designation of 2 meant that it was a non-music-class student. The latter were either cut and pasted into the columns, which copied the variables of interest, matching a music-class student with the same (or close to same) test score, or were deleted entirely because enough suitable matches had already been made. Because there were far more students in the non-music-class category, many of their cases were deleted; all of the music-class student scores were used. In both the Communication Arts and Math pairings, there was a perfect 1.0 correlation at the beginning, indicating that this initial matching process was successful. The few cases where I had to settle for being 1 to 4 points off did not make any difference in the overall correlation because of the number of students in the study – the pairs still ended up representing a perfect correlation.

A paired-sample t-test was computed using SPSS software to determine if a statistically significant difference existed between proficiency achievement of music-class students and that of the matched group of non-music-class students. A paired-sample t-test was computed each year to see if any difference was sustained into middle school. Of the students who continued into either orchestra or band in the 6th grade, further comparisons were made with sub groups who decided to continue into 8th grade and those who dropped out. For this comparison, an independent samples t-test was employed.

Results

Results for Communication Arts for all music classes are shown in Table 1. There was no difference in 2007, which was deliberately designed, since that was the starting point where pairs were matched. In all subsequent years, the students who took an instrumental music class had significantly higher scores than the students who did not.

Table 1. Differences Between Students Who Continued in the 5th Grade Strings Class and Middle School Band or Orchestra and No-Class Students (Who Did Not Continue Beyond 4th Grade) on Communication Arts Scores ($N = 487$)

	Class		No Class		t
	M	SD	M	SD	
2007, 3rd grade	661.8	27.1	661.81	27.1	1.21
2008, 4th grade	677.7	25.0	674.16	24.0	3.13***
2009, 5th grade	692.8	23.9	688.75	24.6	3.75***
2010, 6th grade	693.4	24.8	689.25	24.7	3.50***
2011, 7th grade	703.0	28.1	699.18	28.0	3.84***
2012, 8th grade	717.2	26.3	712.20	25.0	3.94***

* $p < .05$. ** $p < .01$. *** $p < .005$.

Table 2 narrows the group from all instrumental music classes to those who only continued in the orchestra program through the 8th grade. Students who continued to take an orchestra class in 6th grade after taking the 5th grade pull-out orchestra program were compared to those who did not continue past the 4th grade compulsory violin class in any elective instrumental music class. Since some students did not continue in orchestra and chose not to take band in 6th grade, we now have 183 pairs for this comparison during the final year; those who elected to take band are not included.

Table 2. Differences Between Orchestra Class and No-Class Students on Communication Arts Scores ($n = 183$)

	Class		No Class		t
	M	SD	M	SD	
2007, 3rd grade	664.0	27.2	664.01	27.3	0.67
2008, 4th grade	680.5	26.6	677.46	22.7	1.54
2009, 5th grade	695.5	21.8	691.29	23.4	2.50*
2010, 6th grade	697.4	24.7	691.44	23.1	3.17***
2011, 7th grade	708.2	28.2	702.19	27.3	3.13***
2012, 8th grade	722.6	28.1	714.42	23.1	3.94***

* $p < .05$. ** $p < .01$. ***. $p < .005$.

In 2009, the difference of almost 4.3 points is significant. In 2010, and 2011 it is approximately six points in favor of the students who continued into an orchestra class in 6th grade compared to those who did not continue in an elective instrumental music class at all beyond the 4th grade. By 2012, it is just over eight points.

Students who continued from the 5th grade pull-out orchestra class into a 6th grade band class were also compared against students who did not take an elective music class beyond 4th grade. There are now 304 pairs that were tracked from the beginning in 3rd grade, as shown in Table 3.

Table 3. Differences Between Band Class and No-Class Students on Comm. Arts Scores ($n = 304$)

	Class		No Class		t
	M	SD	M	SD	
2007, 3rd grade	660.4	27.0	660.48	27.0	1.03
2008, 4th grade	676.0	23.8	672.17	24.6	2.82***
2009, 5th grade	691.2	25.0	687.21	25.1	2.82***
2010, 6th grade	691.0	24.6	687.92	25.5	2.01*
2011, 7th grade	699.9	27.6	697.38	28.3	1.61
2012, 8th grade	713.9	24.6	710.86	26.1	1.91

* $p < .05$. ** $p < .01$. ***. $p < .005$.

Just as the orchestra group shows steady improvement each year, the group that elected to stay in the pull-out orchestra class in 5th grade and move to pull-out band class in 6th grade still scored significantly higher than those who did not continue taking an elective music class beyond the 4th grade. By the time these students progressed into 7th grade and 8th grade, the band students still

scored higher, but the difference only bordered on significance ($p = .057$). Everyone was pair-matched to be equivalent in the beginning.

Further, students who had taken an orchestra class or a band class in the 6th grade and were still in an instrumental music class by 2012 were compared against those who dropped out after the 6th grade band or orchestra experience; results are in Table 4.

Table 4. Differences Between Continuing Instrumental Music Class and Dropping Class on Communication Arts Scores

	Class in 8 th Grade ($n = 355$)		Stopped Class in 6 th Grade ($n = 149$)		
	M	SD	M	SD	t
2012 Scores	719.45	26.61	710.5	25	3.511***

* $p < .05$. ** $p < .01$. ***. $p < .001$.

While the students who continued instrumental music instruction into 5th and 6th grade scored significantly higher than those who did not, those who continued into 8th grade outpaced those who dropped out at the end of 6th grade. Those who still had an instrumental music class of any kind in 2012 had almost nine point higher scores.

The same analyses were run on the Mathematics scores. Table 5 shows the results for all forms of an instrumental music class compared to those who had no instrumental music class beyond the 4th grade.

Table 5. Differences Between Students Who Continued in the 5th Grade Strings Class and Continued into an Instrumental Music Class Through the 8th Grade and No-Class Students (Who Did Not Continue Beyond 4th Grade) on Mathematics Scores ($N = 477$)

	Class		No Class		t
	M	SD	M	SD	
2007, 3rd grade	646.1	30.7	646.1	30.7	0.64
2008, 4th grade	666.8	27.1	662.9	40.6	2.06*
2009, 5th grade	688.4	31.9	686.3	34.9	1.47
2010, 6th grade	703.4	31.9	699.8	32.8	2.51*
2011, 7th grade	711.4	35.9	706.1	34.0	3.39***
2012, 8th grade	734.0	35.3	728.8	33.8	3.23***

* $p < .05$. ** $p < .01$. ***. $p < .005$.

There was no difference in 2007, which again was deliberately designed, since that was the starting point where pairs were matched. By the next year, 2008, there are differences in Math Scale Scores of more than 2 points with the music-class students achieving higher levels. Then, only the students who continued to take an orchestra class in 6th grade after taking the 5th grade pull-out orchestra program were compared to those who did not continue past the 4th grade compulsory violin class in any elective instrumental music class. There are now 187 pairs for this comparison, as shown in Table 6.

Table 6. Differences Between Orchestra Class and No-Class Students on Mathematics ($N = 187$)

	Class		No Class		t
	M	SD	M	SD	
2007, 3rd grade	649.47	29.45	649.5	29.5	0.22
2008, 4th grade	669.76	26.83	665.6	29.4	1.98*
2009, 5th grade	693.25	32.86	690.8	35.1	1.02
2010, 6th grade	708.17	30.16	702.8	31.4	2.29*
2011, 7th grade	716.07	37.25	708.9	31.3	2.81***
2012, 8th grade	740.37	32.91	730.8	32.7	4.01***

* $p < .05$. ** $p < .01$. ***. $p < .005$.

In 2010, the difference is significant with almost six points in favor of the students who continued into an orchestra class in 6th grade compared to those who did not continue in any elective instrumental music class at all beyond the 4th grade. In the subsequent two years, this difference becomes more significant.

Students who continued into a 6th grade band class (rather than an orchestra class) were compared against students who did not take an elective music class beyond 4th grade. There are now 290 pairs that were tracked from the beginning in 3rd grade; see Table 7.

Table 7. Differences Between Band Class and No-Class Students on Mathematics ($N = 290$)

	Class		No Class		t
	M	SD	M	SD	
2007, 3rd grade	643.96	31.31	643.9	31.3	1.18
2008, 4th grade	664.81	27.05	661.2	46.4	1.32
2009, 5th grade	685.31	30.9	683.4	34.5	1.06
2010, 6th grade	700.36	32.66	697.8	33.7	1.39
2011, 7th grade	708.34	34.67	704.2	35.6	2.07*
2012, 8th grade	729.83	36.17	727.4	34.5	1.12

* $p < .05$. ** $p < .01$. ***. $p < .005$.

Here, though, the group of students who continued in the 5th grade pull-out orchestra group and chose band as a 6th grade student was higher than the students who did not continue in an instrumental music program beyond 4th grade, but it is not enough to be significant except for 2011. Clearly, the difference of higher scores is far more predominant for those who continued in orchestra class.

As before with Communication Arts scores, students who had taken an orchestra class or a band class in the 6th grade and were still in an instrumental music class by 2012 were compared with those who dropped out after the 6th grade band or orchestra experience on their Mathematics scores, and these results appear in Table 8.

Table 8. Differences Between Instrumental Music Class and No-Class Students on Communication Arts Scores

	Class in 8 th Grade (<i>n</i> = 343)		Stopped Class in 6 th Grade (<i>n</i> = 148)		
	M	SD	M	SD	t
2012 Scores	737.00	34.68	726.55	34.51	3.06**

* $p < .05$. ** $p < .01$. *** $p < .001$.

While the students who continued instrumental music instruction into 5th and 6th grade scored significantly higher than those who did not, those who continued into 8th grade outpaced those who dropped out at the end of 6th grade. Those who still had an instrumental music class of any kind in 2012 had significantly higher scores by over 10 points.

Conclusion

The evidence is compelling that string students who were pulled out of the regular academic classroom for the 5th grade pull-out string instruction did not suffer negative effects in their academic performance, as measured by the MAP. Furthermore, students who were excused for string instruction scored significantly higher in the Communication Arts and Math sections of the MAP than students who remained in the classroom. The research findings of this study support the following answers to the questions originally posed:

1. There was a significant difference between string students and non-string students in their achievement on the Communication Arts section of the MAP.
2. There was a significant difference between string students and non-string students in their achievement on the Math section of the MAP.
3. There was a significant difference between string students who continued study of an instrument (band or orchestra) and non-string students who do not in Mathematical achievement on the MAP over time.
4. There was a significant difference between string students who continue study of an instrument (band or orchestra) and non-string students who do not in Communication Arts achievement on the MAP over time. Students who continued into the voluntary 5th grade string program but continued into band for the 6th grade scored higher than students who did not continue into instrumental music beyond the compulsory 4th grade string program, but was only significantly higher in the 7th grade on the Mathematics portion of the MAP.

5. There was a significant difference between students who continued into the voluntary 5th grade string program but continued into band for the 6th grade and those who did not continue past the compulsory 4th grade string program in Communication Arts scores on the MAP.

Implications

It may seem illogical that academic achievement did not suffer any negative effects and may possibly have been enhanced when students left the regular classroom for their string instruction. Many variables could have caused this effect, and the empirical evidence necessary to draw specific conclusions from this sample of students lies beyond the reach of this study.

One explanation for string students' scoring significantly higher in the Communication Arts section of the MAP could be that both sections require good reading comprehension and critical thinking skills. To perform well on both, one must also have a good English vocabulary. Like reading words, reading music involves interpreting abstract symbols and translating them into physical and cognitive expressions. The skills involved in reading musical symbols may transfer to those required for comprehending linguistic symbols and interpreting maps, graphs, and charts. Studies need to be developed that examine if there would be a correlation among these cognitive activities.

When string students are excused from their classrooms for string class, they are not leaving instruction. They are moving to another classroom in a different area of the building. The concepts taught in strings go far beyond pitch and rhythm. For example, a student must understand fractions and their relationships to each other in order to manipulate rhythm. The student who has trouble understanding the abstract concept that a half is twice one quarter may comprehend the concrete example of his or her bow's moving twice as far on half notes as quarter notes. The musician reads abstract concepts from the page and then translates them into concrete phenomena that involve time and space.

The Mathematics section of the MAP showed the greatest difference between SS and NS. One of the limitations of this study is the inability to assess the impact of different classroom teachers and school atmospheres on string students' learning. In schools where strings participation is encouraged, students may have less difficulty performing at standard on the MAP as a result of the cooperation of the classroom teacher.

It would be safe to conclude that the problems associated with music pullouts will continue to concern educators in the foreseeable future. Of the difficulties commonly associated with pullout programs, teachers' concerns that students who are pulled out for instrumental music suffer academically may be unfounded fears. Additionally, it would also be safe to conclude that the longer a student studies a string instrument, the better these students would do on the Math and Communication Arts skill assessments when compared to peers who do not continue study of an instrument. If the results of this study can help to

demonstrate this, then the other tensions and frustrations associated with pullout programs or decisions whether or not to sustain instrumental music programs may be alleviated. The results of this study add to the evidence that more instrumental music opportunities for our children in the school day can only improve students' performance on standardized Math and Communication Arts assessments.

Hennessey's (1994) statement quoted earlier that "eager classroom teachers wait for [pullout] students to return to the classroom so that the teaching process can resume" seems to imply that the teaching process stops while pullout students are engaged in their various out-of-classroom activities. If this is true, researchers need to compare the academic achievement of NI students who attend schools that use pullout scheduling for instrumental music with a matched sample of NI students in schools that do not use pullout scheduling. The scope of research could be broadened to compare the effects of all special pullout programs, including gifted and remedial coursework that requires pullout scheduling. If some teachers cease instruction when pullout students are removed from the classroom, there may be a relationship between the number of pullout programs implemented within a school building and the academic achievement of that building's student population.

Follow-up research could be developed that will continue to measure the impact of pullouts on standardized assessments, possibly including the science section of the MAP. Performance standards in the writing, reading, and mathematics sections of standardized assessments have been raised with the implementation of the Common Core testing instruments. Studies can be designed to continue monitoring pullouts and student achievement on these assessments as these proficiency standards are implemented.

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Characteristics and Accessibility of Loaner Programs Used by Missouri String Teachers**Juliana M. Georgiades, MM****Missouri State University****August 2015****Committee Chairperson: Dr. Daniel S. Hellman****Thesis Abstract:**

The purposes of this study were (a) to describe string instrument loaner programs and associated administrative practices in socioeconomically diverse schools and (b) to analyze the accessibility of string education with respect to school size and socioeconomic status. The research involved the responses to an electronic survey completed by 42 Missouri K-12 string teachers who taught at 119 schools, spanning 20 school districts. Findings suggest that lower income schools were more likely to have students using school-owned instruments as their only instrument, more likely to not use loaner instruments that were shared between schools, and more likely to lack the instruments needed to allow interested students with financial need to participate. Based on the results, string music education participation may not be equitable by socioeconomic status. Discussion addresses funding, resource allocation, and commitment to equitable access to string education.

Expertise Development in Musicians: The Roles of Deliberate Play and Deliberate Practice

Jackie Lordo
University of Missouri
December 2015
Committee Chairperson: Dr. Wendy Sims

Dissertation Abstract:

This dissertation comprises three projects designed to investigate whether the Developmental Model of Sport Participation is applicable to help explain the development of music expertise. One investigation is a review of literature pertaining to expertise development and deliberate play, a concept from sport psychology that can add insight to the understanding of music learning. A phenomenological qualitative study using retrospective interview techniques determined that Cote's Developmental Model of Sport Participation and the concept of deliberate play could be applied to expert musicians, but that a new aspect termed *awareness* should be added to the model for musicians. The third investigation is an experimental quantitative study. Middle school student participants in the treatment group replaced traditional scale practice in band warm-ups with researcher-designed deliberate play scale games. Participants' weekly scale performance scores were compared during and after treatment, and a practice behavior and motivation questionnaire were used as pre/post assessments. There were no differences found between control and experimental groups during the short study. Synthesis of the findings from the three projects indicate that deliberate play is relevant to musicians' development, and that school-age students can learn through music deliberate play.

Puppetry as an Effective Teaching Tool in the Elementary Music Classroom**Elisabeth R. Schoenecke****Missouri State University****December 2015****Committee Chairperson: Dr. Daniel S. Hellman****Thesis Abstract:**

The purpose of this study was to examine the use of puppetry in the elementary music classroom and its potential as a teaching tool. Determining its value will help music educators in applying puppetry to music learning. Common benefits claimed by educators and therapists include increased attention, awareness and critical thinking. Extant literature suggests that puppetry can accommodate different learning styles, assist with recall, and enhance classroom management. This study involved observing and interviewing two elementary music teachers who incorporated puppetry into their curriculum. Based on the results, puppetry in the elementary music classroom supports enjoyment, engagement, and learning.

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Those who wish to submit a report for consideration should comply with the following guidelines:

1) There will be three kinds of research accepted for presentation: a) completed master's theses or doctoral dissertations; b) reports of original research studies, and c) student non-degree projects.

2) a) To submit completed master's or doctoral research, it only is necessary to submit a copy of the abstract, a copy of the document's title page, and a copy of the signature page which indicates that the paper was accepted in partial fulfillment of degree requirements. The name of the degree-granting institution should appear on one of these pages, or must be included with the submission, as well as the author's full name and e-mail. If all of the above-mentioned items are included, the completed thesis or dissertation will be guaranteed acceptance for presentation. These may be sent by e-mail to the address on the next page.

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3) Papers presented at conferences other than previous MMEA state conferences *will* be permitted as long as this is clearly indicated in a statement included with the submission.

4) Authors will be apprised of the results of the selection process by e-mail. A hard copy of acceptance letters will be provided upon request.

5) Submissions must arrive at the address below by December 12, 2015. Authors will receive notification of acceptance by the end of December. Address submissions (or questions) to:

Wendy Sims, University of Missouri-Columbia
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We will look forward to a large number of submissions and to another interesting and lively research session.

INFORMATION TO CONTRIBUTORS

The *Missouri Journal of Music Education* is a publication devoted to the needs and interests of the school and college music teachers of Missouri and of the nation. The editorial committee of the journal encourages submissions of original research pertinent to instruction in music of a philosophical, historical, quantitative or qualitative nature.

Submission Procedures. Authors are invited to submit an abstract of 150 – 200 words and manuscript in a single doc attachment to the editor via silveyba@missouri.edu. Authors are requested to remove all identifying personal data from submitted articles. Manuscripts submitted for review must not be previously published or under consideration for publication elsewhere.

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