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Since being introduced into classrooms in the late 1990s, online instruction has grown substantially both in student enrollment and the number of programs offered at state, district, and multi-district levels. Although having been applied liberally to all core subjects and many supplemental subjects, online instruction has yet to be utilized extensively in the musical arts. Courses in music performance present a unique set of technological and logistical challenges when adapted to an online setting. Nevertheless, private music teachers have utilized Internet resources extensively. Similar techniques applied to public school music programs, however, have yet to be explored thoroughly. Utilizing a combination of asynchronous instruction and synchronous instruction for teaching online music performance courses offers a potential for study and development.

The purpose of this study was to establish the feasibility of an online music performance course that included both asynchronous and synchronous instruction. An approach that utilized both a multimedia blog format and real-time video instruction was developed, implemented, and delivered to a limited group of trombone students as a pilot study. Nine students participated in online trombone lessons that focused primarily upon the development of performance fundamentals. The delivery of content was assessed to determine a feasible format for music performance instruction in an online setting. Although typical

technological shortcomings were experienced during instructional settings, students were able to identify, explain, and apply concepts gleaned from the blog and real-time video lessons.

Internet-based resources have been applied to independent and collegiate music performance instruction; pedagogical approaches, however, have not been developed for use in secondary level online learning programs. Consequently, online music performance instruction has not evolved as rapidly as online instruction of core academic subjects. As technological advances become available, the possibility for delivering online instruction in areas of the performing arts, and especially in music performance, becomes more feasible and likely will be integrated into the curricula of many online learning programs. Until such time, the implementation of viable online instructional models is essential for the development of traditional music performance courses.

BRIDGING THE VIRTUAL GAP IN INTERNET BASED MUSIC INSTRUCTION:

A FEASIBILITY STUDY IN TROMBONE

PERFORMANCE EDUCATION

by

Aaron James Wilson

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APPROVAL PAGE

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Online learning programs in the 21st century have grown steadily, both in student enrollment and the number of different programs offered at state, district, and multi-district levels.[1] As of 2011, online learning opportunities have been made available to students in all 50 states.[2] Although student access to online instruction varies depending upon the state (or even the zip code), the overall trend is toward an increased utilization of online resources in most general education subjects.[3]

The comprehensiveness of online learning programs differs among states. With the exception of Florida, no state offers both full-time and supplemental online instructional options to all of its students.[4] According to Keeping Pace 2012, approximately 275,000 students enrolled in full-time online schools in the 2011-2012 school year.[5] In that same year, part-time or supplemental online

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[1] John Watson et al., *Keeping Pace with K-12 Online Learning: An Annual Review of Policy and Practice*, Annual Review (Evergreen Education Group, 2011), 6.

[2] Ibid., 4.

[3] Ibid, 4.

[4] John Watson et al., *Keeping Pace with K-12 Online & Blended Learning: An Annual Review of Policy and Practice* Annual Review (Evergreen Education Group, 2012), 4.

[5] Ibid, 5.

learning programs served 619,847 one-semester course enrollments.[6] Whereas programs such as the North Carolina Virtual Public School offer only supplemental course options,[7] many states have progressed towards providing both full-time and supplemental online learning programs to all students.[8]

Although online learning programs provide completely virtual learning opportunities to an increasingly large number of students every year, traditional brick-and-mortar schools also utilize Internet resources for instruction. Approximately two-thirds of school districts nationwide offer courses that utilize Internet resources as means for delivering a portion of the curriculum.[9] These blended courses allow for students to learn from teachers in a supervised brick-and-mortar classroom while receiving instruction concurrently through an online delivery system that enables them to engage the material independently.[10]

All three levels of comprehensiveness, full-time online school, supplemental online school, and blended learning options within traditional brick-and-mortar schools, have grown substantially in the past decade.[11] Internet resources have been applied to every core curriculum subject. In addition, many

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[6] Ibid.

[7] Ibid., 132.

[8] Ibid., 14–16.

[9] Ibid.

[10] Heather Staker, *The Rise of K-12 Blended Learning: Profiles of Emerging Models* (Innosight Institute, May 2011), 5.

[11] Ibid., 1–2.

virtual schools, including the North Carolina Virtual Public School, offer advanced placement, honors, and credit recovery courses.[12]

Students enrolled in virtual schools also are afforded the opportunity to engage in more specialized courses. Because the content is delivered digitally, barriers created by physical distance between the student and teacher can be eliminated. Consequently, digital learning allows for an array of course options to be delivered to underserved student populations. For example, the North Carolina Virtual Public School offers courses in professional development, world languages, and other highly specialized subjects not often available in traditional brick-and-mortar schools.[13] Sixty-four percent of school districts ranked the increased course offerings as being one of the most important reasons for integrating online learning into their school's curriculum.[14]

To restate, digital learning allows students to access previously unavailable course content in numerous subjects. The format, however, has yet to be utilized extensively in the creative and performing arts. Consequently, creative and performing arts course offerings delivered through virtual schools

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[12] "Welcome to the Virtual Advantage of NCVPS," *North Carolina Virtual Public School*, accessed March 1, 2013, http://www.ncvps.org.

[13] "Spring 2013 Traditional Catalogue," *North Carolina Virtual Public Schools*, Spring 2013, http://www.ncvps.org/index.php/courses/catalogue/spring-2013-traditional-catalogue/.

[14] Barbara Queen and Laurie Lewis, *Distance Education Courses for Public Elementary and Secondary School Students: 2009-10* (Washington, DC: U.S. Department of Education, National Center for Education Statistics, November 2011) 3.

are limited primarily to history or appreciation classes. Few course options are made available that focus upon developing skills. Although the five largest virtual public schools (*Florida Virtual School, North Carolina Virtual Public School,* Alabama's *ACCESS Distance Learning, Michigan Virtual School,* and *Georgia Virtual School)*[15] offered limited skills-based course options in the fine arts areas during the spring 2013 semester, no performance-based courses in music, theater, or dance were made available.[16]

Courses in music performance, specifically, present a unique set of logistical challenges when adapted to an online setting. Technological limitations, including latency (lag time) and the quality of audio and video, create obstacles that are difficult to overcome without sacrificing the quality of instruction. Traditional group activities that rely on low levels of latency and high levels of audio quality, including music ensemble classes, are hindered when delivered in a completely online format. Therefore, technological limitations necessitate an updated approach to online music performance instruction.

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[15] Watson et al., *Keeping Pace 2012*, 31.

[16] "Course Catalog," *Florida Virtual Schools*, Spring 2013, https://ar.flvs.net/Coursecatalog.aspx; "Spring 2013 Traditional Catalogue"; "Course Catalog," *Access Distance Learning*, Spring 2013, http://accessdl.state.al.us/documents/9-6-12-Catalog_Fall12-Summer2013_Web-BasedCourses.pdf; "2012-2013 Course Offerings," *Georgia Virtual School*, Spring 2013, http://www.gavirtualschool.org/CourseInfo/20122013Courses.aspx; "Plus Catalog for High School Other," *Michigan Virtual School*, Spring 2013, http://media.mivu.org/cems/catalogs/HS_PLUS_OTHER.pdf.

Online learning programs cater typically to independent learners in asynchronous instructional environments. Asynchronous instruction occurs when a student accesses teacher created course content on her/his personal time.[17] By accessing course content in an asynchronous environment, students are afforded the opportunity to allocate the time necessary to understand the course material thoroughly before progressing to the next lesson.[18]

Music performance instruction, however, is delivered traditionally in person and guided by an experienced teacher. These types of classrooms, where teacher and students interact in real-time, are called synchronous learning environments.[19] In this environment, teachers work closely with students, providing instant feedback and advice.[20] Although instruction in traditional musical arts courses, including performance ensembles, already is delivered synchronous learning environments, adaptation to an online setting is limited by the student-teacher ratio and the technological limitations mentioned previously. The modification of existing traditional musical arts courses to completely online settings is not a feasible option, necessitating the development of innovative teaching methods that go beyond mere adaptation.

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[17] John Watson, *A National Primer on K-12 Online Learning* (North American Council for Online Learning, April 2007), 6.

[18] "Synchronous Vs. Asynchronous Classes," *eLearners.com*, April 2, 2012, http://www.elearners.com/online-education-resources/online-learning/synchronous-vs-asynchronous-classes/.

[19] *The Online Learning Definitions Project* (Vienna, VA: Interna, October 2011), 9.

[20] "Synchronous Vs. Asynchronous Classes."

Statement of Purpose

The purpose of this study was to establish the feasibility of utilizing both asynchronous and synchronous approaches for teaching an online course in trombone performance. Feasibility was determined by examining data for strengths and weaknesses in two areas: the impact of logistical and technological challenges upon instruction and the ability of participants to comprehend and apply asynchronous lesson content in synchronous instructional settings.

An approach that utilized both a multimedia blog format and real-time video instruction was developed, implemented, and delivered to a limited group of trombone students as a pilot study. Specifically, three asynchronous online lessons targeting elements of trombone pedagogy were developed for this study. Asynchronous content was delivered through a blog titled *Online Trombone Teacher,* created specifically for use in this study. Following the completion of each blog lesson, students explored the course material further by participating in real-time video lessons with a professional trombone instructor. Whereas the asynchronous blog lessons focused upon developing a cognitive understanding of the course content, the synchronous real-time video lessons focused upon developing skills. The intent was to create an experience that included aspects of both independent and guided learning.

Participants were recruited randomly from three categories: pre-college trombone students, early college trombone students, and music education students. All participants studied the same blog lessons; real-time video

instruction, however, was modified according to each participant's background and ability level.

The objective was not to develop an online course to replace traditional music instruction, but rather to supplement performance ensemble classes through increased attention to individual student growth. Although designed for trombone performance instruction, the methodology, not the content, was the focus of the study. Similarly, the effectiveness of the instruction was not evaluated. Examination of the data allowed for conclusions to be drawn regarding individual aspects of both the asynchronous and synchronous approaches. The study, however, focused upon assessing the combination of both instructional types.

Definition of Terms

Because digital learning utilizes terms that can have multiple meanings, the following terms are defined for the purpose of clarity.

> **Apps**: Apps are subprograms within larger programs that provide added functionality. In this study, a screen-sharing app was utilized during real-time video lessons.
>
> **Asynchronous learning**: "Communication exchanges [that] occur in elapsed time between two or more people."[21] Asynchronous learning allows for students to access teacher created content on their own time and at their own pace. For the purposes of this study, participants engaged in asynchronous learning during blog lessons.
>
> **Bandwidth**: "The maximum data transfer rate of a network or Internet connection. It measures how much data can be sent over a specific

[21] *Definitions*, 3.

connection in a given amount of time."[22] Bandwidth can be equated to the number of lanes on a highway. Although traffic or construction may block one or more lanes of a four-lane highway, the maximum number of lanes is still four.

Blended learning: "Any time a student learns at least in part at a supervised brick-and-mortar location away from home and at least in part through online delivery with some element of student control over time, place, path, and/or pace."[23]

Blog: For the purpose of this study, a blog is a website used for asynchronous content delivery.

Blog Lesson: The asynchronous lesson taken by each participant, prior to the real-time video lesson.

Comprehensiveness: An indication of the extent that students can enroll in an online learning program: full-time or supplemental.

Digital Learning: "Education in which instruction and content are delivered primarily over the Internet."[24]

Full-time online program (school): "Full-time online schools, also called cyberschools, work with students who are enrolled primarily (often only) in the online school."[25]

Latency: "The total time required for a signal to travel from one point to another, generally from a transmitter through a network to a receiver."[26] This term is associated with lag time or delay. Latency can be equated delays incurred due to the integrity of the road traveled and the amount of traffic encountered.

Online course: A course offered exclusively over the Internet.

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[22] "Bandwidth," *TechTerms.com*, May 16, 2012, http://www.techterms.com/definition/bandwidth.

[23] *Definitions*.

[24] Ibid., 7.

[25] Ibid., 6.

[26] "Latency - Technical Definition of Latency," *Your Dictionary Computer*, accessed February 8, 2013, http://computer.yourdictionary.com/latency.

Online learning: Digital learning.

Online learning program: "An organized offering of courses delivered primarily over the Internet."[27]

Plug-in: "A plug-in is a (sometimes essential) piece of software code that enables an application or program to do something it couldn't [do] by itself."[28] Adobe Acrobat Reader, a plug-in that allows for pdf documents to be accessed in an Internet browser, is an example of a common browser plug-in.

Real-time video lesson: A synchronous lesson conducted using videoconferencing software.

Routing: The process of moving data from one destination to another destination. Several networks are used to move that data from its original source to its destination.[29] The process of routing can be equated to the specific directions one follows when driving to a destination.

Screen-sharing: An app associated with many videoconferencing programs that allows for a user to see the desktop of another user.

Supplemental Online Program: "An online program that allows students to take less than a full load of online courses, as defined by local or state legal entities." [30] Sometimes referred to a as "part-time online program."

Synchronous learning: Learning that "requires students and instructors to be online at the same time."[31] For the purposes of this study, this term refers to the real-time video lessons.

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[27] *Definitions*, 7.

[28] "What Are Plug-Ins?," *BBC WebWise*, accessed February 25, 2013, http://www.bbc.co.uk/webwise/guides/about-plugins.

[29] "Definition of a Route," *InetDaemon.com*, December 1, 2012, http://www.inetdaemon.com/tutorials/internet/ip/routing/route.shtml.

[30] *Definitions*, 7.

[31] "Synchronous vs. Asynchronous Classes," *eLearners.com*, April 2, 2012, http://www.elearners.com/online-education-resources/online-learning/synchronous-vs-asynchronous-classes/.

Traditional course or Traditional lesson: These terms are used to indicate instruction that is presented in a face-to-face format where student and teacher are in the same room.

Videoconferencing: "Communication technologies [that] allow two or more locations to interact using two-way video and audio transmissions simultaneously."[32]

Music Performance Instruction in Online Learning Programs

Since being introduced into classrooms in the late 1990s, online instruction has grown substantially, both in student enrollment and the number of programs offered at state, district, and multi-district levels.[33] Although having been applied liberally to all core subjects and many supplemental subjects, online instruction has yet to be utilized extensively in the musical arts. Courses in music performance present a unique set of technological and logistical challenges when adapted to an online setting. Although private music teachers already employ videoconferencing technology, application of Internet resources to public school music programs is an area in need of development. The combination of asynchronous and synchronous instruction for teaching music performance skills in an online setting is in need of further development.

The purpose of this study was to establish the feasibility of utilizing both asynchronous and synchronous approaches for teaching an online course in trombone performance. In the second chapter, existing Internet based

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[32] *Definitions*, 9.

[33] John Watson et al., *Keeping Pace with K-12 Online Learning: An Annual Review of Policy and Practice*, Annual Review (Evergreen Education Group, 2011), 6.

pedagogical resources and the logistics of utilizing videoconferencing software to teach private music performance lessons are explored. The procedures of the study are described in Chapter Three. In the fourth chapter, the results of the study are detailed. Conclusions and suggestions for further research are supplied in the Chapter Five. Although the utilization of Internet resources for the purpose of teaching music performance skills has grown steadily, widespread application into public school programs has not yet been developed. The investigation of existing methods of online music performance instruction is necessary for the development of similar approaches for use in an online learning program.

CHAPTER II

REVIEW OF LITERATURE AND EXISTING ONLINE PROGRAMS

Real-time Video Music Instruction Studies

The investigation of online instructional approaches for music performance has been slow to develop. Although studies concerning the implementation of technology into traditional classrooms have been thorough, innovative approaches in completely online music performance instruction have yet to be explored extensively. With the exception of the utilization of videoconferencing software as an alternative to traditional private music lessons, scholarly publications concerning online music performance instruction have not emerged.

Private music instructors began utilizing videoconferencing software to teach music performance lessons as early as the mid 1990s. Articles about this type of instruction are published routinely and are concerned generally with presenting the pros and cons of the instructional format. Two such accounts, one presented by a vocal instructor who teaches "95%" of his lessons online,[34] and a second by a Professor of Piano Pedagogy at Stephen F. Austin University,[35] provided a common assessment of online videoconferencing instruction. Both

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[34] Mitch Seekins, "The Study Of Voice & The Internet," *Canadian Musician* 34, no. 6 (December 2012): 32–32.

[35] Mario Ajero, "Teaching Real-Time Music Lessons Over Videoconference," *American Music Teacher* 60, no. 1 (September 2010): 44–47.

instructors concur that music instruction delivered through videoconferencing software offers a level of convenience unparalleled by the traditional format.[36] By being able to connect with students from any distance, instructors need not miss lessons due to illness or change in location.[37] Although both instructors recognized technological problems as being detrimental to instruction, both supported the format with enthusiasm.[38]

Publications detailing the utilization of videoconferencing software in music performance instruction, including the articles published by Ajero and Seekins, are primarily anecdotal. The conclusions presented, however, frequently resemble the findings of a study conducted by Richard Dammers at Rowan University.[39] The purpose of Dammers' study was to determine if videoconferencing software was feasible for use in instrumental performance instruction.[40] This study involved observing nine videoconference lessons between a high school trumpet student and a college professor.[41] From videotaped lessons, interviews with both the student and the professor, and field

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[36] Seekins, "The Study Of Voice & The Internet," 32; Ajero, "Teaching Real-Time Music Lessons Over Videoconference," 44.

[37] Ajero, "Teaching Real-Time Music Lessons Over Videoconference," 44.

[38] Ibid., 47; Seekins, "The Study Of Voice & The Internet," 32.

[39] Richard J. Dammers, "Utilizing Internet-Based Videoconferencing for Instrumental Music Lessons," *UPDATE: Applications of Research in Music Education* 28, no. 1 (November 2009): 17–24.

[40] Ibid., 18.

[41] Ibid.

notes, Dammers was able to draw several conclusions concerning the positive and negative aspects of the teaching format.[42]

Several facets of the instructional method proved to be at least as effective as traditional lessons, if not more so. Aside from the connectivity advantages also mentioned by Seekins and Ajero in their reports[43], Dammers noted that the exchange of information through recordings and pdfs was expedited through the use of technology.[44] Lessons also were able to be conducted at a pace similar to that of face-to-face instruction, despite inconsistencies in lag time.[45] In addition, the trumpet professor was able to "provide clear feedback, particularly regarding pitch and rhythm issues."[46]

Although Dammers concluded that videoconference lessons are functional, he was not convinced that the format was "equivalent to face-to-face instruction." [47] Specific aspects of trumpet performance were able to assessed and corrected, but the limited quality of audio and video inherent in the format made physical modeling and evaluation quite challenging, if not impossible.[48]

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[42] Ibid., 19.

[43] Seekins, "The Study Of Voice & The Internet," 32; Ajero, "Teaching Real-Time Music Lessons Over Videoconference," 44.

[44] Ibid, 21.

[45] Ibid, 20.

[46] Ibid, 20.

[47] Ibid, 23.

[48] Ibid, 20-21.

Technological constraints not only hindered assessment, but also weakened the emotional bond created between student and teacher. Although the professor and the student were able to view and speak to one another, neither felt a personal connection equivalent to one established through face-to-face instruction.[49]

Although Dammers found the format to be somewhat functional, his perception of future developments was unenthusiastic:

> Music performance is inherently a synchronous experience, as musicians make music together in time. Whereas many collegiate programs in other disciplines are moving rapidly into asynchronous online instruction, music programs are unlikely to do so, given their synchronous nature. Lag time, resulting from the compression and transmission of the signal, precludes the possibility of live online ensemble performance, even with the forward march of faster technology. Synchronous online instruction is likely to expand and supplement music instruction but not revolutionize it.[50]

Dammers' negative conclusions concerning the utilization of videoconferencing software were influenced by the numerous technological shortcomings encountered during the study.[51] Although his assessments of synchronous music performance instruction are warranted, the application online instructional methods is widespread among private instructors. In addition, emerging

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[49] Ibid, 20.

[50] Ibid., 22.

[51] Dammers, "Utilizing Internet-Based Videoconferencing for Instrumental Music Lessons," 22.

technologies continually improve the quality and potential of real-time video lessons.

Technological Factors

Musicians have utilized videoconferencing software for performance and instruction since the mid 1990s. Although the technology has improved substantially with respect to reliability and accessibility, videoconferencing sessions are still subject to the speed of Internet connection and the technology used by each participant. Specifically, three factors influence the quality of videoconferencing session: bandwidth, routing, and personal computer issues.[52] When any or all of these factors affect the Internet connection negatively, lag time and a degradation of audio and video quality are present.

The term bandwidth refers to the maximum capacity through which a network connection can move bits of data, measured in bits per second.[53] For a real-time video lesson, an Internet connection with high bandwidth is preferable for both the student and the teacher. If one or both ends of the connection have a low bandwidth, less data can be moved per second resulting in compromised audio and video quality.[54]

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[52] "Understanding Video Conferencing Latency," *Nefsis*, accessed February 17, 2013, http://www.nefsis.com/best-video-conferencing-software/latency.html.

[53] Ibid.

[54] Ibid.

Routing refers to the pathway in which data is transferred from one end of a connection to the other.[55] As data travels, it has to pass through several networks before arriving at its destination. Consequently, if the number of networks through which the data travels is large, the quality of connection is affected negatively. In addition, if networks along the route experience connectivity issues, the rate of data transfer will be reduced.

Several miscellaneous personal computer issues also inhibit the ability of each user's computer to send and receive videoconferencing data. System updates, viruses, malware, and the quality of equipment (microphone, sound card, speakers, webcam) are included in this category.[56] Personal computer issues play a significant role in the current study because of the large number of variances inherent in each participant's personal computer.

When all three factors, bandwidth, routing, and personal computer issues, are of poor quality, the transmission of data is reduced resulting in high latency. Latency is the total time required for a signal to travel from one point to another, measured in milliseconds (ms).[57] One millisecond is equal to 1/1000 of a second. Situations with high latency result in longer delays in the sending and receiving of data.

The concept of latency, however, is not limited to transmission of data over the Internet. Musicians contend with latency issues in any collaborative

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[55] Ibid.

[56] Ibid.

[57] "Latency - Technical Definition of Latency."

music performance situation, both online and offline. In face-to-face musical experiences, the physical distance between performers affects the time taken for sound to reach the members of an ensemble.[58] Because the rate in which sound travels is approximately 1 foot per 1 ms, latency levels can be as low as 2-3 ms in a chamber music setting to well over 150 ms in a marching band. Because light travels faster than sound, musicians frequently contend with high latency situations by relying on visual cues. For example, members of a marching band might watch the drum major's direction rather than listening to other performers who may be 50 or more yards away. Although the physical distance is not a factor in online music making, technological influences frequently cause both audio and video perception to be delayed. Without visual cues, accurate group performance in high latency videoconference session is unachievable.

Videoconferencing software is utilized for music performance in two ways: to broadcast a performance from a single location or to connect the members of a performance ensemble from multiple locations.[59] As long as network connections are quick enough prevent the audio and video from being affected negatively, broadcasting a performer or a group of performers from one location is not problematic.[60] Effective performance from multiple locations, however, requires low levels of latency when connected through a

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[58] Christopher Bartlette et al., "Effect of Network Latency on Interactive Musical Performance," *Music Perception: An Interdisciplinary Journal* 24, no. 1 (September 2006): 49.

[59] Ibid., 50.

[60] Ibid.

videoconferencing application.[61] Group music activities used frequently in traditional music instruction, such as duet playing, are made impossible when the connection has high latency.

In a 2006 study conducted at the Eastman School of Music, music performance in videoconferencing sessions was determined to be achievable with latency levels below 86 ms.[62] Internet connections, including those found commonly in residences or public hotspots, cannot sustain a level of latency below 86 ms. To compensate for instances of high latency, videoconferencing applications, including the one used for this study, automatically drop packets of data from the transmission resulting in lower audio and video quality.[63]

Advanced networks, specifically Internet2, allow for low latency levels to be achieved without a reduction in audio and video quality.[64] Internet2 is a joint collaboration between "U.S. and international leaders in research, academia, industry and government who create and collaborate via innovative technologies."[65] The goal of Internet2 is to provide the most advanced networks created to meet the needs of researchers in all academic areas.[66] Using Internet2

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[61] Ibid.

[62] Ibid., 58.

[63] "Understanding Video Conferencing Latency."

[64] Ann Doyle, *Arts & Humanities Initiative* (Internet2, April 2010), 2, http://www.internet2.edu/resources/infosheetarts.pdf.

[65] "About Internet2," *Internet2*, 2012, http://www.internet2.edu/about.

[66] *Internet2* (Internet2, September 2012), 1–2, http://www.internet2.edu/resources/AboutInternet2.pdf.

technology, musicians can perform in videoconferencing environments with latency levels as low as 22ms.[67] This allows for music ensembles to perform together from multiple locations. Unfortunately, only members of the Internet2 collaboration have access to these advanced networks.

Online Music Performance Instruction

Online music performance instruction is not limited to synchronous videoconferencing formats. Numerous individual music teachers have created free asynchronous content in the form of YouTube videos, blogs, and online articles. In addition, asynchronous content has been developed for use in many college-level online music programs.

Independent Online Music Performance Instruction

Most independently created music performance websites fall into one of three categories: an online database of pedagogical content; a forum devoted to one instrument, style, or composer; or a means to connect students with online performance teachers. Content created for databases and forums is not typically organized into a course of study, but rather a collection of resources accessible at anytime by anyone. Although users can receive pedagogical instruction from databases and forums, direct guidance in a real-time setting is unachievable in either of these formats. Independently operated websites, however, regularly allow for students to learn directly from orchestral players, freelance musicians, or other music teachers. In addition to synchronous learning opportunities,

[67] Doyle, *Arts & Humanities Initiative*, 2.

websites in this category frequently provide asynchronous pedagogical resources. Much like databases and forums, however, the asynchronous content is typically designed to be accessed independently rather than in an organized course of study.

One website in this category was developed specifically for the purposes of trombone instruction. Tom Gibson, faculty member at Kennesaw State University and freelance musician in the Atlanta area, is the owner and Webmaster behind trombonelessons.com, a website that provides pedagogical resources and access to videoconference lessons.[68] Gibson's website is similar to many other independently operated music performance websites. Its inclusion here is due to the site's long tenure and its familiarity to many student and professional trombonists. Through his website, Gibson provides pedagogical content presented in multiple media types, including text, video, and podcasts. His lessons in trombone pedagogy are designed to be informative, yet accessible to all. In addition to the substantial asynchronous content, Gibson also offers synchronous videoconference lessons for a small fee. Although the content offered between the website and the videoconference lessons is not meant to be studied in conjunction, the combination of both formats offers a thorough, albeit not comprehensive, curriculum in trombone performance pedagogy.

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[68] Tom Gibson, "Trombonelessons.com," *Trombonelessons.com*, accessed February 12, 2013, http://www.trombonelessons.com.

Distance Learning at Manhattan School of Music

Websites similar to Tom Gibson's *Tromboneleessons.com* cater to individual students rather than entire middle or high school music performance ensembles. Distance Learning at Manhattan School of Music, however, has developed an outreach program that connects internationally acclaimed performing artists with youth music ensembles. The Manhattan School of Music has a long history of utilizing Internet resources for music performance instruction. In 1996, Manhattan School of Music introduced the very first videoconferencing program to be used in a music conservatory.[69] Since then, the school has developed numerous offerings in online music performance instruction. For K-12 students, Distance Learning at Manhattan School of Music provides an opportunity to study music performance from faculty members in individual and group settings. In addition, the school also offers videoconference lectures in areas of musicology. Although the faculty at Distance Learning at Manhattan School of Music has created numerous synchronous learning opportunities, asynchronous learning opportunities have not yet been developed or applied.

Berkleemusic.com

Online learning programs that utilize an organized curriculum of asynchronous and synchronous approaches for music performance instruction have yet to be developed for secondary level students. Notable programs have been created, however, for college and independent music students. The largest

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[69] "About Us," *Distance Learning @ Manhattan School of Music*, accessed February 26, 2013, http://dl.msmnyc.edu/about.

and most successful of these programs, Berkleemusic.com, was initiated by Berklee College of Music in 2002.[70] Select Berkleemusic.com courses have won the University Professional & Continuing Education Association award for "Best Online Course," every year from 2005-2012.[71] In addition to their award winning courses, Berkleemusic.com offers over 100 other course options.[72] Although Berkleemusic.com's course catalogue is comprised primarily of non-performance based music classes in theory, music business, and arranging, a small selection of guitar, bass, drums, keyboard, and vocal performance classes also are available.[73]

In addition to the convenience of studying music online from any location around the world, students who study from Berkleemusic.com receive asynchronous instruction from industry leaders in what is termed a "flipped classroom model."[74] The concept is fairly similar to an asynchronous learning environment, except that Berkleemusic.com provides students opportunities for guided instruction from the teacher. This type of course organization allows students greater control over the pace and accessibility of instruction. Students

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[70] "The Berkleemusic Experience," *Berklee Music*, accessed January 5, 2013, http://tour.berkleemusic.com.

[71] "Beklee Music Online Courses & Programs" (Berklee Music, 2012).

[72] "About the School," *Berklee Music*, accessed January 5, 2013, http://www.berkleemusic.com/school/information/3.

[73] "Online Courses by Area," *Berklee Music*, accessed January 5, 2013, http://www.berkleemusic.com/school/courses/.

[74] Barbara Schultz, "Your Online Classroom," *Electronic Musician* 29, no. 3 (March 2013): 25.

who are struggling with the course material have the ability to contact the music instructor for help through an online forum or by email.

Several media formats are utilized to deliver instruction during weekly lessons, including video, audio, flash animation, musical examples, and text. Weekly lessons are organized to encourage students to engage lesson content in small segments, allowing for greater comprehension of the lesson material before advancing to more advanced concepts. Progress is determined through the completion of weekly homework assignments. Each week, students post their work on the course's forum to be assessed by the instructor and other class participants.

Although Berkleemusic.com has received numerous endorsements from industry leaders, the program may not be well suited for everyone. Course organization favors students who are independent learners. Consequently, students receive instruction from their teacher frequently through the forum and through email. Real-time interaction is limited to weekly video chat sessions.[75] In addition, the program was not designed to replace a traditional collegiate level music instruction. Whereas traditional schools of music focus upon classical or jazz performance, Berkleemusic.com's offerings are limited primarily to the development of skills in music production, composition, and popular music performance.

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[75] "Step Inside a Sample Course," *Berklee Music*, accessed January 5, 2013, https://www.berkleemusic.com/welcome/samplecourse_all.

The apparent deficiencies in Berklee's program can be explained by examining the target clientele of Berkleemusic.com. The program is not designed for those who wish to study classical music; rather Berkleemusic.com is meant for students who want to learn the skills needed to become successful in the performance and production of popular music. Berklee's program is ideal for such an audience because many of the skills necessary for success in popular music production make use of technology or are concerned with the development of non-performance skills, including composing, arranging, music theory, and mixing. In addition, the program grants flexibility to popular music artists who may want to learn new skills without giving up their performance schedule.

Summary

Online instruction in music performance has been studied primarily for its use in synchronous real-time video lessons. Current network capabilities, however, place limitations upon content delivery in the videoconferencing format. With the increasing capabilities of Internet connectivity, developed by the collaboration known as Internet2, synchronous online music performance instruction continues to advance. Online music performance instruction, however, is not limited to synchronous videoconferencing formats. Asynchronous instructional formats are used frequently for the instruction of music. In the current study, the feasibility of utilizing both asynchronous and synchronous formats for teaching a three-lesson course in trombone performance was explored.

CHAPTER III

PROCEDURES

General Overview

The purpose of this study was to assess the feasibility of utilizing both asynchronous and synchronous approaches in online instruction of trombone performance. Feasibility was established by examining data for strengths and weaknesses in two areas: the impact of logistical and technological challenges on instruction and the ability of participants to comprehend and apply asynchronous lesson content in synchronous instructional settings. Determining success in both areas required the collection of both observational data and participant survey data.

Similar to the organization and pedagogical approaches employed by Berkleemusic.com, this study utilized both asynchronous and synchronous instruction to teach a three-lesson course in fundamental trombone performance skills. Participants accessed lesson content in an asynchronous environment by logging onto a blog designed specifically for this study named *Online Trombone Teacher.* Content was delivered using multiple media types, including images, diagrams, audio clips, video demonstrations, and text. This asynchronous approach was developed to give student participants a resource to be accessed during and following the study. Following the completion of each blog lesson, participants received instruction from a trombone performance teacher in a real-

time video lesson format. Whereas the asynchronous blog lessons were intended to develop a cognitive understanding of the course content, the synchronous real-time video lessons focused upon developing performance skills. The intent was to create an experience that included aspects of both independent and guided learning.

Blog Lesson Planning

Learning objectives for the blog lessons were chosen specifically to address three areas of fundamental trombone technique that require continual development from students of all ages. The three pedagogical areas chosen for this study were tone production, slide technique, and legato technique (Appendix A). To facilitate a variety of learning modalities, lesson content was delivered in multiple media formats, including text, images, diagrams, audio, and video. Activities and musical exercises were also provided to students as an outlet for developing skills.

The primary content of the each blog lesson was designed to be accessible by all participants, regardless of ability level. Musical exercises, however, were split into beginning, intermediate, and advanced difficulty. All participants were directed to practice beginning level exercises first before progressing to more difficult exercises. As a result, all levels of students were able to learn from the same blog lesson.

The objective of the first lesson was to develop tone through the examination of posture and breathing. The intention was for students to learn how to identify aspects of posture that inhibit the production of characteristic

tone. In addition, students practiced relaxed breathing techniques through exercises introduced in the blog lesson. Coupled with brief textual explanations, images were the primary resource used to demonstrate exemplary and detrimental posture. Instructor-created video content was utilized to demonstrate techniques for improving the breathing process. A posture observation activity and three written exercises were assigned to be practiced before participating in the first real-time video lesson.

Slide technique was the subject of the second blog lesson. The primary learning objective was to develop a relaxed hand position through the practice of exercises that incorporate half-step motion and the chromatic scale. Organization of the second lesson was similar to the first lesson. Because slide technique is observed easily, video presentations were the primary method of content delivery. With the exception of the introduction, textual content was limited to brief statements.

For the third blog lesson that addressed legato technique, a slightly different approach was conceived. Because students frequently harbor misconceptions concerning the sound and development of trombone legato style, a "myth busting" approach was developed. Several false statements about trombone legato technique were presented and refuted with the aid of video demonstrations taken from YouTube. The primary learning objective of this lesson was to categorize legato technique into three components: consistent airflow, precise articulation, and relaxed, yet quick, slide technique. Students were directed to practice and be able to perform one lyrical song aurally and one

from sheet music provided on the blog. Advanced students also were required to practice an etude from a commonly used legato technique book.

All blog lessons were created with the intent of developing a cognitive understanding of each learning objective. Participants then had the opportunity to apply that understanding to their own trombone playing through the practice of musical exercises assigned from the blog. After engaging the lesson material independently, participants received real-time video lessons from a trombone performance instructor. Real-time video lessons were designed to clarify content and develop skills in a supervised environment.

Real-time Video Lesson Setup

Due to the large number of technological and logistical hurdles, preparation for real-time video lessons was much more extensive than traditional lessons. Limiting the negative implications of the technology while accentuating the positive attributes inherent with increased communication capabilities necessitated careful planning. Precise procedures, for both instructor and participants, were followed to ensure that the process of connecting to real-time video lessons was as simple as possible. Deviation from the written procedures, nevertheless, was an unwelcome but necessary eventuality for individual participant circumstances.

Following initial contact with the instructor, participants prepared their computers for the upcoming real-time video lessons in accordance to an instructional handout created for the study. The minimal technological requirements needed for participation included access to a computer with a

microphone, a webcam, speakers, and an Internet connection. Variances in participant equipment quality were unavoidable; however, the instructor's equipment and setup were consistent throughout the study. All lessons were conducted using the same laptop computer from one of two locations. The instructor's location was determined based upon Internet connectivity. Auxiliary speakers and a Zoom H4n microphone were attached to the instructor's computer to ensure a higher quality of sound input and output, thus enabling more accurate assessments of student performance.

In addition to the technological requirements, participants were requested to sign up for the social networking service Google+ (pronounced Google Plus). Although the social networking aspect of online music lessons is an integral component of Berkleemusic.com, examination of this component was beyond the scope of this study and therefore not explored. Instead, Google+ was utilized for its video chat application, Google Hangout, a free service that requires little setup and is relatively easy to use. The videoconferencing application also allowed instruction to be recorded and uploaded directly to YouTube. To ensure the utmost confidentiality, the privacy settings for each uploaded video were set to private.

Google+ was selected instead of other videoconferencing software because it is free and accessible to anyone with an Internet connection. The videoconferencing application Skype also was considered. Despite its popularity

among online music performance instructors,[76] Skype was not selected for use in this study because of logistical reasons. Whereas Skype requires users to install the complete program on their computers, Google+ requires only the installation of a browser plug-in. "A plug-in is a (sometimes essential) piece of software code that enables an application or program to do something it couldn't [do] by itself."[77] Adobe's Acrobat Reader, a plug-in that allows for pdf documents to be accessed in an Internet browser, is an example of a common browser plug-in.

Enabling the video chat function between two Google+ accounts required participants to install the appropriate plug-in prior to the first real-time video lesson. Although two students experienced difficulty in the installation process, all were eventually able to access Google Hangout. In addition, connecting with students using Google Hangout required the addition of each participant to the instructor's circle (a friendship organization system created by Google for use in their social networking site). To facilitate this portion of the study, each participant completed a basic information form in addition to the necessary consent forms. With that information, the instructor was able to locate each participant's Google+ account. When the real-time lesson day arrived, participants logged into their Google+ accounts five to ten minutes prior to the scheduled time and waited for the instructor to initiate first contact using Google Hangout.

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[76] Tim Woodall, "Connecting the World," *Strad* 124, no. 1473 (January 2013): 56.

[77] "What Are Plug-Ins?".

Conducting Real-time Video Lessons

Real-time video lesson content was developed carefully to accommodate the technological shortcomings inherent in the format. Whereas traditional lessons may involve both the student and the instructor warming up or playing etudes together, latency issues caused real-time video lessons to involve more individual playing. Activities typically conducted in traditional lessons were modified to fit the real-time video format. Success varied with each approach, but many exercises proved functional with minimal adjustment.

In addition, pedagogical approaches that utilized the screen-sharing app associated with Google hangout were explored. Apps are programs within larger programs that provide added functionality. Screen-sharing allows for a videoconferencing user to display content on another user's computer. This function was used to view YouTube videos and recordings of student performance without the hassle of emailing files. Portions of student performances were recorded using a free software program called Screencast-O-Matic. Following the completion of one or more musical exercises, participants were shown video recordings of themselves using the screen-sharing app. Participants then were asked to assess their performance using content gleaned from asynchronous blog lessons.

Real-time video lesson content varied depending upon the student's background and ability level. Although many activities were planned prior to real-time video lessons, the needs of the student modified the delivery of lesson content frequently. Although the core content of each real-time video lesson

remained the same, college trombonists, high school students, and music education students all received lessons of varying organization and content delivery.

Assessment

Data was collected for this study in two different ways: written observations of real-time video lessons from the instructor, and a participant survey conducted following the completion of the final real-time video lesson. Written observations were completed initially using a shorthand method developed specifically for this study (Table 1). Following the conclusion of each real-time video lesson, the instructor clarified shorthand notes with more detailed descriptions. Each lesson was evaluated for strengths and weaknesses in two different areas: the impact of logistical and technological challenges on instruction, and participant comprehension of asynchronous blog content.

Participants' opinions of both the blog lessons and the real-time video lessons were collected by means of an anonymous online survey. The survey was created and conducted using the Google Form tool, an application associated with Google Drive. Participants received the link to the survey following the completion of the final real-time video lesson. The format of the survey included rating and short answer items. Rating items were used to determine the participant's impressions of the technological and communications aspects of the study. Participants were presented with a statement such as "I was able to see the instructor," and asked to rate their agreement of the statement on a 1-5

Table 1. Shorthand for real-time video lesson assessment.

Pedagogy: **GOA -** Good Online Activity *(Technology aides or does not inhibit content delivery)* **BOA -** Bad Online Activity *(Technology prevents an activity from working)* **TED -** Trombone Evaluation Difficulties *(Sound quality or visual quality affects the ability to evaluate student performance)* **Communication:** **ICI -** Instructor Communication Issue *(Trouble explaining something due to technological constraints)* **SDI -** Student Demonstration Issue *(Trouble getting into frame, too far away from camera, etc…)* **IDI -** Instructor Demonstration Issue *(Trouble getting into frame, too far away from camera, etc…)* **Technology:** **CP -** Connection Problem *(Trouble with initial connection)* **VP -** Video Problem *(Video drops out or isn't present)* **AP -** Audio Problem *(Audio drops out or isn't present)* **LP -** Lag Problem *(Excessive lag issues)*

Likert-type scale, 1 standing for "Strongly Agree," and 5 standing for "Strongly Disagree." Determining the participant's experience with the pedagogical approaches utilized in both the blog and real-time lessons required a short answer format.

Summary

The feasibility of utilizing both asynchronous and synchronous online instruction to deliver online lessons in trombone performance required the development and implementation of a three-lesson curriculum. Each blog lesson and real-time video lesson was constructed with the intent of enhancing skills in one of three areas of trombone technique: tone production, slide technique, and legato technique. The instructional format was assessed for strengths and

weaknesses in two areas: the impact of logistical and technological challenges on instruction, and the participant's ability to comprehend and apply asynchronous lesson content during synchronous real-time video lessons. The trombone instructor, using a shorthand method developed for this study as well as written reflections, assessed student comprehension in real-time video lessons. Participants evaluated both blog and real-time video content by completing an anonymous online survey. Following the completion of the study, data was organized and examined to determine the feasibility of combining both asynchronous and synchronous instructional approaches for teaching music performance skills in an online setting. The results of the study are presented in the following chapter.

CHAPTER IV

RESULTS

Introduction

Through the combination of asynchronous and synchronous online music performance instruction, participants were given the opportunity to engage lesson content both individually and with guidance. While conducting this study, this method of instruction was assessed for strengths and weaknesses in two different areas: the impact of logistical and technological challenges on instruction, and participant comprehension of asynchronous blog content. Both observational data and participant survey data were organized and examined to determine the feasibility of utilizing both asynchronous and synchronous instruction for online music performance lessons.

Assessment of Technological and Logistical Impacts on Instruction

To assess the impact of technological and logistical factors on instruction, the instructor produced observational data during and following the completion of each lesson. Data collected for this purpose was focused primarily upon the assessment of synchronous real-time video lessons. Similar to previous projects, including Dammers' Rowan University study, observational data from this study indicated that the videoconferencing software helped and hindered various aspects of instruction.

Observational data suggested that technological factors often influenced instruction positively. Favorable conditions were most noticeable in the first lesson that focused upon the development of tone through an examination of posture. Because instruction was conducted using videoconferencing software, both student and instructor were required to position their bodies to be visible within the frame of the computer screen. In turn, posture became a more prominent focus point of each lesson. For example, to make sure students were able to see proper slide technique, the instructor had to position his hands within the frame of the screen, thus channeling student attention to that area. In addition, the real-time video format also allowed for accurate assessments of rhythm and tuning except for when the videoconferencing session was affected negatively by latency issues.

Lag time, created by increased latency, did not impact instruction substantially. The presence of lag time only prevented student and teacher from playing trombone at the same time. Latency induced reductions in audio and video quality, however, occasionally proved problematic. As mentioned earlier, when Internet connectivity is low, audio and video quality are sacrificed to reduce the level of latency. Videoconferencing applications, including Google Hangout, reduce latency by dropping packets of data. When less data is being transmitted and received, the audio and video quality is reduced. Although audio and video issues were present somewhat in every real-time video lesson, the impact upon instruction was minimal in most cases. For some lessons, however, the videoconferencing software dropped enough packets of data to

affect instruction and assessment negatively. Even with high connectivity and high-end recording and playback equipment attached to the instructor's computer, audio and video quality was frequently determined by the participant's location and equipment. Participants with more sophisticated equipment tended to experience lessons with higher levels of audio and video quality. Consequently, instruction and assessment were impacted less during these lessons.

Audio quality also was affected by the combination of latency issues and reverberation. Because a specific location was not a requirement for participation in this study, students utilized many different locations during real-time video lessons. Most participants used school practice rooms; however, bedrooms, kitchens, and even a church basement, also were utilized during this study. When high levels of latency affected the videoconferencing session, the reverberation of the room negatively impacted the quality of sound. In less reverberant rooms, tone quality and articulation became increasingly muffled, preventing accurate assessment of student performance. Conversely, overly reverberant rooms frequently resulted in distorted sound quality. Although the problem was unavoidable, participants who rotated the bell away from the microphone lessened the impact of reverberation upon audio quality.

Although fair assessments of posture, rhythm, and tuning were possible, specific aspects of trombone performance were not easily observed or corrected using the real-time video lesson format. Poor audio and video quality often prompted the instructor to assess student performance using non-traditional

methods. Tone, for example, more often was determined by the quality of articulation, rather than the overall sound. If the end of each note sounded closed off, the tone quality was most likely also affected.

Visual diagnosis was more frequently utilized for assessing performance in real-time video lessons than in traditional lessons. Because poor audio quality prevented accurate aural diagnosis, the instructor's attention was drawn toward the impact of posture and slide technique on performance. Consequently, appraisals of sound were coupled with visual inspections. If no problems were detected visually, then the primary cause of poor performance was deduced using the process of elimination. This method of assessment, although more time consuming than the traditional format, proved functional to the instruction of basic trombone technique. Although traditional lessons provide an environment that is more conducive to highly detailed assessments of student performance, data collected during this study indicated that student learning in synchronous real-time video lessons was not only possible, but was improved with the addition of asynchronous content.

Student Comprehension of Asynchronous Content

Student comprehension of asynchronous content refers to the student's ability to understand and apply blog lesson content. Asynchronous lessons were designed to limit reading to small segments interspersed between objects of other media types. The intent was to discourage skimming and encourage careful reading, thus increasing student comprehension. The model for this design was adapted from Berkleemusic.com, a program that has earned several awards for

course design. In general, participants were able not only to understand blog lesson content, but also to apply lessons learned to real-time video lessons.

Testing each participant's ability to apply asynchronous content required a creative approach to assessment. Because eight out of nine participants study trombone regularly from a private instructor, the assessment of trombone technique was not a valid way to evaluate student comprehension. Instead, real-time video lessons were designed to include activities that directly indicated careful study of blog lesson content. Often, simple questions concerning the asynchronous lesson content sufficed. Creative activities that utilized technological resources, however, proved to be more beneficial to assessment and student learning.

The most useful activity of this type involved students applying concepts learned from the blog lessons to mock teaching situations. Students performed this activity in one of three ways. The first method required the instructor to mirror a student's playing style back to her/him. Students were then prompted to assess and provide instruction for alleviating any technique issues that were observed in the instructor's demonstration. Although this methodology is sufficient for traditional instruction, participants occasionally had difficulty discerning technique issues due to low audio and video quality. To alleviate this issue, a second approach was employed. Using videos taken from YouTube, participants performed the same type of assessments, only with the performers on the video instead of the instructor. Students who had studied the blog were

able to quickly identify problematic technique issues. Those who had not studied the blog lessons were unsuccessful during this exercise.

The third method for testing comprehension proved to be the most accurate and beneficial. After watching a video playback of their performance of a musical exercise or song, participants were able to provide solutions to their own technique issues. Although the recordings were not of the highest quality, students were able to quickly identify issues and subsequently hear progress made from the application of concepts learned in the blog lesson. This activity proved beneficial not only for assessment of student comprehension, but also for individual student achievement. Many participants responded positively to this activity, both in person and in the survey:

> The use of recording and playback is a huge benefit. This allows not only for aural help but also for visual help that might not be possible without the use of recording.

Through the employment of the assessment activities discussed above, the instructor was able to determine student comprehension of asynchronous lesson content. In general, participants who had carefully studied the blog were able to demonstrate comprehension. Those who admitted to not reviewing the blog content had more trouble achieving success during these assessment activities.

Participant Perceptions of Blog and Real-time Video Lesson Content

Following the completion of the final real-time video lesson, participants were asked to complete an anonymous online survey. The survey is presented in its entirety in Appendix B. The results of this survey are presented in Appendix

C. The survey contained thirteen items: one item attaining background information, six items ranking participant agreement with statements concerning accessibility of lesson content, five items gauging participant perception of logistical and technological impacts on instruction, and one item providing additional space for comments and suggestions. Of the nine participants involved in the study, eight completed the online survey.

Item 1 was included to determine each participant's previous experience with private trombone lessons. Of the eight responses, all but one participant had received at least some private instruction in trombone performance. In Items 2-7, participants responded to six statements concerning accessibility of both blog and real-time video content. The first four items of the series addressed each participant's ability to see and hear the instructor during real-time video lessons. The remaining two Items collected data on participant perception of blog content. Results for this section are presented in Table 2.

Accessibility of both the blog and real-time video content generally received favorable assessments from participants. As determined from Items 2-4, all students were able to see and hear the instructor speak and play trombone during real-time video lessons. Item 5 was included to determine participant reaction to the effects of latency on instruction. Seven participants at least somewhat agreed that the delay did not inhibit learning. One student, however, disagreed. In Items 6 and 7, participants indicated that not only were they able to access the asynchronous blog content, but they also felt that the blog benefitted their learning.

Table 2. Participant responses to Items 1-8. For Likert-type scale items, 1=strongly agree and 5=strongly disagree.

Item Number	Question/Prompt	Participant Responses							
		1	2	3	4	5	6	7	8
1	Have you ever taken a private trombone lesson?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
2	I was able to see the instructor	1	1	1	1	1	1	1	2
3	I was able to hear the instructor speak	2	1	1	1	1	1	2	1
4	I was able to hear the instructor play the trombone	1	1	2	1	1	1	2	2
5	The delay in the video and sound did not keep me from learning	1	1	2	1	1	2	1	3
6	I was able to access the website's instructional content (videos, pdf's, pictures) with ease	1	2	1	1	1	1	2	2
7	The content on the website was beneficial to my learning	1	1	1	1	1	1	2	2
8	Given the opportunity, would you take a real-time video lesson again?	Yes, but I would like to take traditional lessons as well.				6 responses			
		Yes, but I would prefer a traditional lesson.				2 responses			

Item 8 was included to determine each participant's willingness to engage in additional real-time video lessons. Six participants responded that they would take a real-time video lesson again, but they would like to take traditional lessons as well. The other two participants also answered yes to this question, but they both would prefer to take traditional lessons.

In Items 9-13, more detailed responses regarding specific aspects of the study were acquired. For Items 9-12, participants answered yes/no questions and elaborated with short written responses. Additional comments and suggestions were obtained in Item 13.

In Item 9, participants were asked, "Did the blog lessons enhance your learning?" All but one participant answered yes to this question. In general, participants appreciated the extra instruction with one student responding, "These lessons gave me a different perspective when listening to my own sound. The feedback given was also as accurate as when given in person." A second participant reported, "It allowed me to work on some of the lesson material before the lesson began, which let us have a better work flow during the [real-time video] lesson." Despite the one negative response, these reactions indicate that blog lessons may help to focus students' attention on the more important aspects of each lesson, thus increasing productivity of real-time video lessons.

Responses to Item 10 confirmed this theory; all eight participants indicated that the blog lesson helped in gaining a better understanding of the material prior to the real-time lesson. Written responses to this question reflected the positive results of Item 9 with one student stating:

> By studying the material beforehand, [the blog lessons] granted me the opportunity to prepare what I felt was my best. When the instructor would give constructive criticisms, I was able to attain more knowledge.

This statement may substantiate the notion that participants learn more efficiently in synchronous lesson environments by first studying lesson content independently in an asynchronous environment. Survey results for Item 10 parallel instructor assessments of the combination of asynchronous and synchronous approaches. Instructors of both real-time video lessons and traditional lessons may see an increase in student achievement if similar approaches were implemented.

Results for Item 11 were less consistent than previous questions. Six participants indicated that the real-time video lesson format did not affect their ability to learn. Two reported that the technology impacted their learning negatively. Participants mentioned latency issues as being problematic for instruction, the severity of which differed with each participant response. In spite of some negative impressions of the format, all participants indicated that they would indeed be willing to continue studying trombone, or any other instrument, using this instructional format. Responses to Item 12 signified that the accessibility and convenience of the format were positive enough attributes to justify future online music performance lessons.

In Item 13, participants were given the opportunity to provide additional comments and suggestions. Of the three students who answered this Item, two mentioned the audio/video quality as being a concern for instruction in this format. Were a larger scale version of this study to be implemented in the future,

improvements in connectivity and equipment, especially on the student's end, may alleviate these concerns.

Summary

By utilizing both blog and real-time video formats to teach lessons in trombone performance, instruction was able to be delivered to students with relative ease. Participants were also better able to understand and apply learning objectives to real-time video lessons by initially accessing content through an asynchronous approach. Consequently, student achievement was increased because of this format. Although the format required acclimation for instructor and student, both parties were able to see the benefits of employing online resources to teach music performance. The technology necessary for providing music performance lessons over the Internet is flawed. The merits, however, as determined by instructor and participant data, are strong enough to warrant further study.

CHAPTER V

CONCLUSIONS AND SUGGESTIONS

Summary

Since being introduced into classrooms in the late 1990s, online instruction has grown substantially both in student enrollment and the number of programs offered at state, district, and multi-district levels.[78] Although having been applied liberally to all core subjects and many supplemental subjects, online instruction has yet to be utilized extensively in the musical arts. Courses in music performance present a unique set of technological and logistical challenges when adapted to an online setting. Nevertheless, private music teachers have utilized Internet resources extensively. Similar techniques applied to public school music programs, however, have yet to be explored thoroughly. Utilizing a combination of asynchronous instruction and synchronous instruction for teaching online music performance courses offers a potential for study and development.

The purpose of this study was to determine the feasibility of utilizing both asynchronous and synchronous approaches for teaching an online course in trombone performance. Completion of the study required the development of a three-lesson program that delivered content through both blog and real-time video instruction. Created specifically for this study, the blog, *Online Trombone*

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[78] John Watson et al., *Keeping Pace with K-12 Online Learning: An Annual Review of Policy and Practice*, Annual Review (Evergreen Education Group, 2011), 6.

Teacher, was utilized to present instruction in trombone fundamentals. Participants accessed blog content during their own time, not in the presence of the teacher, categorizing this portion of the study as asynchronous instruction. Following the completion of each blog lesson, participants engaged in real-time video lessons with a trombone performance instructor. Although the student and teacher were not in the same room, interaction took place at the same time using a videoconferencing application, categorizing this portion of the study as synchronous instruction.

Data was collected for this study in two different ways: written observations of real-time video lessons from the instructor and a participant survey conducted at the conclusion of the final real-time video lesson. Both sets of data yielded positive responses. Through the course of the study, observational data indicated that traditional pedagogical approaches transferred well into the real-time video format. In addition, participants were able to apply information from the asynchronous blog lessons to performance in synchronous real-time video lessons. The presentation of content through asynchronous instruction allowed participants to understand the learning objectives for each lesson on their own time and at their own pace. Consequently, learning was enhanced during real-time video lessons because learning objectives were presented beforehand and well understood by student participants.

Conclusions

The objective for this study was to determine the feasibility of utilizing both asynchronous and synchronous approaches for teaching an online

trombone performance course. Feasibility was established by determining the strengths and weaknesses in two areas: the impact of logistical and technological challenges on instruction and the ability of participants to comprehend and apply asynchronous lesson content in synchronous instructional settings. Results indicated that by combining both asynchronous and synchronous approaches, online instruction in an appropriate setting is a feasible method of teaching fundamental music performance skills.

Logistical and technological challenges did impact the delivery of instruction during real-time video lessons. Student learning, however, was still possible in this format. Technological limitations necessitated alternative approaches for assessment and instruction. Although the delivery of instruction required more time than in traditional lessons, students were still able to comprehend and apply suggestions from the instructor during synchronous instruction. Technological aids, including YouTube videos and recording technologies, were incorporated to facilitate and enhance instruction.

Student learning in synchronous music performance lessons also was supplemented through the application of asynchronous instruction. This method of instruction allowed for participants to access lesson content at their own pace. By doing so, students were able to achieve a more thorough understanding of the content before engaging in the real-time video lessons. Employing methods of assessment devised for this study, participants were able to demonstrate comprehension of asynchronous lesson content. Furthermore, participants also

were able to apply asynchronous lesson content to performance in synchronous instructional settings through self-assessments utilizing video recordings.

The utilization of both asynchronous and synchronous approaches in online music performance instruction presents a feasible alternative or enhancement to traditional music instruction. Consequently, the format developed for this study is applicable for students who do not have access to a private instructor because of geographic location. Most notably, underserved student populations can benefit from receiving individualized music instruction in an online setting when the opportunity for traditional instruction is not available.

Although designed for trombone performance instruction, the methodology, not the content, was the focus of the study. Adaptation of this program to the instruction of other musical instruments likely could produce similar results. In combination with traditional music performance classes, including large ensembles, this format provides a feasible alternative to supplement individual student performance for every instrument type.

Suggestions for Future Study

The current study revealed the benefits of combining asynchronous and synchronous instruction. Although observations from the current study allowed for conclusions to be drawn, continued investigation into this approach will necessitate an examination into the effectiveness of the instructional format. A quantitative investigation with a larger number of participants is warranted for the conclusions of this study to be confirmed.

Future studies into the utilization of both asynchronous and synchronous approaches in online music performance instruction require a broader scope than the current study. The number of lessons produced for this study can be expanded to perform a more thorough examination of instructional methods during a longer period of time. An increased sample size with participants selected randomly from a larger pool of pre-college and college students will yield more concrete conclusions. Furthermore, a greater number of pre-college student participants may spur the eventual implementation of this instructional format into already established online learning programs.

This format of instruction is well suited for blended learning environments and supplemental online programs. In remote geographical areas, location denies many students an opportunity to access private music instruction. Online resources in music performance education can provide access to music instruction for any student who is connected to the Internet. By developing options for online music performance study, virtual schools and blended learning courses developed within existing middle and high school programs can provide underserved populations with essentially identical opportunities afforded to students in more populated areas.

Several similar studies have been conducted that concern the effects of guided-practice instruction on individual student performance. These previous guided-practice instruction studies were conducted in traditional settings,

without the aid of online resources.[79] By contrasting and comparing the traditional format of these previous studies and the online format of the current study, improvements to instruction in both settings may be discovered.

In addition, similar studies can be conducted for the instruction of other musical instruments. Although the current study utilized trombone performance instruction as a means to investigate the feasibility of combining asynchronous and synchronous approaches, similar results can be achieved with other instrumental groups. Utilization of similar instructional methods with course content created specifically to meet the needs of a particular instrument group will yield similar results to the current study.

Continued investigation into utilizing both asynchronous and synchronous approaches for teacher education courses in music performance instruction is also suggested. Because only one participant in the current study was a music education student whose main instrument was not trombone, no conclusions were drawn concerning the development of pre-service music teachers. Similar, yet expanded, versions of the current study may prove to be highly beneficial for music teachers who wish to develop a more thorough understanding of other musical instruments. Although music teachers may wish to develop greater playing proficiency on every instrument, online instruction may enhance understanding more if focused upon developing pedagogical skills.

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[79] Jeffrey Allen Wardlaw, "The Effects of Guided-Practice Instruction on the Weekly Performance Achievement of University Brass Students" (D.M.A. dissertation, University of North Carolina at Greensboro, 1997), 10.

The study and application of online learning approaches to music performance instruction offers tremendous potential. Although many music instructors already utilize videoconferencing applications as a means for teaching private students, pedagogical approaches that truly revolutionize music instruction have yet to be explored. Consequently, a feasible method for the delivery of online music performance instruction has not yet been developed or implemented on a large scale. Online music performance instruction has an identical potential for development as has the online instruction of core academic subjects. As technological advances become available, the potential for delivering online instruction in areas of the performing arts, and especially in music performance, appears to present unlimited possibilities for integration into the curricula of many digital learning programs.

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APPENDIX A

ASYNCHRONOUS BLOG LESSONS

Online Trombone Teacher

Tuesday, November 20, 2012

Lesson 1 - Developing Tone

Goals

Following the completion of this lesson, the student will be able to:

1. Describe how the torso, the right hand, the left hand, and the shoulders are positioned while playing the trombone.
2. Identify possible areas of tension by examining themselves in the mirror while holding the trombone.
3. Perform "off the trombone" breathing exercises.

The greatest contributor to the development of good tone is the air. Unneeded tension in the breathing process leads to a strained and unresponsive tone. To develop a breath that is free of tension, we must focus on how the body works during the inhalation and exhalation.

Posture

Good posture is necessary for the breathing process to work at its highest efficiency. The following sets of pictures will demonstrate examples of good posture and hand position as well as common problems to be avoided.

Standing Body Position

Good: The top of the head, shoulders, and hips are in a straight line

Bad: The body is slumped down causing the neck to crane forward, the shoulders to slump forward, and the sternum (the bone that is in the middle part of the ribcage) to sag inward.

Seated Body Position

When seated, the top of the head, shoulders, and hips must still line up.

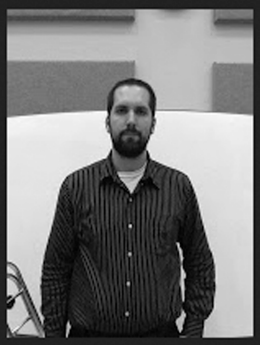
Good: The back is off of the back of the chair. The feet are flat on the ground. The trombone is aimed slightly down.

Bad: The body is slumped backward in the chair causing the shoulders to become more rounded and the neck to crane forward.

Bad: The trombone slide is being aimed at the ground causing the whole torso to slump forward.

Bad: Although the head, shoulders, and hips are lined up, the angle of the trombone will cause unneeded pressure on the top lip.

Shoulders



Good: The shoulders must be relaxed and back, allowing the sternum to raise.

Good: Holding the trombone must not affect the shoulders.

Bad: Holding the shoulders up will cause tension to build up in the body. The slide movement will be greatly affected by tight shoulders.

Good: The instrument is held off of the shoulder, allowing the left hand to carry the weight of the instrument while the right hand can move the slide.

Bad: The instrument is being rested on the shoulder. This put a lot of pressure on the top lip and cause the right hand to support the instrument in 5th, 6th, and 7th positions.

Left Hand

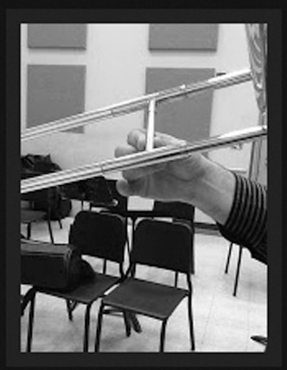
Original photo courtesy of Edwards Trombones http://www.edwards-instruments.nl/images/trombones/slide327.jpg. Additions done by Aaron Wilson.

Good: The left hand supports the entire weight of the instrument. The middle, ring, and pinky fingers suspend the instrument from the stationary brace on the slide while the pointer finger balances the instrument. There is no gripping involved. The image below indicates where the fingers should be placed when holding the slide.

Right Hand

Good: The right hand does not support any of the weight of the instrument. The slide that is farthest away from the mouthpiece is straddled between the middle and ring finger of the right hand with the thumb gently placed on the brace. When moving the slide, all parts of the arm (the knuckles, wrist, elbow, and shoulder) must work together to move the slide. The thumb pushes the slide out and the fingers draw the slide in.

Bad: If any part of the arm is tense, the player will not be able to move the slide rapidly or make fine adjustments for intonation. All three of the following examples will cause the elbow to control all of the slide's motion.



Activity

Stand in front of a full length mirror and examine your posture first without and then with the trombone. Look at how you hold your torso, your shoulders, and your head. With the trombone, examine your left and right hand. Is all the weight being supported by the left hand? Can you move the slide out with the thumb and back in with the fingers?

Breathing

The following video will discuss what muscles are used in the breathing process and how posture affects breathing.

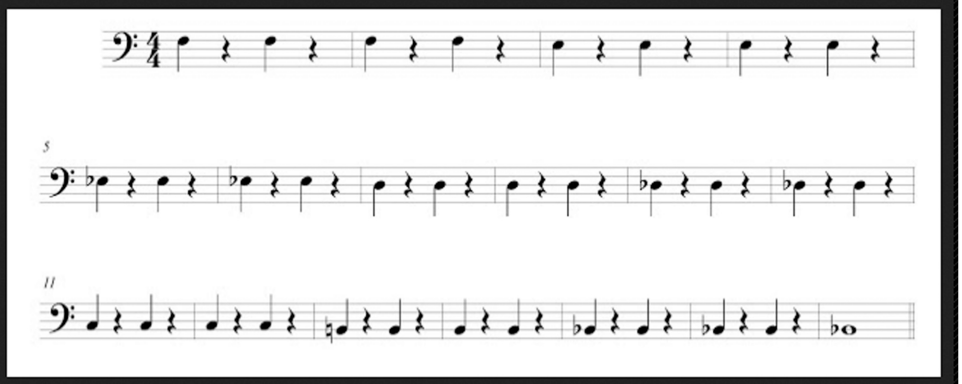
This next video will give some examples of "off the trombone" breathing exercises that you can do in your own time.

Exercises

Quarter Notes

With the quarter note exercise, our goal is to work on taking a consistent relaxed breath. Think about interrupting each inhalation with the exhalation, and visa versa, eliminating any gap in the breathing process. You should breathe after every note.

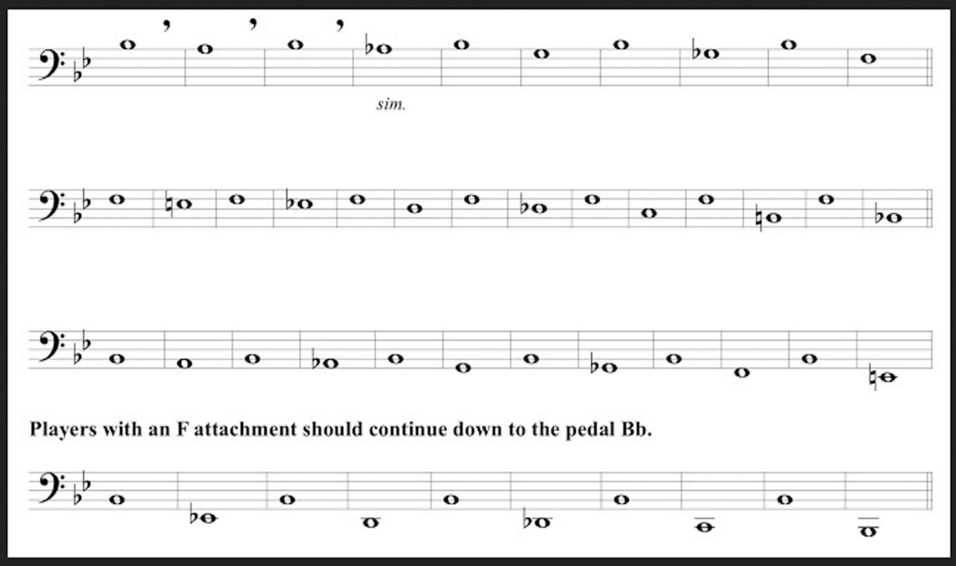
Download Quarter Notes Exercise (click File/Download)



Long Tones

Much like the quarter note exercise, you should breath after every note in the long tones exercise. Your breath will be very similar to the "off the trombone" breathing exercises discussed in the video.

Download Long Tones Exercise (Click File/Download)

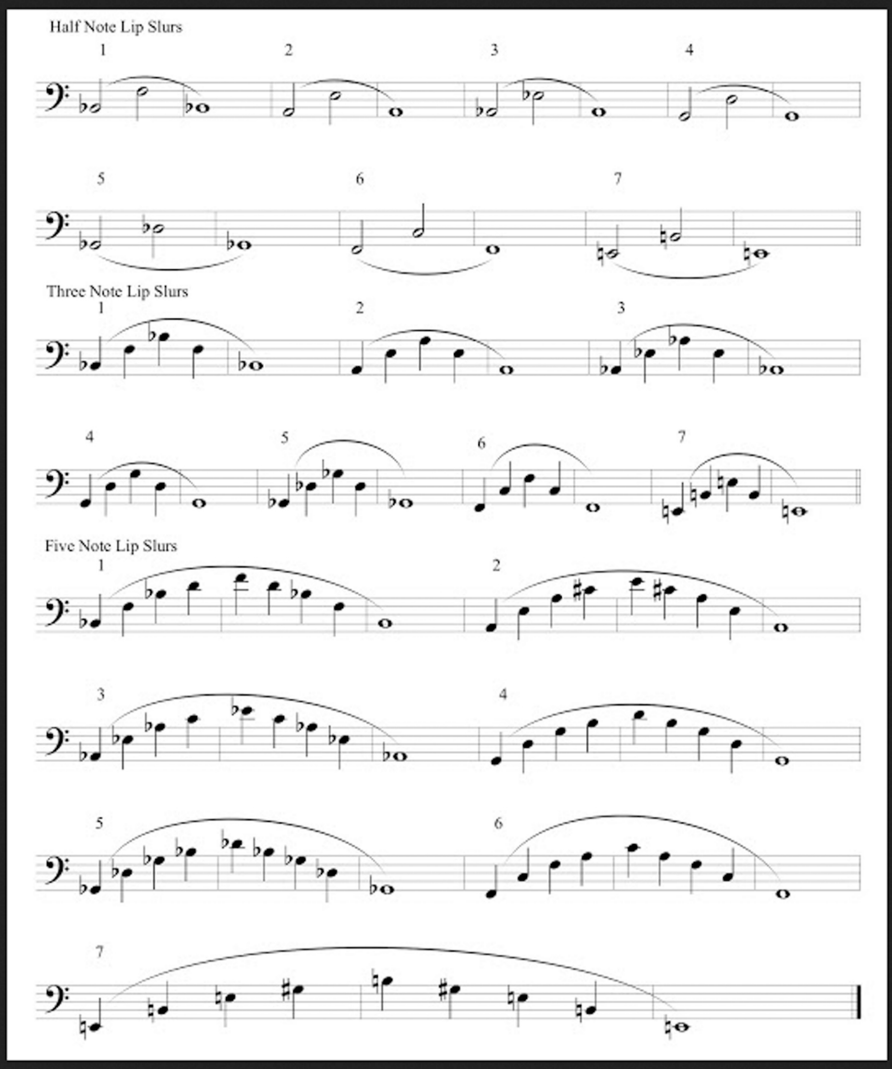


Courtesy of the Remington Warm-up Studies for Trombone

Lip Slurs

The purpose of lip slurs is to develop flexibility throughout the entire range of the instrument. When performing these exercises, only the first note of each slurred group should be tongued. The numbers above indicate the slide position. Try to hold out each note for its full duration before shifting to the next note. The shift must be instantaneous and relaxed. Try whistling each of these exercises before each attempt. The way that the air moves when whistling is exactly how it moves when playing the trombone. Try out the Half Note Lip Slurs and the Three Note Lip Slurs. If those exercises feel comfortable, try moving on to the Five Note Lip Slurs.

Download Lip Slurs Exercise (Click File/Download)



Courtesy of the Remington Warm-up Studies for Trombone

Online Trombone Teacher

Thursday, December 20, 2012

Lesson 2 - Slide Technique

Review of Posture

Before continuing with this lesson, take a moment to review the "Left Hand" and "Right Hand" sections of "Lesson 1 - Developing Tone."

Activity

Put the slide lock on and pick up the instrument with just the left hand. Now, play the first two bars of the quarter note exercise, taking the instrument off of the face to breathe between each quarter note. To free up the right hand, we must work on making the left hand independent and strong enough to support the instrument. Try this exercise in front of a mirror to check your posture and hand position.

The Mechanics of the Right Hand

To practice moving the slide effectively, we must understand what parts of the hand and arm are utilized. Take a look at your right hand and slowly make a fist. You should see that every joint in the fingers and thumb are moving to complete this action. Those joints also move when you play the trombone. Additionally, your wrist, elbow, and shoulder also move when playing trombone. All of the bendable parts of the arm and hand work simultaneously in trombone playing

Locking up any part of the arm or hand will force the other joints to work too hard, slowing down your slide speed. The most common problem with slide technique is locking the fingertips. Take a look at the pictures below. In each example, the fingers are unable to move, leaving too much work to the wrist and elbow.

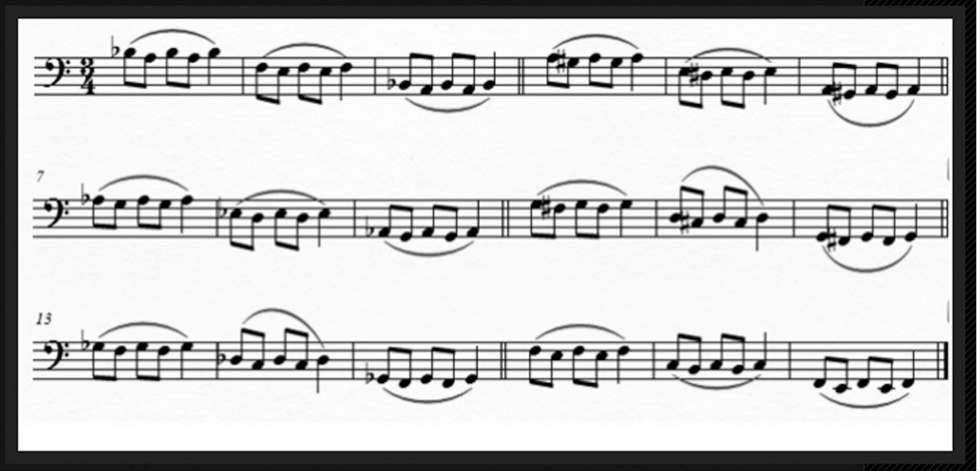
Check out this video for a more detailed explanation.

Developing Slide Technique

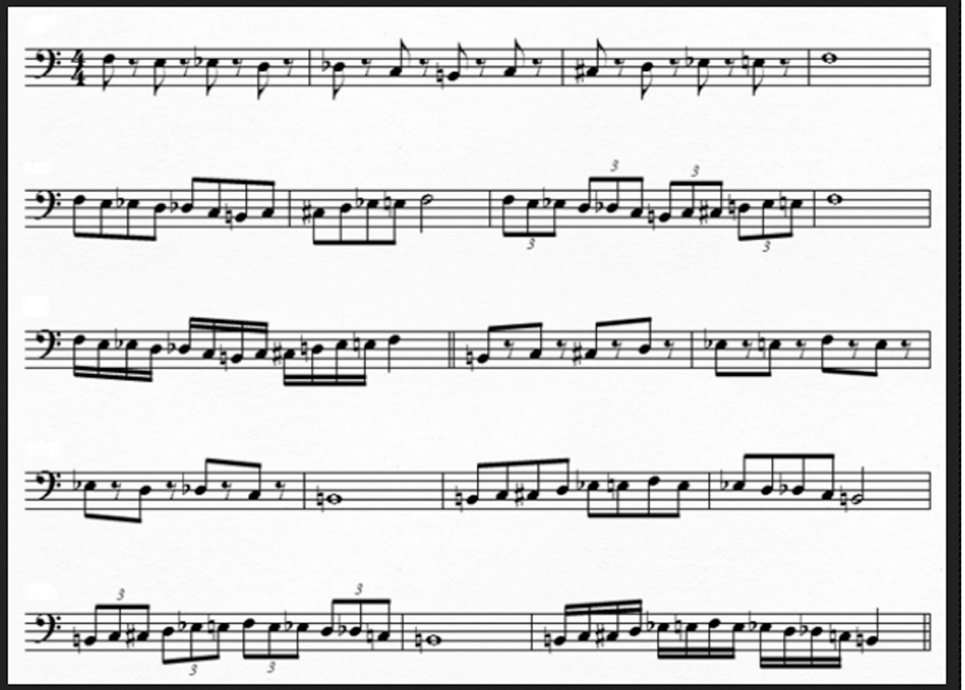
The following exercises are effective ways to develop comfortable and relaxed slide technique.

One Position Shifts

This exercise is taken from the Remington Warm-up Studies for Trombone. Focus on using the thumb to propel the slide out and the fingers to draw the slide in. You may even want to isolate the slide technique by playing all notes under one phrase marking as a glissando.



Chromatic Scale Practice



If you are really adventurous, try starting this exercise on a different pitch. It may be played in any register, starting on any note.

Exercises

The second page of the first lesson exercises contains exercises that are good for developing slide technique. If you need another copy of the exercise, you may download it here. (file/download).

Online Trombone Teacher

Friday, January 25, 2013

Lesson 3 - Legato

Trombone Legato Myths

The trombone is incapable of playing in a legato style.

False! Although the trombone lacks the valves that the other brass instruments have, it is still possible to play in the legato style. Trombonists instead rely on a steady airstream to create the connected sound and the tongue to articulate the beginning of each note. Listen to the recording below to hear a great example of trombone legato.

Playing in the legato style requires less air.

False! The legato style requires constant air to create a connected sound. To play in a lyrical and legato style, all of the notes must be connected. It is often a good idea to practice a legato piece using no articulation to work on blowing through each phrase. Once the air stream is made consistent, the articulation can be reintroduced.

To play in the legato style, the player must tongue softly and farther back in the mouth.

False! Legato playing requires a constant air stream. If the tongue is too far back, it will interrupt the air stream with each articulation. Instead the tongue must remain flat and forward. Articulation is generated with a flicking motion of the tip of the tongue. The point of articulation is on the back of the top teeth. Think of the tongue as moving up and down to interrupt the air stream, rather than back and forth.

Listen to the vocalist in the recording above connects each word of the song. The articulation does not hinder the sound being produced. Trombone legato is much the same. The various consonant sounds found in vocal music reflect the varying weight and articulation strength trombonists place on each note in the legato style.

The slide moves slowly when playing in the legato style.

False! The slide moves quickly in legato playing. The key to great legato playing is to stay on each note as long as possible and move the slide quickly and smoothly when switching notes. If the slide technique is sloppy or rigid, the connections between notes will sound forced.

Although this video is very silly (and may cause nausea), David Finlayson's slide technique is impeccable. His slide motions are quick without affecting the tone.

The trombone must play soft to play in the legato style.

False! Although lyrical music often requires the full range of dynamics, it is not all meant to be quiet. The sound must always be full and vibrant.

Activity

Think of a simple song like "O, Danny Boy" or "Yesterday" and sing this song out loud (really belt it out!). Do you notice how the sound of your voice does not stop between each word of the song? Learn that song on the trombone in any key and try to emulate that sound quality on the trombone. If you can't think of an easy song, try "My Country tis of Thee." **Be ready to play your song during your real-time video lesson.**

Exercises

Practice "Amazing Grace" before your next real-time video lesson. For the trombone majors, also bring a Bordogni etude of your choice.

Amazing Grace pdf (file/download)

APPENDIX B

PARTICIPANT SURVEY

Participant Survey

This is the questionnaire that you are asked to complete after you have taken your online trombone lesson(s).

Have you ever taken a private trombone lesson?
This does not include the online trombone lesson(s) you just completed.

- (●) Yes
- ( ) No

Using the following scale from 1 (Strongly agree) to 5 (Strongly disagree), rate each of the following statements.
All of these statements refer to the online trombone lesson

	1-Strongly Agree	2-Somewhat Agree	3-Neither Agree nor Disagree	4-Somewhat Disagree	5-Strongly Disagree
I was able to see the instructor	( )	( )	( )	( )	( )
I was able to hear the instructor speak	( )	( )	( )	( )	( )
I was able to hear the instructor play the trombone	( )	( )	( )	( )	( )
The delay in the video and sound did not keep me from learning	( )	( )	( )	( )	( )
I was able to access the website's instructional content (videos, pdf's, pictures) with ease	( )	( )	( )	( )	( )
The content on the website was beneficial to my learning	( )	( )	( )	( )	( )

Given the opportunity, would you take a real-time video lesson again?
A traditional lesson is one that is taken face-to-face with the instructor in the same room.

- ( ) Yes. I prefer this format rather than a traditional lesson.
- ( ) Yes, but I would like to take traditional lessons as well.
- ( ) Yes, but I would prefer a traditional lesson.
- ( ) No. I would prefer a traditional lesson
- ( ) No, I am not interested in taking lessons.
- ( ) No opinion

Did the blog lessons enhance your learning?
This is the material you studied prior to the lesson

- Yes
- No

Why or why not?

Did you gain a better understanding of the material by studying the blog lesson prior to the real-time lesson?

- Yes
- No

Why or why not?

Did the format of the real-time video lesson affect your ability to learn?

- Yes
- No

Why or why not?

Would you continue studying trombone (or any other instrument) using this instructional format?

This question refers to the combination of blog and real-time online lessons.

- Yes
- No

Why or why not?

Please include any additional comments or suggestions

Submit

APPENDIX C

PARTICIPANT SURVEY RESPONSES

ITEM 9 Did the blog lessons enhance your learning?	
RESPONSES	7 YES, 1 NO
WRITTEN RESPONSES	
It was the same stuff covered in the lesson.	It provided an extra opportunity to learn outside of class.
It allowed me to work on some of the lesson material before the lesson began, which let us have a better work flow during the lesson.	These lessons gave me a different perspective when listening to my own sound. The feedback given was also as accurate as when given in person.
I was able to study the proper setup examples and work through it on my own in different settings. I didn't have to worry about fitting it into the limited lesson time.	Particularly when a short video of my playing was played back to me, I was able to hear things I wasn't able to capture myself, especially with beginnings and ends of notes. The only downside was that I couldn't get a clear representation of tone, but fixing things like articulations were really beneficial in attaining a noticeable difference in tone.
The blog lessons prepared me for the actual video lesson.	

ITEM 10 Did you gain a better understanding of the material by studying the blog lesson prior to the real-time lesson?	
RESPONSES	8 YES, 0 NO
WRITTEN RESPONSES	
By studying the material beforehand, it granted me the opportunity to prepare what I felt was my best. When the instructor would give constructive criticisms, I was able to attain more knowledge.	When reading the material beforehand, my own thoughts and opinions on the matter were formed. Then when reviewing them with the teacher, instead of relearning, I was merely tuning the knowledge that I had already received.
Yes, I could dissect the music prior to the lesson.	The student knows what to practice and work on before each lesson as well as what topics will be covered.
It was good for reference.	It gave me a good idea of what was going to be covered in the lesson.

ITEM 11 Did the format of the real-time video lesson affect your ability to learn?	
RESPONSES	2 YES, 6 NO
WRITTEN RESPONSES	
It was easy and convenient.	No real problems.
The quality of sound from the instructor was harder to perceive when he played the instrument. However, the video allowed for recording, which then could be reviewed. This allowed for mistakes and inconsistencies to be seen clearly in my own playing.	Despite some lag issues, it was almost as if it were an "actual lesson," meaning that the concepts that were being taught came across just as clear as if the instructor were actually in the room.
Besides momentary freezing with the video stream, the lessons went well.	It was just as easy as a normal lesson, just a small amount of technology errors.
Sometimes there was some delay in getting situated so the instructor could see me. I think eventually the result was the same; it just took more time to accomplish it. A traditional lesson may have been more productive.	

ITEM 12 Would you continue studying trombone (or any other instrument) using this instructional format?	
RESPONSES	8 YES, 0 NO
WRITTEN RESPONSES	
It was easy and convenient.	Good alternative way to reach students you can't meet in person.
This way of learning has many benefits to it with the use of technology. The use of recording and playback is a huge benefit. This allows not only for aural help but also for visual help that might not be possible without the use of recording.	These lessons are especially beneficial for taking lessons over distances. Taking lessons with instructors from other colleges or another person you would like to take lessons with is easily accessible.
I believe this is a very effective and creative way to teach.	I think this type is easier to access and coordinate than traditional lessons.
Yes, I think it would be great for students who are sick for long periods of time. That way the sick student would not lose out on lesson time.	

ITEM 13 Please include any additional comments or suggestions.	
It was great, thanks!	Try improving the audio/visual quality so there isn't a gap in synchronization-this happened in third lesson.
The use of headphones would help students. Also, advocate the use of a location with good internet connection. With the continuation of these lessons, alternate methods of recording might be found that would enhance the quality of sound that can be played back to the students.	The only problem that arose for me was that I was never notified, other than via email, when I was being invited to a hangout. I found out rather quickly that I needed to actually click the tab on the side that said "Hangouts". In regards to actually playing the trombone, this method of instruction is particularly efficient for teaching articulations and ending notes. Overall a really fun experience.