THE EFFECT OF THE USE OF TECHNOLOGY ON STUDENT MOTIVATION AND ACHIEVEMENT IN THE ELEMENTARY MUSIC CLASSROOM

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# EFFECT OF TECHNOLOGY ON STUDENT MOTIVATION AND ACHIEVEMENT

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Abstract

For many of us, technology is an essential element of our daily routines and life without it is completely unimaginable. As technology continues to become integrated in all aspects of society, the way that we educate our students must evolve accordingly. The purpose of this study was to examine the effect of the use of technology on student motivation and achievement in elementary music class. Two classrooms of second grade students at a South Florida school were given pre-tests and post-test to gauge their motivation and note-reading knowledge. One class, the control group, was taught basic note-reading techniques through a traditional teaching approach. A second class, the experimental group, was taught through the use of iPads. Following data analysis, it was determined that the experimental class had a significant \((p = .007)\) increase in student motivation after learning with iPads. The control group’s motivation toward music decreased, although the decrease was not significant \((p = .476)\). Both classes showed a significant improvement in achievement following their note-reading lessons (Experimental: \((p = .002)\); Control: \((p = .005)\). The post-test motivation and achievement scores of the two classes were also compared, however no significant difference was found between the two classes for the motivation \((p = .11)\) or achievement \((p = .48)\) tests. Though technology may be a tool useful for motivating some students, the teacher and pedagogical approaches utilized are of utmost importance. Future research might explore an extended number of lessons with the students. Researchers might also investigate the effects of different types of technology on student learning and on students of varying age groups.

*Keywords*: technology, iPad, music, motivation, elementary
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The Effect of the Use of Technology on Student Motivation and Achievement in the Elementary Music Classroom

Most will agree that music is a large part of their daily lives. Whether it be composing a piece of music, writing a new rap song, playing a band instrument, or even listening to music, we are culturally immersed in musical sounds and experiences as members of contemporary society. Many will also agree that the arts are a vital and necessary part of the school curriculum. In many United States’ schools that offer a music education, music is a mandatory part of the elementary curriculum for students. However, music education frequently becomes an elective option upon entrance to secondary schools. Some students will choose to continue with music classes through middle school and high school, whereas more students will not. Illinois Creates: The Illinois Arts Education Initiative (2006) found that though many principals and superintendents saw the significance of arts as an essential part of the curriculum, only 25% of high school students were enrolled in any arts courses (Abril & Gault, 2008).

Researchers have found many benefits to music education. For example, the study of music has been found to be related to the development of language and reasoning, but most importantly, music allows students the opportunity to create (Phillips, 2014). Students may forgo this opportunity if they do not know how to read music or play an instrument. However, technology can allow students who have little prior musical experience to engage with music in ways that are enjoyable and relatable.

Technology continues to be integrated in all aspects of society. Likewise, contemporary technologies offer new ways that we can educate our music students (Bauer, 2014). Today’s K-12 students are technology natives (Prensky, 2001) with the regular use of technology playing a huge role in their everyday lives. From the moment they wake up in the morning to the alarm on
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their iPhones to the time that they fall asleep playing on their iPads, many students are immersed in a technological culture. Stearns (1993) believed that the synthesizer would be the folk instrument of this generation, and today some musicians and researchers are touting mobile computing devices such as the iPad as musical instruments (Randles, 2013). Technology allows students opportunities to create in ways that they may have never otherwise experienced. Additionally, technology may motivate students’ engagement in school activities. However, little research has been conducted on how the use of technology may impact the motivation and musical achievement of elementary students. The purpose of this study was to examine the effect of the use of technology on student motivation and achievement in the elementary music classroom.

Review of Literature

Motivation and Music

Motivation is an important topic for educators to understand when determining how to best teach their students. O’Neill and McPherson (2002) described research on motivation in music as seeking to “understand how children develop the desire to pursue the study of a musical instrument, how they come to value learning to play an instrument, why they vary in the degree of persistence and the intensity they display in achieving their musical goals, and how they evaluate and attribute their success and failures in different achievement contexts” (p. 31). An understanding of motivational principles will better equip educators to design their teaching practices to optimize student learning.

Motivation may play a significant role in musical achievement (Asmus & Harrison, 1990). Students who are motivated to learn may enjoy practicing at home more, enroll in more music classes, and develop a better appreciation for music. In fact, 74% of teachers say that
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Technology in the classroom motivates students to learn (Dunn, 2014). This review of literature will focus on research examined motivation in music. It will explore a variety of factors that may affect motivation levels, as well as different motivational theories, in order to provide context for how technology may influence student motivation in elementary music classes.

Researchers have conducted several studies examining music and motivation. Asmus and Harrison (1990) explored the relationship between musical motivation and aptitude, and how these factors may contribute to musical achievement. The researchers utilized a College Music Aptitude Profile Tonal and Rhythm Imagery test to measure musical aptitude and Asmus’ Motivation of Music test to measure motivation among 187 non-music majors enrolled in three sections of a music appreciation course. The researchers found a significant relationship between the motivating factors and the Magnitude of Motivation measure of music motivation.

A few years later, Asmus, Harrison, and Serpe (1994) completed another study that was focused on students enrolled in a college freshman music theory course. Similar to Asmus’ previous study, this also focused on achievement and motivation. The difference, however, was in this investigation, the researchers examined whether (a) musical talent and aptitude, (b) academic achievement, (c) intelligence, (d) musical experiences, (e) and motivation for music were predictors for musical achievement. Participants were given three different tests over the course of ten semesters. The researchers concluded that these factors did affect achievement in aural skills.

**Appreciation.** Smeltz (2012) discussed the importance of helping students develop a lifelong appreciation of music. By forcing students to practice through the enforcement of playing tests and practice charts, student’s love and appreciation for music may be harmed. Smeltz (2012) surveyed 89 adult musicians about their practice habits and attitudes. The
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researcher found that it is possible to increase the effectiveness of students’ practicing without decreasing their joy. She recommended doing this by reframing student practice to help them develop an intrinsic motivation. If we can help our students develop a love for music, it may in turn affect their practicing and ultimately their musical achievements. To do this, we must find ways to motivate our students.

Motivational theories. Researchers have created many different motivational theories that may help musicians understand the complex nature of motivation and its application to music performance achievement (O’Neill & McPherson, 2002). One of the most important theories of motivation is Expectancy-Value Theory. This theory explains why individuals may be interested in an activity to the degree that they believe it will be important to them in the future. It is made up of four main components: attainment value, intrinsic motivation, extrinsic utility value, and perceived cost.

Attainment value refers to how important a student believes it is to do well at a task. Allowing students to see the benefits and importance of music may enable them to better understand why they are learning certain things. Next, many students will be motivated by pure intrinsic motivation. This refers to those who enjoy performing music for the sake of the music itself. Third, students arrive at the extrinsic utility value by determining a task’s applicability to future goals. If students believe that performing a certain task may be beneficial to their future career choices, for example, they may perceive it as having a higher extrinsic utility value. Lastly, the perceived cost refers to the amount of time or effort required to engage in an activity. For example, an instrument that may take a lot of time and practice to master may be perceived as having a high cost, in which a student may or may not be willing to invest.
Green and Hale (2011) have examined Achievement Goal Theory as a framework to motivate students. This theory addresses the reasons students make an effort to succeed in academic activities. It states that of the two orientations held by students (a grade orientation or a learning orientation), those who develop a learning orientation are likely to be more interested in learning skills than receiving a rating. These students will usually be more likely to develop an intrinsic motivation.

Schmidt (2005) wrote about Attribution Theory and its application to music teaching and learning. This theory focuses on the perceived causes of success and failure by students. Schmidt surveyed 300 students in grades 7-12 that were enrolled in band programs in four school districts in New York and Massachusetts to gather information about their background, participation in festivals, and ratings achieved at solo festivals. The survey also included questions to measure commitment to band, self-concept in instrumental music, and various motivation variables. In addition to the survey, teachers rated the students’ individual performance achievement and overall effort. Schmidt (2005) concluded that “of the motivation variables, intrinsic orientation, self-concept, and commitment to band were significantly correlated across teacher’s ratings of performance and effort, students’ self-reported practice time, and solo festival participation, with intrinsic orientation most strongly associated with practice times and ratings of effort” (p.144). Related to this, Stipek (1998) found that the most common attributions are ability and effort, whereas the less common attributions include luck, task difficulty, and strategy.

Researchers have continued to make attempts at both measuring student motivation and determining factors that may affect it. MacIntyre, Potter, and Burns (2012) attempted to apply R.C. Gardner’s socio-educational model of second language learning motivation to learning motivation in instrumental music. This socio-educational model fits into a large framework with
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four major divisions: (a) the social milieu, (b) individual differences, (c) acquisition (learning) contexts, and (d) outcomes. After having 107 high school band students complete a questionnaire that contained items from the Attitude Motivation Test Battery scales, they concluded that “motivation predicted both students’ perceived competence and reported number of minutes of practice” (MacIntyre, Potter, & Burns, 2012, p.138). Students who were more motivated tended to practice more, which produced feelings of accomplishment. The practice underlying the self-reported achievement level reflects the outcome section of Gardner’s framework (MacIntyre, Potter, & Burns, 2012.)

Self-efficacy refers to how students may perceive themselves in terms of their ability to succeed at a specific task. For example, a student who believes that they have much musical talent and potential may be more likely to prepare and perform a solo at an upcoming concert than a student with a lower perception of self-efficacy. Lautzenheiser (1990) talks about self-motivation as being the only true form of motivation. Students must want to succeed internally and teachers are responsible for helping them achieve this. Teachers may be able to do this by focusing on what the student is able to do rather than what they are not. If a student believes that they are good at creating music, they will most likely be more motivated to continue to create. However if a student believes that they have no musical ability whatsoever, then there is a slim chance that they will continue to desire to participate in musical activities. Technology may be useful in improving one’s self-efficacy and in turn, motivation, by providing all students with a wide variety of opportunities to create and explore using their own personal strengths. This may be done in the form of differentiated instruction.

Helping students establish a sense of purpose and self-discipline may also aid in increasing their motivation. Dweck (2002) discussed entity and incremental beliefs. Entity
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beliefs occur when students see ability as a fixed trait, such as a natural-born musical ability. However, incremental beliefs occur when students see ability as something ever-changing that can be increased with effort. Students who have incremental beliefs will be more likely to work hard to achieve a certain goal than those who see musical ability as an entity. It is important that educators teach a growth mindset that will create motivation and productivity (Dweck, 2002.)

Csikszentmihalyi’s (1990) flow theory recommends balancing the challenge of the task and the musician’s skill to achieve an optimal performance. Students who are presented with a task that is too simple may not put forth their best effort thus resulting in less than desirable results. Similarly, students who are presented with a task that is too difficult for their ability level may become anxious and anticipate failure, thus resulting in less than optimal results. As a result, the difficulty level of materials will change as skills continue to develop.

Achievement. In addition to the studies regarding theories as to what may affect motivation; researchers have also studied how motivation may affect academic achievement and career goals. Students’ self-efficacy value may affect the goals that they wish to pursue. Schmidt, Zdzinski, and Ballard (2006) completed a study that examined the following motivation orientations: (a) mastery, (b) intrinsic, (c) cooperative, (d) individual, (e) competition, (f) ego, (g) approach success, (h) avoid failure, (i) hyper competition, and (j) personal development competition. To measure motivation constructs as well as to gather information regarding academic achievement and career goals, surveys were administered to 148 undergraduate music education majors from three different universities. Upon analyzing the results of this study, five major motivational factors were identified: (a) competitive/ego, (b) achieve success/avoid failure, (c) cooperative vs. individual, (d) intrinsic/mastery, and (e) personal development competition. More importantly, researchers found that “motivation and self-concept variables
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were not correlated with academic achievement variables and generally did not differ by sex or class level” (Schmidt, Zdinski, & Ballard, p.138).

Technology and Music Education

The importance of technology in the classroom setting is evident by the national standards that include it\(^1\). Students are expected to become technologically literate in order to ensure that they have the skills necessary for successful lives. Technology is a major part of how much music today is created, transcribed, performed, and listened to (Bauer, 2014). Additionally, a meta-analysis of 40 years of research found that technology in the classroom can improve academic achievement (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011).

Technology as a teaching medium is becoming more prominent in the classrooms each and every day (Bauer, 2014). Though many teachers utilize technology for administrative purposes such as attendance programs, computer based lesson plans, and as a vehicle for information delivery to students and parents, teachers may also choose to use items such as interactive tablet, interactive whiteboard, tablets or e-readers, or web based interactive games to help better achieve desired learning outcomes (Dunn, 2014).

Teachers have provided a number of reasons for not using technology as much as they may like to in the classroom, citing factors such as inadequate funding and resources, as well as lack of information on how to effectively integrate the technology. Mishra and Koehler (2009) developed a framework, based on Lee Shulman’s construct of pedagogical content knowledge, to describe the necessary teacher knowledge for technology integration – TPACK (Technological Pedagogical and Content Knowledge). Content knowledge refers to the teachers’ knowledge about the subject matter that they are teaching. This may also include the knowledge of concepts,

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theories, ideas, organizational frameworks, and knowledge of evidence and proof (Schulman, 1986). Teachers’ must also have a pedagogical knowledge. This refers to how the material will be taught. Pedagogical knowledge may also overlap with content knowledge in this TPACK model to represent the way that one may teach certain content, or the pedagogical content knowledge. Lastly, technology knowledge was added to Shulman’s PCK model to describe the importance of having the teacher being technologically literate.

Researchers have studied different ways that technology can be used as an effective tool for teaching. Kassner (2003) examined the Technology/Research Integrated Music Mastery (TRIMM) system of organizing instruction. This combines learning strategies from three areas of research: technology for music instruction, mastery learning, and cooperative learning (Kassner, 2003). In addition to being a great means of differentiating instruction, technology may also allow the teacher to help students acquire knowledge while always being aware of the student’s progress. “Technology delivers individual instruction, mastery learning organizes and keeps track of instruction, and cooperative learning sets the work within a social context” (Kassner, 2003, p.28).

Music Ace Maestro is an example of a program that provides students with constant engaging instruction. Contrary to when teachers try to repeatedly teach the same material, but may become less enthusiastic when they grow tired or if they are ill, “Maestro Max always responds with a positive message no matter how many times students need to go through the guided practice and understanding-check sessions” (Kassner, 2006, p. 26). Software such as this allow students to experience repetition through games that they enjoy, rather than simply playing scales over and over again. “Most students do not think of Music Ace Maestro as instructional software- it is so much fun and entertaining, it has the feel of one of their home video games, but
with a sense of humor” (Kassner, 2006, p. 27). Students are also given the one on one instruction they need to learn and reinforce new concepts.

Rajan (2014) discussed the many different ways that today’s students and children listen to music. In discussing the constantly evolving digital world in which our students live, Rajan (2014) also provided ideas for “encouraging music listening, music making, and music watching, in ways that are appropriate for young children” (p. 8). In terms of music listening, teachers may use iPods to create playlists and podcasts to enable easy and fast listening activities for their students. Students may also use certain instrumental apps for creating music. These apps are much more cost efficient and accessible than many actual instruments. In fact, “if one types the keywords “playing instruments” during a search [of the iTunes app store], nearly 400 applications appear for playing a variety of musical instruments” (Rajan, 2014, p.9). Other applications such as SoundPirim 2 and GrooveMaker 3 may be used for compositional purposes by manipulating visuals and/or sound loops. The ability to watch musical performances has also evolved with the integration of technology in our societies. When people once had to attend live concerts to see a performance, they may now access performances via YouTube (Bauer, 2014).

Burns (2006) wrote that “music technology helped me enhance the curriculum so I could differentiate instruction and challenge the musically gifted students while encouraging those students who felt musically challenged to engage and succeed musically” (p. 129). She provided many examples of ways that technology may be used in the elementary music classroom. In one example, students worked together to identify line and space notes on a Smart Board that were connected to the teacher’s computer. Students were introduced to Harmonic Vision’s Music Ace

2 http://www.soundprism.com/
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Maestro\(^4\), through which they learned and answered questions about the staff, with student achievement tracked through a fun and straightforward assessment tool. In another example, first graders completed a WebQuest by finding instruments of the orchestra after learning about Prokofiev’s *Peter and the Wolf*. By completing activities like this, students began to enjoy learning. Burns (2006) stated “I have been told by many parents of first graders that their children love this website and will take the handout that I gave them in class and show the parents how to find and play all of the orchestral instruments.”

Krueger (2015) also found many ways to get students excited about learning through the use of iPads in the music classroom. GarageBand\(^5\) is a great program that can allow students the opportunity to play a variety of virtual instruments in the classroom. In one example, Krueger suggested a lesson for second grade students which utilized *Sharon Burch’s Freddie the Frog*\(^6\) to teach students about 12-bar blues and Roman numerals in connection with the music alphabet. Students then used the GarageBand guitar to play chords to the steady beat of the blues recording. After this experience, the students used a SmartBoard to write and sing their own blues songs! Not only did the kids enjoy the freedom of activity, but the parents enjoyed seeing what they have come up with (Krueger, 2015).

The Korean approach to music education has always been very teacher focused and so it was hoped technology might be used to provide students with an interactive approach in which both the teacher and students could lead the classes. “The revised curriculum of Korea recommends music classes that are learner-centered and self-directed so as to foster students’ collaborative and active engagement” (Kim, 2013, p.3). Kim utilized a three-part class model

\(^4\) https://www.harmonicvision.com/mamfact.htm
\(^5\) http://www.apple.com/mac/garageband/
\(^6\) http://www.freddiethefrogbooks.com/author.html
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that consisted of a teacher introduction of the objective and topic, followed by an introduction to a music technology activity as was as displaying a specific image to the students. Then, students completed a project in which they used technology to create music for the image that they had just seen. Kim utilized mind maps to uncover how students’ degree of music perception was linked with the music knowledge they required over the course of the study. After comparison and analysis, researchers found that the post-class mind map showed the addition of more new words, as well as a greater number of branches. Many of the students “connected the first branch from the central circle to the technologies they had learned and used, including “ALSong7,” “Tunaround8,” background music, blogs, and so on” (Kim, 2013). Additionally, researchers found positive changes in the students’ perception of music following the technology lessons.

Another way to incorporate technology in the classroom may be through the use of a technology music corner (Kersten, 2006). “Keyboards, cassette recorders, drum pads, computer, videos, CDs, and DVDs can be included” (Kersten, 2006). The iPads and/or computer may allow students access to applications such as those that have been suggested by Krueger (2015) and Kim (2013.) Kersten also suggested software such as SingingCoachKidz9, Pianomouse Goes to Preschool10, and My First CD-ROM Toddler11 for young students. A technology corner such as this may also allow opportunities for differentiated instruction. If a student is struggling or excelling at a particular concept, this corner will allow them somewhere to go to work on this.

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8 http://download.cnet.com/ios/tunaround/3260-20_4-10107910-1.html
9 http://www.rmlearning.com/43235.htm
10 http://www.toydirectory.com/product.asp?id=4086
11 http://www.superkids.com/aweb/pages/reviews/multisub/toddler/1/dktod/merge.shtml
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In addition to the use of personal technology devices, the “interactive whiteboards, such as the SMART Board\textsuperscript{12} have augmented the teaching techniques and tools available for primary, secondary; and even collegiate classrooms” (Nolan, 2009). These interactive boards might be conceived of as larger versions of the tablets, and allow students to collaborate. Nolan describes a lesson in which students took turns coming up to the board to highlight rhyming words. The students’ grew very eager about this activity and all raised their hand for a chance to come to the board (Nolan, 2009). After seeing how excited students became at the idea of using this interactive board, Nolan began using this to enhance her teaching and ultimately the students’ learning. The integration of technology was helpful in enhancing both instruction and assessment (Nolan, 2009). The SmartBoard may even be used to introduce students to new software that they may later work with individually. This learning approach may especially reach out to those kinesthetic learners.

Literacy. Technology may also be used to help students develop their language literacy while learning music. Nardo (2009) discussed a new technology called TUNEin to READING\textsuperscript{13}. This program allows students to determine a repertoire of songs within their appropriate ranges and reading levels by having them sing into a headset microphone. Students sing songs and are able to progress from lower to higher readability levels. Additionally, they are given feedback and opportunities to repeated and improve their performance (Nardo, 2009). Repeated reading will allow the students improve their ability to read and sing music.

Nardo’s article discussed a USF study that examined the program Carry-a-Tune\textsuperscript{14}, which was said to have an effect on public school reading scores. Researchers found that students who

\textsuperscript{12} http://education.smarttech.com/
\textsuperscript{13} http://www.tuneintoreading.com/
\textsuperscript{14} http://www.carryatunemusic.com/
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used this program achieve a gain of 1.37 grade levels in instruction reading. The use of the product had a positive effect on the reading levels of middle school students. (Nardo, 2009). The researchers also found a high level of motivation in students who worked with this program. This may be partially due to the fact that the program contains a wide range of repertoire for all grade levels.

Music is an essential part of the school curriculum. Not only does it allow students to create and express themselves, but it also improves essential skills such as spatial reasoning and literacy. Educators must be able to provide students with the best education possible and understanding how they learn is a very important step. Teachers must be able to motivate students to learn in ways that will interest them. Asmus (1990) explored the relationship between musical motivation and aptitude while several other researchers have explored a variety of motivating factors linked to achievement. Though some research has been done on motivation and music, little research may be found on the effect of the use of technology in the elementary music classroom. The purpose of this study was to examine the effect of the use of technology on student motivation and achievement in the elementary music classroom.

Methodology

Participants

This action research study utilized 29 second grade students in a Florida elementary school. The students, 18 males and 11 females, comprised two intact music classes. The students at this private school are mostly from a high socio-economic background, with approximately twenty percent of them participating in music lessons outside of class.
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Measurement Instruments

Two motivation instruments were utilized in this study. Students completed the Magnitude of Motivation test (Asmus, 1988; see Appendix A). This test contained 27 statements about music. Students determined the extent to which they agreed or disagreed with each statement. Additionally, they completed a researcher-designed achievement test (see Appendix B.) This test contained a series of treble clef notes that students were asked to identify or place on the staff.

Procedure

The instructional objective for both classes was to be able to identify the notes of the treble clef staff. One class was designated as the experimental group. Technology (iPads) was used in teaching this class. The students used NoteWorks\textsuperscript{15} and Name that Note\textsuperscript{16} as the primary means of learning. The second class was the control group. They learned through a traditional teaching process (see Appendix C). Both groups completed the Magnitude of Motivation test and a researcher-designed achievement test prior to the lessons. The results of the pre-tests were compared using an Independent Samples Mann-Whitney U Test to ensure that the two groups were equivalent prior to beginning instruction. No significant difference was found between the two classes on the motivation ($p = .87$) or achievement ($p = .73$) pre-tests. The classes were determined to be equivalent in regards to the variables being studied.

Students were taught note reading skills over a period of three weeks using either a technology-based (Experimental) or traditional (Control) approach (see Appendix A for a detailed description of the instructional procedures used for both groups). Following the instructional period, the students took the motivation and achievement post-tests. In addition, the

\textsuperscript{15} https://itunes.apple.com/us/app/noteworks-free/id577433139?mt=8
\textsuperscript{16} https://itunes.apple.com/us/app/name-that-note/id556292142?mt=8
teacher/researcher kept a journal that documented her observations of and reflections on each class session, especially in regards to factors that may have been related to motivation and achievement.

Results

Between Groups Analyses

To determine if there was a significant difference in the post-test motivation and achievement scores between the two classes, an Independent Samples Mann-Whitney U Test was calculated between the classes’ post-test motivation and achievement scores. No significant difference was found between the two classes for the motivation (p = .11) or achievement (p = .48) tests (see Table 1.)

Table 1

<table>
<thead>
<tr>
<th>Pre- and Post-test Results for All Participants (N=29)</th>
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<tbody>
<tr>
<td>Asmus Pre-test</td>
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<tr>
<td>Mean (M)</td>
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<tr>
<td>Median (Mdn)</td>
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<tr>
<td>Standard Deviation (SD)</td>
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Within Groups Analyses

Class One (Experimental- iPad). To determine if there was a significant change between Class One’s (Experimental – iPad) pre- and post-test achievement scores, a Related Samples Wilcoxon Signed Rank Test was calculated. A significant (p = .002) difference was found between the pre- and post-test scores. To examine if there was a significant change between Class One’s (Experimental – iPad) pre- and post-test motivation scores, a Related
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Samples Wilcoxon Signed Rank Test was calculated. A significant \( (p = .007) \) difference was found between the pre- and post-test scores (see Table 2).

### Table 2

<table>
<thead>
<tr>
<th>Class 1 (Experimental)</th>
<th>Pre- and Post-test motivation and achievement scores ( (n=15) )</th>
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<tbody>
<tr>
<td></td>
<td>Asmus Pre-test</td>
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<tr>
<td>Mean ((M))</td>
<td>60.79</td>
</tr>
<tr>
<td>Median ((Mdn))</td>
<td>62.50</td>
</tr>
<tr>
<td>Standard Deviation ((SD))</td>
<td>17.12</td>
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</table>

Class Two (Control – Traditional). To determine if there was a significant change between Class Two’s (Control – Traditional) pre- and post-test achievement scores, a Related Samples Wilcoxon Signed Rank Test was calculated. A significant \( (p = .005) \) difference was found between the pre- and post-test scores. To examine if there was a significant change between Class Two’s (Control – Traditional) pre- and post-test motivation scores, a Related Samples Wilcoxon Signed Rank Test was calculated. No significant \( (p = .476) \) difference was found between the pre- and post-test scores (see Table 3).

### Table 3

<table>
<thead>
<tr>
<th>Class 2 (Control)</th>
<th>Pre- and Post-test motivation and achievement scores ( (n=14) )</th>
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<tr>
<td></td>
<td>Asmus Pre-test</td>
</tr>
<tr>
<td>Mean ((M))</td>
<td>62.14</td>
</tr>
<tr>
<td>Median ((Mdn))</td>
<td>61.00</td>
</tr>
<tr>
<td>Standard Deviation ((SD))</td>
<td>13.86</td>
</tr>
</tbody>
</table>

**Discussion**

It appears that the use of iPads did not improve student achievement to a great degree than did traditional learning approaches. Many of the students did not have any prior note-
EFFECT OF TECHNOLOGY ON STUDENT MOTIVATION AND ACHIEVEMENT
reading knowledge, and so before the lessons, both groups received very low, yet statistically equivalent, scores on the achievement tests. However, both classes achieved significantly higher results on the achievement post-tests, and they achieved at a comparable level as no significance difference was found between the post-test achievement scores. It appears that that good teaching may be the single most important factor in student learning, regardless of the teaching approach used. With this being said, it is important that teachers have strong pedagogical knowledge when teaching their students.

Class One’s motivation scores significantly increased over the course of the unit. The students became more motivated toward music while working with the iPads to learn. Students were noticeably more excited when they entered the music room and cheered at the site of the iPad cart. Class Two’s motivation scores decreased, although the decrease was not statistically significant. Their motivation remained unchanged, statistically, yet it was trending downward. This may be due to the lecture approach that was used to teach the student. Students often asked if they were going to play instruments or a game soon. Motivation may have increased had the teacher chosen to incorporate either one of these activities into the unit. It is also possible that if the unit had lasted slightly longer, there may have been a statistically significant decrease in motivation. It should be pointed out though, that no significant difference was found between the two classes’ post-test motivation scores.

Throughout the course, the researcher observed the students, keeping a journal of their behaviors. During the pre-test, both groups complained that the Magnitude of Motivation test was too long. Students needed clarification on many of the questions and it seemed as if many of them were reading too much into the question. One example was an item from the test that said “I would rather be playing music than watching TV.” Several students exclaimed that they
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agree because they just watch/listen to music on TV. Students in both classes seemed
discouraged while taking the pre-achievement test. Many students left the entire test blank,
question marks for every answer, or even notes such as “L, M, N, O, and P.” The suitability of
these measures for second grade students may need to be reexamined.

As the study began, Class One became very excited at the idea of iPads. Once students
catched on to the idea of the game, they became very competitive. Students were so engaged that
they did not even want to leave the room to use the restroom. Many students wrote down the
name of the Noteworks app and said that they wanted to play it at home! Class Two seemed a bit
more discouraged and less engaged as the researcher demonstrated the notereading acronyms to
them. Students grasped the idea of note-reading quickly but did not like the idea of sitting still
for so long. Many were very fidgety, attempting to move around the room as the teacher
explained this new concept.

Both groups appeared eager to take the post-achievement test and show what they had
learned. They said that it was much easier this time and were happy that there was no time limit.
However, students were still discouraged about completing the three page Magnitude of
Motivation test.

Research has found that technology is becoming more and more prominent in the
classroom each and every day. Students of today are “digital natives,” yet sometimes teachers do
not provide instruction in a manner that aligns with the students’ technological abilities. This
aligns with the results of this study in that students do indeed become more motivated when
presented with a learning method that is comfortable and exciting to them, which in this case was
technology. Kassner (2006) discussed how students may even think of some technology as a
video game rather than an actual learning tool. This happened many times throughout the course
of the study in which the children in the experimental class were competing for the highest score without even realizing that they were learning at the same time. Burns (2006) found that music technology was a great tool for differentiating instruction. This was also the case in the present study as children in the experimental group were able to change the level on their iPads to allow them to move faster or slower. This technological affordance was very beneficial to both students who were struggling and those that were excelling.

Implications of this study for future research might include a replication study with different participants. Because this study included a rather small pool of participants, results could vary with a different group of students. Researchers may choose to use different types of technology, as well as different content. Additionally, a future research study may entail different age levels and length of study.

The use of technology may help with student motivation and achievement. However, good teaching is imperative to student learning. Students may successfully learn the same content with or without the use of technology. Nevertheless, teachers may use a variety of technology such as iPads, interactive whiteboards, software, websites, and computers to more fully engage students, helping them become excited about learning.
References


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Magnitude of Motivation Test

Circle your response to each item.

1. I am a good musician.
   Strongly Disagree   Disagree   Agree   Strongly Agree
   A         B        C       D

2. Music is a very important part of my life.
   Strongly Disagree   Disagree   Agree   Strongly Agree
   A         B        C       D

3. Music I work hard to do well in my music classes.
   Strongly Disagree   Disagree   Agree   Strongly Agree
   A         B        C       D

4. I like myself best when I am making music.
   Strongly Disagree   Disagree   Agree   Strongly Agree
   A         B        C       D

5. Listening to music is more important to me than watching television.
   Strongly Disagree   Disagree   Agree   Strongly Agree
   A         B        C       D

6. Music I enjoy music class more than other classes I take.
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7. I want to be involved in musical activities more than in other activities.

Strongly Disagree Disagree Agree Strongly Agree

8. I would rather play an instrument or sing a song than read a book.

Strongly Disagree Disagree Agree Strongly Agree

9. Music class is my favorite class of the day.

Strongly Disagree Disagree Agree Strongly Agree

10. Attending a musical activity is more important to me than attending a
    sports activity.

Strongly Disagree Disagree Agree Strongly Agree

11. If I could, I would spend more time listening to music.

Strongly Disagree Disagree Agree Strongly Agree

12. Music I find music classes to be more exciting than some other classes I take.

Strongly Disagree Disagree Agree Strongly Agree
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13. I am willing to put more time into my music than any other of my interests.
   Strongly Disagree Disagree Agree Strongly Agree
   A        B       C       D

14. If I can, I will be involved with music all my life.
   Strongly Disagree Disagree Agree Strongly Agree
   A        B       C       D

15. Music class is never a waste of time.
   Strongly Disagree Disagree Agree Strongly Agree
   A        B       C       D

16. I can do without other things, but I have to have music.
   Strongly Disagree Disagree Agree Strongly Agree
   A        B       C       D

17. I think about music frequently.
   Strongly Disagree Disagree Agree Strongly Agree
   A        B       C       D

18. I find music classes to be very stimulating.
   Strongly Disagree Disagree Agree Strongly Agree
   A        B       C       D
19. I am willing to work harder on my music than on anything else.

Strongly Disagree  Disagree  Agree  Strongly Agree
A  B  C  D

20. Music is one of my favorite activities.

Strongly Disagree  Disagree  Agree  Strongly Agree
A  B  C  D

21. If I had my way, I would spend more time in music class.

Strongly Disagree  Disagree  Agree  Strongly Agree
A  B  C  D

22. I would like to pursue a career in music.

Strongly Disagree  Disagree  Agree  Strongly Agree
A  B  C  D

23. I am an excellent music student.

Strongly Disagree  Disagree  Agree  Strongly Agree
A  B  C  D
Appendix B
Name: _____________________________
Class: ____________
Date: ____________

Achievement Test
Please identify the following treble clef notes to the best of your ability. Write the answer on the blank line underneath the question.

1. 
2. 
3. 
4. 

5. 
6. 
7. 
8. 

5. 
6. 
7. 
8. 

Please write the following notes on the staff below:

9. High Treble E (space note)
10. G-sharp (line note)
Desired Learning Outcomes:
- Students will be able to correctly identify the notes C, D, E, F, and G on the treble clef staff.

Activities to Meet Objectives:
1. As the students enter the classroom, they will have a seat on the floor with their assigned iPad.
2. Students will put use the iPad as a writing surface as they take the pre-test.
3. The teacher will then complete a demonstration on the front board. She will briefly explain the concept of note-reading using a treble clef staff on the Promethean board. She will explain the five notes that will be the focus of the class.
4. The teacher will then walk the students through the Noteworks app. Here is a link with more information on this app: https://itunes.apple.com/us/app/noteworks-free-note-reading/id731430479?mt=8
5. The students will complete a practice session by choosing the “for beginners with help” option with no time limit.
6. As students become comfortable with this, they may advance to the “no help” option and even increase the speed.

Desired Learning Outcomes:
- Students will be able to quickly and correctly identify one octave of notes (C5-C6) on the treble clef staff.

Activities to Meet Objectives:
1. Students will have a seat on the floor with their assigned iPads.
2. The teacher will complete a brief review of the previously learned notes (C-G) on the Promethean board. Students will be selected randomly to identify notes that the teacher writes.
3. Students will login to Noteworks using the username that they had created during the previous class.
4. Students will begin on the “slow” level without hints.
5. Once students are able to complete a slow level with a perfect score, they will advance to a moderate level.
6. Once students correctly identify all notes at a moderate level, they are to move on to the fast level.
7. Students will continue to identify notes on the fast level until the end of class. They will aim to see how many times they can receive a perfect score.
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Desired Learning Outcomes:
- Students will be able to correctly identify notes on the treble clef staff including flats and sharps

Activities to Meet Objectives:
1. The teacher will begin class with a brief review of the treble clef notes learned in the previous lessons.
2. The teacher will then review the concept of sharps and flats with the students.
3. The students will be introduced to the “Name that Note” app.
4. Students will begin this game by playing at the beginner level.
5. As students complete levels correctly, they will progress to harder levels.
6. By the end of class, students should all be playing at the intermediate level.
7. Students will complete the post-test during the last ten minutes of this class.

January 22\textsuperscript{nd}, 2016
Class B (Control) - Lesson 1

Desired Learning Outcomes:
- The students will be able to correctly identify treble clef notes C, D, E, F, and G with the assistance of the acronyms.

Activities to Meet Objectives:
1. The teacher will begin class with a review of the five note staff and treble clef symbols.
2. The teacher will then distribute the five line staff cards to the students along with a handful of colored bingo chips.
3. The teacher will then briefly review “line” and “space notes” by having students place their bingo chips on these notes.
4. The teacher will introduce the “every good boy deserves fudge” acronym for line notes and have students identify the notes E, G, B, D, and F on the their staves.
5. The teacher will then introduce the “face” acronym for space notes and have students identify the notes F, A, C, and E on their staves.
6. Leaving these acronyms displayed on the front promethean board with the staff example, students will identify a variety of line and space notes using their card and chips.

January 29\textsuperscript{th}, 2016
Class B (Control) - Lesson 2

Desired Learning Outcomes:
- Students will be able to quickly and correctly identify one octave of notes (C5-C6) on the treble clef staff.

Activities to Meet Objectives:
1. The teacher will begin by reviewing the note names using the acronyms.
2. The teacher will draw several notes on the board and ask the students to identify these while constantly reminding them of the acronyms (not writing them on the board.)
3. The teacher will then pass out the cards and chips to the students again.
4. Without any assistance on the board, the teacher will ask the students to place their chips on a variety of treble clef notes.
Desired Learning Outcomes:
- Students will be able to correctly identify notes on the treble clef staff including flats and sharps

Activities to Meet Objectives:
1. The teacher will review treble clef notes using the acronyms. The teacher will also review the sharp and flat symbols and definitions.
2. The teacher will then distribute “It’s Raining” to the students.
3. The students will first sing through this song using the words.
4. Next, the students will work independently to write in the correct notes of this song.