RESEARCH IN MUSIC TECHNOLOGY

20 SELECTED STUDIES

FLOYD RICHMOND
(THESIS ADVISOR)
FLOYD.RICHMOND@HOUGHTON.EDU
HTTP://FLOYDRICHMOND.COM/ATMI2017

ATMI 2017

LONG DISTANCE RECORDING USING VIRTUAL DRUMS

Greg Maragos
September 30, 2011

Abstract

The purpose of this mixed methods study was to research long distance recording via the Internet using the virtual drum software, BFD2. It was a two-part study that researched qualitatively the limits and possibilities of recording an album, collaborating long distance and then testing quantitatively if the results are the same as using non-virtual drums. A survey instrument was constructed from the long distance recording to test the null hypothesis that there would be no difference between live acoustic drums and BFD2 triggered drums. A random sample that included musicians (N=86) and non-musicians (N=42) was surveyed. The null hypothesis was accepted from the data results of the survey.

1

The Effect of Learning Sequence Activities on the Skills of High School Students and the Influence of Technology-Assisted Learning
Dan Friel, May 01,2011

Abstract

The purpose of this study was to examine the effects of Edwin E. Gordon's pattern instruction on the audiation abilities of high school students. Students were grouped into three categories.

1. Those who would receive pattern instruction from a software program.
2. Those who would receive pattern instruction from the teacher in a classroom setting.
3. No Pattern Instruction.

The group receiving no pattern instruction would receive instruction using an ear training software program not based in Gordon's learning theory. The Advanced Measures of Music Audiation, a music aptitude test, was administered for student grouping. A post-test, written by the author of the study, was given to determine the effect of each treatment. Participants included 15 high school students in grades nine through twelve. An analysis of variance indicated that there is no statistically significant difference between the three groups. Recommendations for pattern instruction at the high school are discussed.

THE MIE MIDI KEYBOARD VS THE FLUTOPHONE: A COMPARISON OF TEACHING BASIC MUSIC CONCEPTS TO THIRD GRADE STUDENTS TO SEE HOW IT IMPACTS THEIR PREPARATION FOR AND OPINION OF BEGINNING BAND

Brittany R. Baker, September 30, 2011

Abstract

The purpose of this study was to determine if there would be a difference in third graders' musical knowledge after six weeks of instruction on two different instruments. Two classes of third graders were instructed on the flutophone to learn basic notes, rhythms and other musical symbols. The other two classes were taught on Music In Education (MIE) keyboards. A secondary purpose was to determine if the instructional delivery impacted students' opinion toward participation in band, and if so which instrument they were interested in learning. Each student was given a pre-test at the beginning and the same test as a post-test at the end of the six-weeks instructional period. Results showed that the flutophone and keyboard instruction produced similar musical knowledge and interest in joining the band. Student preferences for specific instruments were not impacted by the instructional delivery. Students in all groups expressed a greater preference for flute and percussion. Both MIE keyboard students and flutophone students were more interested in joining band than choir. Also, students that received piano instruction outside of school scored higher in the general musical knowledge section than their classmates. This leads to the conclusion that teachers can obtain similar results using the flutophone or the MIE keyboard, depending on which is available in their classroom.

BACH, BARTOK AND COMPOSITION
Eveline Taylor
May 01, 2011

Abstract

Johann Sebastian Bach and Bela Bartok were two composers whose work reflected their ability to take the old music from the past, and make something new from it. Bach polished counterpoint and polyphony into a musical style identified with himself and the Baroque era, and which is still studied and performed today.   Bartok combined some of the forms and techniques of Bach with the altered tonality of the symmetric scales and the modes of the folk songs he collected to shape a neo-Baroque style.   This thesis looks at the elements which Bartok adopted from Bach, some adaptations he made and compositional techniques he used in employing the Baroque forms.

The recital component for the Master of Music in Music Technology was presented on April 19, 2011. It included 3 choral arrangements and a guitar duet, plus 4 original pieces written for the recital. The original works included 2 piano solos, 1 violin duet and a work for flute, horn and cello, and employed forms adapted from Bach and Bartok.

4

Integrating DVD Technology to Create Instructional Videos to Support Beginning String Instruction
Dalinda Bohr, December 2012

Abstract

This project examines the process of creating and implementing supplemental video instructions for beginning string students with the purpose of creating an "at home" learning support system to aid in developing proper string technique. Examples of proper packing and unpacking techniques, rest and playing positions and practice routines for rudimentary songs as well as use of video technology to introduce musical vocabulary and instrumental parts were developed in a sequence of videos for beginning violin, viola, cello and string bass students. In addition students and parents were surveyed to gain insight regarding attitudes towards learning with the use of video technology.

Integrating DVD Technology to Create Instructional Videos to Support Beginning String Instruction
Dalinda Bohr, December 2012

Results

* 81% of the students responded that they were excited to use the DVDs at home to practice

* 74% of students responded that a DVD would help them practice more at home.

* 83% of parents agreed or strongly agreed that a DVD would help them understand what their child is learning in string lessons

* 85% of parents responded that they will encourage their child to use the DVD during at-home practice.

* Additional comments written by parents indicated that the song videos were most helpful and that their child liked to watch the DVD and then practice on their own.

A COMPARISON OF FIDELITY, COST AND FUNCTIONALITY OF AN iPAD DIGITAL AUDIO WORKSTATION WITH A DESKTOP DIGITAL AUDIO WORKSTATION

George Diehl, August 2013

Abstract

This project examines the functionality, fidelity and cost effectiveness of the Apple iPad as a Digital Audio Workstation (DAW) in comparison to that of a traditional desktop computer based DAW configuration. A collection of three original songs, varying in genre, were recorded and produced on each DAW configuration. A website was then constructed to present two versions of each song to listeners along with a survey asking which DAW configuration the listener believed was used for each version to gain insight to whether the listeners could tell the difference between each version and what factors may have influenced their selection. The hypothesis stated that there would be no difference in fidelity of an Apple iPad DAW as compared with a traditional desktop DAW. The cost effectiveness and functionality of both were examined.

The survey results indicated that the majority of participants were unable to correctly identify which Digital Audio Workstation was used for each audio recording. Consequently, the stated hypothesis of the study was met.

6

Composition Recital and Paper:
Rebecca Rhodes
May 2013

Program

Noel, Out of Your Sleep

Quintet No. 1

Whistling Bishop

Drinking the Wind

Use of Instructional Technology in Music Performance Classes

Anne Kramer
December 2013

Abstract

Music educators are caught between the traditional world of musical instrument performance and the ever-evolving world of technology and its impact on students. In traditional music education, school performance groups are continually on public display and must always be ready for the next performance. . . . Most ensemble directors agree that time with the instrument, ensemble, and repertoire cannot be replaced or substituted.

In the educational technology realm, advocates claim that technology can help maintain student interest, differentiate instruction, and ultimately bring about greater test scores and other successes. Therefore, with the high value of performance time required in music classes, is it worthwhile, or even possible, to incorporate the technology that attracts students and may possibly impact their level of learning? Are performance-based educators prepared for and successfully implementing technology?

[This study surveys teachers to find these answers.]

Results

86 music teachers from a large district in Maryland were surveyed regarding their thoughts about music technology.

Teacher views technology as worthwhile	How often technology is used by the teacher	How often performance students interact with technology (Average of Q 16.3 & 16.4)
Absolutely 59.5%	Every class 21%	Every class 1.9%
Somewhat 33.3%	Most of the time 23.1%	Most of the time 15.6%
No opinion 3.6	Occasionally 20.6%	Occasionally 21.25%
Rarely 3.6	Rarely 7.5%	Rarely 12.5%

The Effects of CAI Software (SmartMusic) on Attitudes, Perceptions, and Behaviors of Beginner Recorder Students and their Parents Regarding Learning and Practicing

Heather Ellenwood, May, 2014

Abstract

Music educators know that practice of music away from an instructor is essential to musical success for an individual player and ensemble. Yet often the mandate, "Practice!" is met with resistance, frustration, and non-compliance. Music educators are presented with a new set of obstacles as the 21st century learner approaches the educational process differently than students of the past. In order to engage modern pupils, music educators can utilize computer-aided musical instruction, including programs such as SmartMusic. It is hypothesized that by actively engaging students through the use of technology, the task of practicing can be improved. This study examines the computer-aided musical software program SmartMusic and expands its use to 3rd-5th grade recorder students. Through the use of surveys and observation it attempts to uncover the attitudes, perceptions, and behaviors that parents and students have towards practicing, especially towards practicing with the aid of technology. . .

The Effects of CAI Software (SmartMusic) on Attitudes, Perceptions, and Behaviors of Beginner Recorder Students and their Parents Regarding Learning and Practicing
Heather Ellenwood, May, 2014

Results

* 67% of the parental volunteers (8 out of 12) completed the experiment with their son/daughter.

* 100% of current recorder students (91) also completed the survey.

* 73% of all 3rd-5th grade general music students felt that other academic assignments were more important than practicing the recorder.

* Students who participated in the experiment overwhelmingly enjoyed utilizing technology in the music classroom and extending music learning outside of the academic school day.

    * Younger students, primarily those in 3rd and 4th grade, indicated the greatest enjoyment from SmartMusic.

    * Older students, such as those in 5th grade, advanced their musical skills at a more rapid rate

Attitudes Toward and Effectiveness of Online Music Instruction

Daniel J. Morrow

May 2014

Abstract Paraphrase

There is much debate over the quality of online education. Each year the number of students enrolled in online schools, whether at the K-12 or college level, has grown. This study will examine synchronously delivered online private music instruction and student and teacher attitudes before and after participating in a series of online lessons.

Attitudes Toward and Effectiveness of Online Music Instruction
Daniel J. Morrow
May 2014

Results

Table 1: Minus Category - Before

Minus Category	Teachers	Students
Concerns favoring face-to-face instruction.	4.5	4
Concerns about potential obstacles.	3.5	3.5
Concerns over video and audio quality.	4.5	4
Concerns over achievement levels.	2.5	3.5

Attitudes Toward and Effectiveness of Online Music Instruction

Daniel J. Morrow
May 2014

Results

Table 2: Plus Category - Before

Plus Category	Teachers	Students
Confidence in face-to-face teaching/learning skills.	6	5.5
Perception of Benefits of online learning.	5.5	4.5

Attitudes Toward and Effectiveness of Online Music Instruction
Daniel J. Morrow
May 2014

Results

Table 3: Minus Category - After

Minus Category	Teachers	Students
Concerns favoring face-to-face instruction.	4.5	3.5
Concerns about potential obstacles.	3	3.5
Concerns over video and audio quality.	4.5	4.5
Concerns over achievement levels.	2.5	5.5

Attitudes Toward and Effectiveness of Online Music Instruction
Daniel J. Morrow
May 2014

Results

Table 4: Minus Category - After

Plus Category	Teachers	Students
Confidence in face-to-face teaching/learning skills.	6	5.5
Perception of Benefits of online learning.	4.5	4

Attitudes Toward and Effectiveness of Online Music Instruction

Daniel J. Morrow

May 2014

Results

The data shows that after the study both students and teachers were less concerned with the potential obstacles to online music instruction.

However, the data also indicated that for both students and teachers, the perceived benefits of online learning dropped after the study.

Attitudes Toward and Effectiveness of Online Music Instruction

Daniel J. Morrow

May 2014

Comments

This study suffered from a very low number of participants (both teachers and students).

No strong conclusions can be drawn from this data.

EDUCATION, TRANSFORMATION AND APPLICATION THROUGH MUSIC TECHNOLOGY
Lanier Motes
December 2014

Abstract Excerpt

The purpose of this study was to collect data from music educators [20 practicing teachers in southeastern Georgia], including their music technology training, experience, use, and proficiency.

[This] survey [had a participation rate of] 70%. . .

EDUCATION, TRANSFORMATION AND APPLICATION THROUGH MUSIC TECHNOLOGY
Lanier Motes
December 2014

Abstract Excerpt

[What Technologies are Participants Using?]
A majority of technology used in the classroom is for administrative, management, and general instructional purposes.

[What Training Did Participants Receive?]
The bulk of training includes music notation and multimedia, while experience with production and recording and electronic/virtual instruments is marginal.

[Impacts of Training]
[Learning] through instructional websites or self-study greatly increased [the use of classroom technology].

[Findings, Recommendations]
The completion of 3-6 credit hours (average) in music technology training is the equivalent of only one or two courses, which clearly indicates a lack of adequate preparation for teaching and training students. Consequently, music educators lack confidence and proficiency in their instruction and use of music technology.

How Virtual Instruments Are Utilized and Perceived
Michael J. Ducassoux
July 25, 2014

Abstract Excerpt

The purpose of this study was to examine the opinions that individuals of various musical and non-musical backgrounds hold on the quality of virtual instruments. The study was completed through an online survey where participants listened to and described virtual instruments. The study was designed to answer the following questions:

1. What are the listeners' opinions of various musical selections programmed from multiple collections of virtual instruments?

2. What playback devices (headphones, studio monitors, tablets, etc.) are being used for listening to music?

3. Will people dislike a musical selection if they know that it is a virtual instrument performance?

    With a 76% completion rate, 105 of 138 surveys were returned. Data was compiled and analyzed in tabular form. Open-ended responses were cataloged by question and attached in an appendix for further study.

How Virtual Instruments Are Utilized and Perceived
Michael J. Ducassoux
July 25, 2014

Results

The largest group of respondents, twenty-nine people (28%), were between the ages of 21 to 30 and one person (0.95%), comprised the age group of 71 and above.

More than half of the respondents, sixty-eight people (65%) said that they actively play an instrument, and only twenty-one people (20%) said they are not involved in the field of music.

Ninety-three of the survey takers (89%) actively listen to music, and no one said they do not listen to music.

Ninety-four people (90%) took the survey at home, and only one person (0.95%) took took the survey at a local or other place with WIFI.

Thirty people (29%) used headphones and only four (3.81%) used studio monitors.

After asking about the individual instruments in each example, 72% said that they liked the virtual instruments.

The Art and Science of Mixing Rock Music
Shelby Marie Sabold
October 2014

Abstract Excerpt

[This study included personal] . . . <u>interviews with notable mixing engineers David Bottrill, Jeff Jackson, Kevin Shirley, and Chris Theis</u>. The questions asked of these engineers were designed to reveal their unique insights into the principles and practices of mixing , , .

The Art and Science of Mixing Rock Music
Shelby Marie Sabold
October 2014

David Bottrill, a three-time Grammy Award winning engineer, worked with Tool, Stone Sour, Mudvayne, Staind, Skillet.

David Bottrill discussed . . .

* How he begins a mix,

* Using signal processing to fit the kick drum and bass together,

* Using compression on different styles of vocals,

* His techniques for blending groups of tracks (i.e. vocals)

The Art and Science of Mixing Rock Music
Shelby Marie Sabold
October 2014

Chris Theis, a two-time Grammy Award winner, mixed Mudvayne's album, *By the People, For the People.*

Chris Theis discussed . . .

* Mixing music
* Roles of the mastering engineer
* Personal experiences working in the rock music industry

The Art and Science of Mixing Rock Music
Shelby Marie Sabold
October 2014

Jeff Jackson, who served as one of the mixing engineers on Linkin Park's 2014 album *The Hunting Party*

Jeff Jackson discussed . . .

* The role of the mixing engineer
* The relationship between the engineer and the artist
* Beginning the mixing process
* EQ techniques
* The most important aspects of a mix
* Compression

The Art and Science of Mixing Rock Music
Shelby Marie Sabold
October 2014

Kevin Shirley worked with many of the rock industry's most celebrated bands including Aerosmith, Bon Jovi, and Journey.

Kevin Shirley discussed . . .

* The roles of the mixing engineer
* EQ and compression
* Gear he works with
* How he got started in the music industry

A RINGING EVOLUTION:
AN INTERNATIONAL GRADUATE COMPOSITION RECITAL
Susan Nelson, August 01, 2015

Abstract

This thesis documents my graduate composition recital, from the initial planning stages in 2011, to the eighty-minute performance in Tallinn, Estonia, on October 15, 2013. The program consists of thirteen handbell compositions and represents a wide variety of musical styles. Eight of the selections employ additional instruments. A musical analysis is included, along with historic research on handbells, their notation, articulations and composition techniques specific to the instrument. The role of music in Estonia's cultural identity is explored.

A Case Study of Technology in Music Classrooms With a High Poverty Population of English Language Learners
Fredrick Higgins, December 2015

Abstract

The purpose of this case study is to understand the impact that music has on teaching English vocabulary to English language learners. This study developed a series of musical activities and songs for English language learners at an urban elementary school in northern Delaware. Students were enrolled in Kindergarten and 1st grade. A pretest to check the English vocabulary of students was given and revealed an average raw score of 5.8181 out of a possible 10 points. Students were then exposed to the materials developed by the author and a posttest was given. Results demonstrated an average raw score of 8.6818. This demonstrates an increase in raw score of approximately 29%, [a strong] . . . improvement. Future recommendations include (a) developing materials for a broader vocabulary, and (b) development of video and musical materials to be used independently and out of class.

MUSIC TECHNOLOGY IN THE MARCHING ARTS:
A Study in the Evolution of Electronics in Marching Ensembles
Kevin Longwill, 2016

Abstract Excerpt

The objective of this thesis was to study and compare the degree to which music technology is used in marching ensembles. . . . Research was done to determine a wide perspective of use at many levels of performance, from scholastic to independent organizations. Additionally, this thesis outlines the evolution of electronics and technology in the marching arts, and how different organizations are creatively utilizing these tools in design and performance at present, and how some are seeking to use them to inspire and continue use into the future.

MUSIC TECHNOLOGY IN THE MARCHING ARTS:
A Study in the Evolution of Electronics in Marching Ensembles
Kevin Longwill, 2016

Participants

1. Geoff Schoeffel The Cadets Drum and Bugle Corps (DCI)

2. Cristian Good The Cavaliers Drum and Bugle Corps (DCI)

3. Erik Kosman Bluecoats Drum and Bugle Corps (DCI)

4. Matt Jordan Music City Mystique (WGIWORLD)

5. Evan Brown Matrix Percussion (WGIWORLD)

6. Brian Christoffersen Motor City Percussion (WGIOPEN)

7. Dan Gelber Nimitz High School (TX)

8. Ryan Bischoff East Central High School (IN)

9. Aaron Tucker Green Hope High School (NC)

10. Grant Butters South County High School (PA)

MUSIC TECHNOLOGY IN THE MARCHING ARTS:
A Study in the Evolution of Electronics in Marching Ensembles
Kevin Longwill, 2016

Questions

1. How has your audio setup evolved over the last five years? How has the demand for electronics changed over the last five years?

2. How much of your overall performance is predicated on material developed outside of the performance realm (i.e. samples, recorded material, etc.)?

3. In what ways have electronics created new possibilities for your performance (i.e. amplification, sampling, synthetic instruments, etc.)?

4. Do you feel there is a backlash to the use of electronics in the marching arts?

5. How do you feel electronics may be used in the marching arts in the future?

MUSIC TECHNOLOGY IN THE MARCHING ARTS:
A Study in the Evolution of Electronics in Marching Ensembles
Kevin Longwill, 2016

Question 1:How is your ensemble using music technology in its performance?

This particular question yielded a multitude of results. Every response had a few things in common. First and foremost, every group was utilizing technology in order to amplify the acoustic sound of instruments in the front ensemble, including the marimbas and vibraphones. Several groups even went as far as to include micing wind instruments (marching band/drum corps) in order to achieve a higher intensity in the overall soundscape of performance. Geoff Schoeffel, audio engineer for The Cadets Drum and Bugle Corps, describes his set up as including "...2 Shure wireless mics, one for a trumpet soloist, and one for an electric violin...some spot mics, 6 french horn mics, 5 timpani mics." (Schoeffel). This particular design includes several microphones, both of traditional wired and wireless designs, based on their application within the context of the performance. For instance, the french horn and timpani microphones remain in a stationary position at the front of the performance field. This allows them to be plugged in directly into a mixing surface. However, the trumpet and electric violin soloist mics are placed in the center of the field, well into the mix of the performance space, creating a necessity of wireless function (Lawson 2016).

OBSTACLES FACING WOMEN SEEKING CAREERS IN MUSIC TECHNOLOGY

Kelley McNamee West
August 2016

Abstract

The career fields of music production and music technology are traditionally male-dominated occupations. The purpose of this thesis was to examine the obstacles between women and careers in these fields. Related literature identified internal obstacles such as lack of role models and self-doubt, and external obstacles such as societal norms, traditions, status quo, and an unappealing environment to women. In this study, surveys with both men and women in related careers were utilized to determine the current mindsets of music technology professionals. When answers were categorized and tallied, it became apparent that participants in this study most often cited a lack of visible female role models as the greatest barrier between women and careers in music technology.

Digital Expression or Distraction:
Urban Youth and Digital Media
Richard G. Lee
May 20, 2017

Abstract

The author proposes that with all the challenges facing urban youth, the use of digital media, specifically music technology, will aid in the positive development of students' overall attitude, and educational experience. This case study looks at this question and summarizes observations supporting this premise. Participants of this study were metro Detroit students ages fifteen to nineteen. These participants were surveyed before and after the study to determine their experience with and attitudes toward digital media. During a seven-week period, as part of an after-school program, students learned digital media through audio recording and music creation. The applications used during this study were Avid ProTools and Apple GarageBand for iPad. Results showed that participants in this study gained a greater knowledge of digital media, developed their capacity for self-expression through technology arts, and established a new confidence in their abilities.

THE COMPRESSION OF DIGITAL AUDIO FILES:

Josiah Krawiec
August 1, 2017

Abstract Excerpt

This study explores the effect of compression on digital audio files and how the listener perceives those changes. Using a sample of sixty music students from a public high school in southeastern Pennsylvania, data was collected from a survey of listening examples at multiple bit rates. The findings from the research show the impact of compression on digital audio files is less observable than expected . . .

Specific findings are as follows. On the test as a whole, subjects could not easily distinguish between files compressed at 320kbps and 128kbps, however, subjects were able to identify 320kbps as best until approximately five minutes into the survey. After five minutes, subjects were more likely to choose 128kbps as the best.

. . . Throughout the study, participants could easily distinguish between files compressed at 80kbps and higher levels and were able to do so on a level that was statistically significantly at the .05 level.

. . . Listening examples were carefully chosen to cover a variety of instrumentations, genres, textures, and timbres. A distinguishing feature between this and similar studies was that the listening environment was exactly the same for each participant in the study, minimizing the possibility that the equipment used for listening could have served as a confounding variable.

Future research is recommended to sample a larger population of music listeners and to address the questions of whether listening fatigue or preference for music sampled at the familiar rates play a role.

Analog vs. Virtual Analog Synthesizers:
Can we hear the difference?
Matthew Blostein, April 28, 2017

Abstract Paraphrase

The purpose of this thesis is to determine if musicians and non-musicians can hear the difference between analog synthesizers and a virtual analog synthesizers.

Virtual analog synthesizer technology has come very close to being able to reproduce the sound at the same quality of real analog synthesizers. However, many purists insist that they can tell the difference between the two and that nothing could replace the sound of a real synthesizer.

The study will examine different groups of non-musicians, musicians who are not synthesizer experts and synthesizer experts. There will be sound samples presented across a range of synthesized sound types that have been prepared and matched closely by both instrument types. The study will consider the listening equipment used by the participants.

The results of the experiment show that people can identify the real synthesizer approximately 56-59% of the time. Their ability to do so was significant at the .05 level (0.0427). The various groups, however were not better than the group as a whole on a statistically significant level. The author believes that virtual analog emulations still have some room for improvement to exactly replicate the sound of real analog synthesizers.

Algorithmic Music Perception: Differentiating Human from Machine Composition
Joe DiVita, April 27, 2017

Abstract

In recent years, musical works composed by computers have caught the attention of the public and have sparked debate on whether computer-based composition could advance beyond the robot-like expressions typically associated with machines to a level comparable to humans. This study will examine the historical and recent developments and will test whether people of varying musical backgrounds can successfully distinguish between works composed by humans and those composed by computers, especially as the computers implement a variety of modern compositional algorithms.

The results of this quantitative study determined that a group of test subjects was able to correctly identify whether a piece of music was composed by a computer or a human 48% of the time. Furthermore, human compositions were correctly identified at a rate of 57%, while computer-composed compositions at 40%. Instrumental experience and age had little to no effect. Levels of music theory training showed a weak, but positive correlation. More modern and complex algorithms that employed a combination of AI systems proved to be more successful.

RESEARCH IN MUSIC TECHNOLOGY
20 SELECTED STUDIES

FLOYD RICHMOND
(THESIS ADVISOR)
FLOYD.RICHMOND@HOUGHTON.EDU
HTTP://FLOYDRICHMOND.COM/ATMI2017
ATMI 2017