THE EFFECT OF VIDEO INSTRUCTION ON THE PERFORMANCE ACHIEVEMENT OF FIFTH GRADE INSTRUMENTAL STUDENTS

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ABSTRACT

The purpose of this study was to examine the effect of instructional videos on the performance achievement of fifth grade instrumental students. The design of the study was pretest-posttest control group experimental. Participants (n = 84) were volunteers selected from fifth grade students enrolled in Garnet Valley School District in Glen Mills, PA, who had participated in the band program for at least one full year. Students were assigned a short etude composed by the researcher to practice for an evaluation. Prior to treatment, each student was recorded performing the etude as a pretest. All students received identical instruction and modeling of the etude during their weekly school lesson. In addition to the weekly school lesson instruction, a Video Practice Group (VP) (n = 42) was given access to a video of the teacher instruction and modeling of the etude for use during home practice, and the Non-Video Practice Control Group (NVP) (n = 42) practiced the etude under usual practice conditions. Each week, participants submitted a practice record detailing the amount of time spent practicing the etude. Following three weeks of treatment, all participants recorded a performance of the etude. Pretest and posttest recordings were scored by the researcher using the researcher-designed Etude Scoring Form. One additional certified music teacher scored a random selection of 15% of the student recordings as a reliability judge. Comparison of pretest and posttest scores showed that overall gain scores for participants in the Video Practice group were significantly greater than the Non-Video Practice Group ($F(1,82) = 20.68$, $p < .001$, $\eta_p^2 = .201$), with significant interactions in the categories of rhythm ($F(1, 82) = 9.45$, $p = .003$), fluency, $F(1, 82) = 9.97$, $p = .002$), and articulation, $F(1, 82) = 8.07$, $p = .006$).

No significant interactions were found for instrument type or participant school. There was no significant difference in reported practice time between the two groups, and practice time was positively correlated with posttest scores.

DEDICATION

For my family.

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CHAPTER I

INTRODUCTION

In a 1913 interview, Thomas Edison predicted: "Books will soon be obsolete in the public schools...It is possible to teach every branch of human knowledge with motion pictures. Our school system will be completely changed inside of ten years" (Saettler, 2004). Though it has taken significantly longer than the ten years Edison originally anticipated, videos are indeed changing the educational landscape as an integral part of the new educational movement known as Blended Learning.

Since the earliest days of recording technology, teachers have used audio and video recordings in many different forms to enhance student learning in and out of the classroom (Saettler, 2004). Over the past four decades, extraordinary developments in computer and digital technology known as the Digital Revolution (Kovarik, 2015), combined with the rise of the internet and the world-wide web, have ushered in a new era of global connectivity dubbed the Information Age (Brabazon, 2016). In the 1990s, teachers began to use the internet to give students digital access to learning materials outside of class (Lage, 2000). Meanwhile, the education community was experiencing a shift away from a traditional, direct-instruction model toward more peer-based, collaborative learning approach grounded in constructivist learning theory (King, 1993).

Blended Learning

Advances in technology have made it increasingly possible for teachers to extend instruction beyond the classroom through use of video recordings posted online.

Teachers in varied fields of education have explored the use of instructional videos to enhance student learning both in and out of the classroom. The terms 'blended learning' and 'flipped classroom' have emerged to describe the different ways that teachers incorporate the use of videos in their curriculum. While the meaning and application of the term blended learning has evolved since it first emerged in the late 1990s, scholars generally agree that blended learning is a method of instruction that combines both in-person instruction or guidance by a teacher, and the use of online resources outside of the classroom. Staker and Horn (2012) defined blended learning as "a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace, and at least in part at a supervised brick and mortar location away from home" (p. 3).

Blended Learning and Music Education

One of the key features of blended learning is that it allows students to access instruction at a time and place of their own choosing, and set their own pace for learning. With access to teacher instruction and resources online, students are able to review and re-watch teacher instruction as many times as necessary in order to understand a concept, rather than waiting until the next class meeting. This aspect of blended learning can be particularly helpful in music education. Compared to other academic subjects, music teachers often have less face-to-face instructional time with students. While some music teachers see their students daily, music instruction is often limited to only once or twice a week (Parsad & Spiegelman, 2011). This is true for elementary classroom music as well as most elementary and middle school instrumental programs, where small-group

instruction is often as little as 30 minutes once a week (Delzell & Doerksen, 2000). At the secondary level, ensemble directors may have more frequent rehearsal time with students, however this is often the form of large-group rehearsal, with limited opportunity for individual instruction.

In the intervening days between face-to-face instruction, students are tasked with practicing the skills and concepts learned during the music lesson. Educators and scholars overwhelmingly agree that effective practice is essential to student progress, yet many students lack the skills for structuring and self-regulating their practice (Austin & Berg, 2006; Hallam, 1997; McPherson & Davidson, 2002; McPherson & Renwick, 2001; Miksza, Prichard & Sorbo, 2012). Music teachers have long recognized the potential for recorded media to help student learning outside of the music lesson or classroom. Violinist and pedagogue Shinichi Suzuki stressed the importance of listening to recorded models of professional musicians in order to develop familiarity with pieces to be learned, as well as an overall sense of musicianship (Suzuki & Suzuki, 1983). Similarly, Edwin Gordon and Richard Grunow, in *Jump Right In: The Instrumental Series,* emphasize the need for students to sing the melodies and the bass lines of simple songs before learning to play them (1989), and all student lesson books include recorded models for the students to practice with at home. Currently, all of the most widely-used instrumental method books include recorded accompaniment and examples in CD or MP3 format. In recent years, several method books, including Tradition of Excellence, Sound Innovations, and Measures of Success, have begun including video instruction on DVDs, software, and online videos. Numerous studies have shown that audio and visual recorded models are helpful to students as they practice, and can improve student

achievement (Dickey, 1992; Puopolo, 1971; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Zurcher, 1975).

Changing Media Landscape

The past 10 to 15 years have seen substantial changes in the way that media are distributed and consumed. The distribution of music, television, and movies continues to shift away from physical storage formats (CD, DVD, and digital files) toward increased consumer use of online streaming services such as Spotify, Netflix, and Hulu (Faughnder, 2017; Sisario & Russell, 2016). Founded in 2005, the website YouTube has grown exponentially to become the world's leading online video hosting service, with over one billion users, and one billion hours of video watched daily (YouTube, 2018). The accessibility, free access, and wide viewership of YouTube have made it a popular site for teachers to post educational videos. Educational videos have become a significant segment of YouTube content, with over 500 million views of learning-related content each day (YouTube internal statistics, as cited in Ducard, 2017). Additionally, information-seeking is one of the top three reasons people view YouTube videos (Google, 2018). Students are increasingly turning to internet searches and video-hosting sites such as YouTube to search for answers to questions and new things to learn, including music and musical instruments.

Need for Study

Previous research indicates that video and audio recordings can be helpful resources for students as they practice outside of the classroom, both as a source of

modeling and instruction. While numerous studies have explored the use of recorded audio and video models and instruction in music education, no extant research can be found that has explored specifically the use of online videos for the purpose of aiding student practice outside of the classroom. The present study will investigate the effect of video lessons posted online which include both modeling and instruction, on the performance achievement of fifth-grade instrumental students.

Limitations of Study

This study was limited in several ways. The instrument types included in the study were limited to alto saxophone, clarinet, flute, and trumpet. This selection of instruments allowed for sufficiently large sample, while including both woodwind and brass instruments. Percussion students were excluded because students were not at a comparable level of pitch reading achievement. Performance achievement of participants was measured in four categories: pitch, rhythm, fluency, and articulation. Although other elements of instrumental instruction such as tone quality, intonation, and expression, are important to the development of young instrumentalists, they were not considered in this study. For the purposes of this study, evaluation focused upon the more clearly quantifiable elements of pitch accuracy, rhythmic accuracy, fluency, and articulation. The length of the treatment was limited to three weeks. It was determined that a span of three weeks would be sufficient to show student growth in the selected performance measure, "Etude".

Definition of Terms

For the purposes of this study, the following definitions are used throughout:

Modeling: A mode of teaching by which the instructor demonstrates the correct (or intentionally incorrect) way of performing a particular musical piece, excerpt, or exercise.

Aural Image: The ability to form a mental model of how a piece of music will sound by viewing sheet music.

Recorded Model: A recording in any form that provides an example of how a piece of music or musical exercise should be correctly performed. Recorded models may be audio only (ex., cassette tape, mp3), or video/audio (ex., VHS tape, DVD, online video).

Recorded Model with Instruction – Same as above, with the inclusion of verbal instructions and/or guidance by the teacher.

Video Practice – Use of a video to assist in the practicing of a piece of music, both for aural modeling and visual modeling.

Non-Video Practice – Practicing in a traditional manner, without the aid of a video modeling or instruction.

CHAPTER 2

RELATED LITERATURE

Practicing

Practicing is universally viewed as essential for student achievement in playing a musical instrument. When practicing, students are expected to apply and reinforce the concepts learned during class or private instruction. Researchers have studied the practice habits of musicians ranging from novice to professional, and examined the relationships between practice strategies and achievement. Increased practice time, coupled with high level of dedication to playing an instrument, has been correlated with increased performance achievement (McPherson, 2000; Sloboda, Davidson, Howe & Moore, 1996). Numerous studies have noted that the *quality* of practice (i.e., the use of effective practice strategies) is a more significant predictor of success than *quantity* of practice (Duke, Simmons & Cash, 2009; Williamon & Valentine, 2000). Practice is most effective when it is structured, where the practicer employs specific strategies for improvement (Ericcson, Krampe, & Tesch-Römer, 1993). In contrast to practicing that is informal or playful, Ericcson et al. (1993) identified "deliberate practice" as a "highly structured activity" in which "specific tasks are invented to overcome weaknesses, and performance is carefully monitored...for ways to improve it further" (p.10). While expert musicians are often adept at employing structured and effective practice techniques, research suggests that less-experienced musicians are less effective at self-regulating practice (Austin & Berg, 2006; Hallam, 1997; McPherson & Davidson, 2002; McPherson & Renwick, 2001; Miksza, Prichard & Sorbo, 2012).

Effective practicing is a skill that must be taught and reinforced (Byo, 2004; McPherson & Davidson, 2002; Rosenshine, Froehlich, & Fakhouri, 2002; Zhukov, 2009). Byo (2004) stresses the importance of teaching students to become "accomplished practicers" (p. 34) and sets forth a series of steps to assist students in organizing their practice sessions. This practice protocol instructs students to identify areas that need to be practiced, isolate them, and work to improve these areas with the goal of achieving several repetitions of the excerpt free of mistakes. Researchers have noted that novice musicians tend to spend practice time playing straight through music without stopping to correct errors (Hallam 1997a, 1997b; Rohwer & Polk, 2006). Rohwer and Polk termed this manner of practicing as *holistic*, in contrast to *analytic*, where the musician breaks the piece into parts and deliberately targets areas of difficulty (p. 355).

In the beginning stages of musical development, many students lack the ability to detect their own errors, and so are unable to work toward correcting them. Hallam, Rinta, Varvarigou, and Creech (2012) note that "if learners have not acquired an internalized representation of the sound of the music that they are trying to play, they have nothing against which to assess whether they are making errors" (p. 654). Hallam (2001) found that self-evaluation alone did not improve student music performance and suggested that while some students may be capable of identifying their strengths and weaknesses, they may lack the ability to "prescribe solutions that would assist them in improving their achievement" (p. 319). A key element of effective practice, then, is the student's ability to identify mistakes in their own playing and work systematically toward the achievement of an accurate aural model.

Audiation and Aural Image

Successful practicing and performance relies upon the student's ability to form an aural image of the music to be performed, thereby allowing the student to detect and correct errors. One of the primary goals of music education is to cultivate within students the ability to audiate, or "hear" music that is not physically present. With this ability musicians can generate an aural model of how music notation should be performed. The phenomenon of silently hearing music by viewing music notation, or in the absence of music notation, has been referenced and studied by numerous researchers in the field of music education and psychology. Carl Seashore (1919) used the term *auditory imagery* to describe "the ability to hear sounds in imagination and memory, to some extent as if they were physically present in the ear" (p. 225). For Seashore, auditory imagery (which he also referred to as musical imagery) represented a broad range of musical ability, from the simple act of remembering the sound of music in one's mind, to the complex creation of aural schema by professional musicians while reading notation or composing. Seashore referred to auditory imagery as a "basic trait of musicianship" and one of the "essential gifts of the musician" (p. 223).

In his essay "The Legacy of Carl E. Seashore" (1998), Edwin Gordon recognized Seashore's contributions to the understanding and measurement of musical ability, but noted the limitations in Seashore's view of auditory imagery:

> Seashore was concerned with only the first stage of audiation (in my description) and ultimately the measurement of music aptitude…it is unknown from his writings if Seashore went beyond the general concept of imagery to give consideration to the possibility of the existence of stages, if not types, of audiation that we progress through when we learn music." (p. 57)

According to Gordon, Seashore's measurement of auditory imagery was limited to only the first stage of what Gordon described as several progressive "stages" of audiation (a term Gordon coined in 1976). Ranging from "momentary retention" to "anticipating and predicting tonal patterns and rhythm patterns" (Gordon, 2003).

In addition to the six stages of audiation, Gordon identified eight types of audiation, one of which is "notational audiation," the musician's ability to hear musical sound, and give meaning to musical notation before it is heard aloud (p. 8). Gordon is careful to make a distinction between *decoding symbols,* in which one performs notation based upon mechanical responses to symbols without preconceiving the sounds that they represent, and the more complex *notational audition*, in which one is able to hear and understand the sound that the written music represents before it is played. In fact, Gordon quibbled with the term aural image, considering it a vague term that did not fully describe the complex process of understanding that occurs in audiation (p. 9). The bar that Gordon sets for true notational audiation is quite high, one that many accomplished musicians never attain, involving the development of an extensive vocabulary of tonal and rhythmic patterns, and the gradual process of learning how those sounds are represented in notation.

Many different terms have been used in the literature to refer to the phenomenon of inner hearing in music. Brodsky, Kessler, Rubinstein, Ginsborg, and Henik (2008) adopted Gordon's term *notational audiation* for their research, and summarized some of the other terms found in the literature:

> The nature of notational audiation is elusive, and one has only to look at the various descriptive labels used in the literature to understand this bafflement. The skill has been proposed to be a process of inner hearing

> or auralization (Karpinski, 2000; Larson, 1993; Martin, 1952) as well as a form of silent singing (Walters, 1989). The resulting internal phenomenon has been perceived as an "acoustic picture" or "mental score" (Raffman, 1993), as supplied by the "hearing eye" (Benward & Carr, 1999) or the "seeing ear" (Benward & Kolosic, 1996). Yet these phenomena should not necessarily be equated with each other, nor do they fundamentally represent the same processes. (p. 428)

While all these terms suggest a sort of "inner hearing," Brodsky et al. go on to describe their own theory that notational audiation may be better described as a kinesthetic event involving "covert excitation of the vocal folds" and "might not have anything to do with hearing per se" (p. 428). Seashore recognized this close relationship between the auditory and kinesthetic processes involved in auditory imagery, noting that "the tones are so tied up in rich auditory and kinesthetic imagery that it may be difficult to isolate one from the other for observation. Many cannot hear themselves sing or play unless they are actually conscious of having gone through the movements in an inceptive form" (p. 227), and later, "auditory imagery is almost inextricably tied up with motor sensations and motor imagery" (p. 228).

Many novice musicians lack the ability to form an aural model from written sheet music, and this presents an obstacle to effective practicing (Barry & Hallam, 2002; Oare, 2014). Steve Oare (2014) described the key role that "aural image" played in the ability of middle school instrumental students to practice effectively. Students commonly expressed the need to hear a model of a given piece of music before they felt comfortable performing. Students were more confident performing, and more likely to practice songs for which they had an aural image. This tendency for students to struggle with reading

notation of unfamiliar songs supports Gordon's assertion that "notation can only assist us in recalling what we have already audiated" (p. 113).

Familiarity

As Oare noted, less experienced students preferred to practice material that was familiar to them, avoiding the pieces that were unfamiliar or challenging (p. 65). An important factor in the ability and motivation of novice musicians to practice is the degree to which the given music is familiar or unfamiliar (Harnischmacher, 1997; Oare, 2012). Research shows that when singing and performing familiar songs, students demonstrate a strong ability to detect melodic errors (Thornton, 2008) and show increased performance achievement (Cash, Allen, Simmons, & Duke, 2014; Frewen, 2010). Frewen (2010) found that elementary students' ability to perform a simple keyboard melody was significantly improved when the melody was familiar. Students who were exposed to multiple repeated aural models of a four-measure melody performed more correct notes than students who did not receive aural modeling.

The importance of student familiarity in learning music is prominent in the philosophies of several influential music education theorists. Zoltan Kodály believed that all students should sing first before learning to play a song, explaining: "Since every instrument imitates a singing tone, the child first has to hear how the tone should be formed on his instrument. The child will be a better performer if he can sing the structural material of the pieces he plays" (Daniel, 1968: 20-24). Kodály also believed that children should learn music starting with the authentic folk songs of their culture, not

only because the music would be familiar to them (Sinor, 1982), but also because it contributed to the "establishment of one's own national cultural roots as the basis for further cultural development" (Madden, 1983, p. 19).

Shinichi Suzuki and Edwin Gordon both emphasized the importance of teacher aural modeling and recorded models to build student familiarity with songs to be performed. Suzuki recommended that students listen daily to recorded models of both beginner and advanced repertoire, both to build familiarity with the beginner songs to be performed, and also develop an overall sense of musicianship (Hermann, 1999). In the *Jump Right In; The Instrumental Series*, based on the learning theories of Edwin Gordon, teachers are instructed to have students demonstrate that a song or pattern is familiar by singing before learning how to play it (Grunow & Gordon, 1989).

As Kodály noted, songs that are likely to be familiar to students are those which are prominent in their culture. This will vary widely depending upon the student's place of birth, age, and upbringing, among other factors. Though there is variation in the degree to which students are familiar with a given song, many beginner instrumental methods feature a significant number of exercises based upon tunes that may generally be considered familiar folk songs and melodies. Some of the most well-known songs that are common for beginners, including "Hot Cross Buns", "Mary Had a Little Lamb", "Twinkle, Twinkle, Little Star", and "Jingle Bells" are standard repertoire for most current beginner instrumental method books. Byo (1988) analyzed the content of nine selected beginner band method books and found that all but one included at least some familiar songs, although the criteria for categorizing a song as "familiar" was not

specified. Six of the band methods incorporated at least 20 percent familiar songs (Byo, 1988).

Brittin and Sheldon (2004) explored the song content of five prominent current band methods, and compared them to the *Universal Teacher*, the first heterogeneous method book, published in 1923. Several factors were explored, including the number of authentic vs. contrived songs[1], music type, and country of origin. Both the historical and modern band methods included a high percentage of songs from the United States. All books contained melodies from other countries, although the modern band methods generally included more diversity in countries represented. The modern methods included nearly double the amount of songs and exercises, with about 50% contrived material, progressing at a slower pace than the historical comparison. These differences can partly be attributed to the growing awareness of recognizing cultural diversity in the US, as well as shifting pedagogical approach toward smaller, sequential skill-building steps. The authors note how students' familiarity with songs is affected by culture and society, and that the higher number of familiar songs in the 1923 *Universal Teacher* method "would facilitate home practice and perhaps make possible this seemingly accelerated teaching pace [as compared to modern methods]" (p. 53).

[1] The authors describe "contrived" pieces as those "written to present /drill a particular musical concept or technical issue", while "authentic" pieces are those pieces composed for another purpose "such as a folk song or excerpt from a symphony" (p. 49).

Modeling

When teaching a new piece of music in an instrumental setting, effective teachers often engage in modeling to demonstrate the accurate performance of pitches, rhythms, and expressive elements. Students are then invited to imitate the performance of the teacher. Learning through imitation is a fundamental component of human behavior. In behavioral psychology, imitation is defined as "the reproduction or performance of an act that is stimulated by the perception of a similar act by another animal or person" (Imitation, 2018). Imitation plays a key role in the Bandura's Social Learning Theory (1971), which describes how people learn from observing others.

Imitation is the foundation of modeling. Dickey (1992) defines modeling in music education as simply "alternations of teacher demonstrations and student imitations" (p. 27). Research overwhelmingly supports that modeling is a fundamental and effective mode of instruction in music (Delzell, 1989; Dickey, 1991; Rosenthal,1984; Sang,1987; Zurcher, 1975). According to Sang (1986), effective modeling can be characterized through demonstration of: a) basic music performance behaviors, b) subtle aspects of musical performance (e.g., phrasing, vibrato), c) musically-related executive skills (e.g., posture, playing position), and d) various melodic and rhythmic sequences by ear (for the purpose of imitating incorrect student performances as well as provide a correct model). Teachers with stronger modeling skills are more likely to use modeling in their teaching. This often results in significant positive effects on student achievement (Sang, 1987). In a review of research on this topic, Dickey (1991) concludes, "In order to be effective, musical models…must be accurate models. Teachers who model must have sufficient skills to demonstrate one musical performance variable correctly and

incorrectly, while modeling all other musical performance elements consistently" (p. 37). While many teachers may be capable of providing accurate models on a variety of instruments, the availability of audio and video recordings enables all teachers to demonstrate high quality modeling to students on all instruments.

Audio and Visual Media in Music Education

Music teachers have long realized the potential for audio/visual media such as radio, television, audio recordings, and video recordings to enhance music education both for classroom instruction and student learning at home. In the early 1900s, the phonograph was seen as a revolutionary tool for bringing the highest quality music to every small town, classroom, and home. At the time, classical music was considered a "powerful cultural and moral force" (Katz, 1998, p. 449), and the phonograph was hailed as an unprecedented tool for bringing "good music" to the masses, particularly those who lived in rural areas, far away from city centers with professional orchestras and concert halls. Early efforts focused upon music appreciation, familiarizing students with important musical works (mostly classical), and providing students with high quality models of music performance. The phonograph also had a significant effect on higher education, as college and university music professors began to expand their course offerings to non-performance students in the form of music appreciation courses (Katz, 1998). In 1958, Rutgers University published a series of records titled "A Course in Basic Musicianship and Training" as a tool for undergraduate music students to practice solfege and ear training as needed outside of class. Chairman of the Music Department A. Kunrad Kvam explained,

> We have used records of this kind in our freshman solfege and ear training course, largely as assignments to be prepared outside of class time, thereby having more class hours for other basic work in sight singing and the fundamentals of music. This does not mean that no ear training is given during class hours, but it is true that most of it will be accomplished by the use of records. In this manner, students who need considerable drill can have it, and the brighter student is not held back by the slow or average one. (Spohn, 1959, p. 73)

In the 1940s, magnetic tape recording technology became commercially available. Educators found the advantages of the new technology, namely the ability to erase and record tape, edit and piece together recordings, and relatively low cost, made tape recorders a particularly useful tool for the classroom (Millard, 2005; Spohn, 1959). Early research on the application of magnetic tape recorders in music education focused upon the development of aural skills in university students (Cookson, 1949; Spohn, 1959; 1963).

In 1921, at the dawn of the radio era, influential music educator Edgar B. Gordon began broadcasting music appreciation programs from WHA in Madison, Wisconsin (Barressi, 1987). According to Barresi, Gordon's pioneering efforts to bring music and music education to a mass audience through radio "[appear to be] the earliest efforts in media music teaching (and perhaps the first media instruction in any area" (p. 264). In the decades following those initial broadcasts, Gordon and other music educators worked to develop formal instructional programs for national radio broadcast which included such innovations as interactive choir rehearsals via radio, verbal cues for student listener participation, and printed songbooks with words, music, music theory lessons, and "follow-up" activities for teachers (Cooper, 2005; Nohavek & Morgan, 1947; Whitsey, 1950).

Similar to the phonograph, magnetic tape, and radio, many in the music education community enthusiastically embraced motion pictures and television as groundbreaking opportunities to enrich and expand music education (Dill, 1946; Nickerson, 1947; Saettler, 2004). In a 1947 article in the *Music Educators Journal*, Westervelt Romaine extolled television as "unquestionably the most powerful medium yet devised for the dissemination of information" and stated, "as a tool for good music education on a socialized basis I am convinced it has no equal" (p. 20).

An early experiment in the potential for televised music lessons was documented in *Music Educators Journal* in 1958. The author, Nina Perera Collier, produced an innovative television series titled "Music for Young People" consisting of thirteen episodes. In cooperation with the Baltimore School District and other local organizations, Collier spearheaded an "experimental telecast" of the series in the winter of 1957-58 that was viewed by students in 132 elementary schools in Baltimore and Baltimore County. Teachers were provided with a printed manual which included helpful information including brief descriptions of the program content and suggested recordings for further listening. Participating teachers completed an evaluation questionnaire. Collier reported that the feedback from teachers, students, and parents was overwhelmingly positive, with nearly 100% of respondents indicating that the television lessons were "clear in purpose" and the accompanying printed materials were "helpful in preparation and follow-up" (Collier, 1958). The similarly-named series "Young People's Concerts", written and hosted by Leonard Bernstein, debuted the same year. Broadcasting 53 episodes over the next 14 years, the series is cited by many professional musicians and educators as influential in their decision to enter a career in

music, and is described by author Alison Kofstein-Penk as "arguably the most influential phenomenon in music education in the second half of the twentieth century" (2015).

In 1967, the Tanglewood Declaration called upon the music education community to research and apply "developments in educational technology, educational television, programmed instruction, and computer-assisted instruction" (Britten, Broido, & Gary, 1968). Two years later, a major report titled *The Utilization of Instructional Television in Music Education* sought to answer that call (Carpenter, 1969). Sponsored by the U.S. Department of Health, Education, and Welfare, this extensive report reviewed the development and trends in television music instruction since the 1940s, described and analyzed 17 "current televised music education programs" in the US, and made recommendations for the future of televised music instruction. Among the issues raised in the report were: a) How can television as a primarily visual phenomenon help and not hinder the teaching of an essentially aural art form? b) What should be the process for evaluating and improving television music instruction? c) How can television instruction be applied to preschool and early childhood music education?

In the 70s and 80s, public television stations led the way in producing educational programs that aimed to nurture young developing minds (Levin & Hines, 2003). Programs such as *Mister Rogers' Neighborhood* and *Sesame Street* addressed the young children in the viewing audience directly, engaging them in a variety of age-appropriate lessons and activities, from learning letters and numbers, to singing and movement, to exploring common feelings and emotions. Research has shown such television programs to be effective in teaching young children basic skills (Coates, Pusser, & Goodman, 1976; Rice, Huston, Truglio & Wright 1990; Sell, Ray, & Lovelace, 1995).

Feierabend, Saunders, and Flagg (2002) studied the effectiveness of a children's television program to improve music performance achievement in kindergarten students. Several times over the course of two weeks, kindergarten students were shown a 20-minute interactive program titled "The Little Red Caboose", which included interactive singing activities of pitch exploration, call and response echo-singing, singing complete song refrains, and free communicative singing. Students watched the program both in teacher-prompt and no-prompt conditions. Results showed an increase in students' pitch exploration and song fragment performances. No difference was seen for teacher prompt vs. no-prompt conditions. The researchers concluded that "television music instruction can contribute to improvements in young student vocal performance achievement," and recommend that further research be conducted with "different music television instruction programs under a variety of treatment conditions" (p. 72).

The effect of television programs on the music skills of children may be related to the degree to which students actively participate, or are prompted to participate in the music activities shown. McGuire (2002) studied the effect of the children's television program *Barney and Friends* on third graders' song recognition. The frequency of self-reported viewing had no significant relationship to the students' ability to recognize songs from the television program.

Audio Practice Accompaniment

Recorded accompaniments allow novice and experienced musicians the opportunity to practice and perform accompanied by professional musicians. By providing recorded accompaniments for students to use during practice, music teachers

hope to help students develop performance skills (such as steady beat, rhythmic accuracy, style, tone, and intonation) by performing with accompaniment of high musical quality, and also to increase student enjoyment, and possibly motivation, while practicing. One of the first uses of recorded media for the purpose of practice accompaniment is the *Music Minus One* series, first released in 1950 by 24-year-old student Irv Kratka (Sumsuch, 2016). The album featured professional musicians performing Franz Schubert's "Trout" Quintet (Piano Quintet in A, Op. 114), with one of the parts missing from the recording, so that the musician at home could play along at home and fill the missing part. A separate album could be purchased for each part, and each would include sheet music for use while playing along. In 1967, jazz education pioneer Jamey Aebersold adapted the *Music Minus One* idea to a jazz context, releasing the first volume of his jazz play-along series, *A New Approach to Jazz Improvisation*. Like the *Music Minus One* series, Aebersold's play-along featured a professional jazz rhythm section (piano, bass, and drum set) performing accompaniment to various songs and exercises, with sheet music included for home practice. In the following decades, music publishers increasingly provided recorded accompaniments with music instruction books, in the form of albums, cassette tapes, and eventually compact discs. Currently, all of the most widely-used instrumental method books include recorded accompaniment and examples in CD or MP3/online accessible format.

Researchers have explored the effects of recorded accompaniment in several contexts. Dickey (1991) found that recorded rhythmic accompaniments used in class activities contributed to the development of kinesthetic response to music. Sheldon, Reese, and Grashel (1999) found that practice and subsequent performance with recorded

or digital accompaniment improved performance achievement in the category of rhythm only. Participants who practiced with accompaniment scored better in an unaccompanied performance than participants who practiced without accompaniment. This result indicates that "the use of accompaniment can be regarded as a learning tool in practice" (p. 262).

Programmed Instruction

With the emergence of tape-recording technology in the 40s, many music teachers saw an opportunity to enhance and extend their effectiveness by tape recording instruction and modeling, then making those tapes available to students for small-group or individual practice (Spohn, 1959). In the 60s and 70s, several research studies were conducted to investigate the effects of tape-recorded models with verbal instruction, often referred to as "programmed instruction," on the development of beginner instrumental students. The use of tape-recorded models with instruction has been shown to have positive effects with beginning snare drum students (Shaw, 1971), beginning trumpet students (Puopolo, 1971), and beginner trombone students (Peightel, 1971). While some studies limited the student practicing to supervised periods within the school day, others explored the effectiveness of modeling/instruction tapes as an aid for home practice. Zurcher (1975) provided practice tapes to beginner brass students which included verbal instructions, metronome pulse, and model performances of the weekly lesson. Students in the study alternated between control and experimental treatment on a weekly basis for the duration of the six-week study. Student home practice was monitored by daily parent checklists. Results showed that the use of practice tapes reduced pitch errors, improved

rhythmic discrimination, and increased practice time. No effect was observed for tempo stability or fingering/slide position errors.

Recorded Model Only

Researchers have also explored the effect of recorded models alone, without the inclusion of verbal instructions or guidance. Folts (1973) found that tape recorded models without verbal instruction had a significant effect on the performance skills of flute, clarinet, and trumpet students, while Hodges (1974) found no significant effect for beginner instrumental students. Rosenthal (1984) studied the effects of modeling with verbal instruction, modeling only, verbal instruction only, and practice only on the performance of advanced musicians. The participants, graduate and upper-level graduate music students majoring in either a woodwind or brass instrument, were assigned a selected unfamiliar etude to practice for 10 minutes under one of the four practice conditions. Notably, the recorded model for all participants was provided by a violin, rather than the instrument matching the participants. Results showed significant differences among all groups in the areas of notes, rhythms, dynamics, and tempo, with the highest scores achieved in the modeling-only group. The guided model was the next-highest scoring group. Rosenthal notes the interesting result that the model only condition was more effective than modeling with verbal guidance, remarking, "the guide may have hindered subjects' musical performance" (p. 269). Rosenthal also notes that this result may be affected by the advanced level of the participants: "Since subjects in this study were relatively sophisticated musicians and teachers who were experienced in attending to music, they may have been able to focus their attention easily on spots that

were troublesome to them. Less advanced students may find a verbal guide more helpful" (p. 272). Though it is possible that less-experienced musicians may need more verbal guidance, Puopolo (1971) reports that 80% of the beginner students in the verbal instruction/modeling tape group indicated they would have preferred more playing and less instruction on the tape. Findings by Sang (1987) and Dickey (1991) support that modeling is more effective than verbal instruction.

Recorded Models in Other Applications

Henley (2001) investigated the effects of a recorded model in combination with various tempo patterns as practice techniques with high school woodwind and brass students. Similar to the Rosenthal 1984 study, the recorded model provided to participants was performed on a violin. The students played the selected etude a total of eight times in a single supervised session, with the first performance serving as the pretest and final performance serving as the posttest. Results showed no significant effect of the modeling condition on pitch, but did show significant effect on rhythmic accuracy. Henley noted, "The rhythmic example provided by the model appears to act as a sort of teaching tool for those in the practice situation. The results of this experiment suggest that recorded models may well prove an effective way of guiding practice in the absence of an instructor" (p. 176).

Delzell (1989) used tape-recorded models as part of a discrimination training program with fifth-grade beginner instrumental students of mixed instrumentation. During the 18-week treatment period, students in the experimental group participated in discrimination training that included listening to tape-recorded models to determine same

or different, and student imitation of the recorded models. At the conclusion of the treatment period, students in the experimental group showed significantly better scores on the posttest for musical discrimination.

Hewitt (2001) investigated the effect of tape-recorded like-instrument audio models, in conjunction with self-listening and self-evaluation, on the performance and practice attitude of junior high band students. Although there was no effect in the areas of intonation and melodic accuracy, students who practiced with an audio model improved more in the areas of tone, technique/articulation, rhythmic accuracy, tempo, interpretation, and overall performance, than those who did not. Hewitt notes that this confirms previous findings (Dickey, 1991, 1992; Puopolo, 1971; Rosenthal, 1984; Zurcher, 1975), and states, "Listening to a model can be an effective method for learning an unfamiliar piece of music and should be incorporated as a regular method of instruction among junior high instrumental music teachers" (p. 318).

While much of the extant research on the effect of recorded models focuses upon individual student achievement, some studies have focused upon ensemble achievement. Morrison, Montemayor, and Wiltshire (2004) examined the effect of recorded model on group performance, self-evaluation, and attitude of middle-school and high school band students. Each participating school ensemble rehearsed one piece after listening to a recorded model, and rehearsed a different piece without listening to a model. The results showed no significant difference in performance achievement, though students overall were more critical in their self-evaluation in the model condition. This may suggest that the model helped students form an aural image of an objective goal to measure themselves against, affecting their self-evaluation of their progress. Other research in this

area has shown similar results. Morrison (2002) found no effect for listening to a recorded model on the group performance achievement of middle school band students, and Sagen (1978) found similar results for ensembles at the college level.

Closely Related Studies

Zurcher's 1975 study, discussed previously in this chapter, was the first to study recorded models as a home practice aid for band students. Citing common challenges of teaching beginner band students, including limited school teaching time, lack of effective practice skills in beginners, and the inability of most parents to effectively help their children during home practice, Zurcher hypothesized that cassette tape recordings of appropriate models and verbal instructions could facilitate "model-supportive practice" and improve the effectiveness of beginners' practicing at home (p. 5). Zurcher's design was unique compared to related tape-modeling studies, in that the two participant groups alternated between experimental and control treatment on a weekly basis, for a total of six weeks. Posttests were administered weekly, and consisted of the assigned material for that week. Results of the cumulative data showed that model-supportive practice tapes were more effective than traditional practice in the areas of pitch accuracy, pitch-matching skills, rhythm accuracy, and increased practice time. There was no difference observed for tempo stability or fingering/slide position errors.

Echoing the concerns raised by Zurcher (and others in the recorded-model research literature), Anderson (1981) discussed the difficulties that beginner band students face when practicing at home, and suggests that audio recorded models might help aid students practice more effectively. Noting the promising but mixed results that

have been observed using recorded models with and without verbal instruction, Anderson set out to explore the effect of tape-recorded models only (no verbal instruction) as a practice aid on the sight-reading and performance skills of sixth-grade clarinet students. Participants in the experimental group received audio cassette tapes containing solo clarinet performances of the assigned music exercises. The tapes also included a tuning note and minimal verbal instructions, such as song title and preparatory beats. For the eight-week treatment period, the students practiced the exercises both at home and during woodwind classes at school. Students in both groups submitted weekly practice charts. At the end of the treatment, students were evaluated on two posttest measures. Sight-reading skill was measured using the Watkins-Farnum Performance Scale and performance skills were measured using a "Practiced Performance Evaluation Test" (p. 26). Results showed no significant differences between the control and experimental groups for any of the skills. Anderson speculated that this unexpected result may have been due to an insufficient amount of treatment time, insufficient use of the tapes by the experimental group, or a maturation effect where students in both groups were exposed to multiple correct performances of the exercises during school lessons.

Linklater (1997) was the first to study the effect of recorded video models as a home practice aid on the performance achievement of instrumental students. Student participants (n = 146) were fifth and sixth-grade beginner clarinet students. Each received the lesson book and instruction during the school day, and were given cassette tapes (audio or video) for use with home practice. The control group received audio cassette tapes containing audio accompaniment only, one experimental group received audio cassette tapes of clarinet modeling with accompaniment, and a second experimental

group received video cassette tapes of clarinet modeling with accompaniment. At the end of the eight-week treatment period, a posttest was administered. The researcher-designed Instrumental Performance Test (IPT) was administered to measure "students' overall instrumental performance skills" (p.406). The posttest consisted of two short songs that were familiar to the students through their lessons and practice tapes, one unfamiliar etude which the students were given a week to prepare, and second unfamiliar etude which the students sight-read.

Results of the posttest showed no significant differences among groups in mean scores in the areas of aural/musical, musical literacy, articulation, or tone quality/intonation. Students in the modeling videotape group scored significantly higher than the non-modeling tape group on visual/physical performance criteria (embouchure, hand position, instrument position, and posture), indicating that the visual component of the videotape model was helpful for beginner students establishing these skills. After the first posttest, the taped models were no longer used. Students were tested two more times throughout the school year to measure the long-term effects of the treatment. In the first of these follow-up posttests, the modeling videotape group did not retain the advantage for physical/visual criteria, however did score significantly higher than the no-modeling audiotape group on tone quality/intonation. A third and final posttest showed no significant differences among the groups, though Linklater notes that the modeling videotape group again scored higher than the non-modeling group in tone quality/intonation "at levels near statistical significance" (p. 410).

Linklater acknowledges that the effect of the modeling video and audio tapes was not as large as expected, and hypothesizes four possible explanations: a) Insufficient

amount of music on the tapes, b) Students not using the tapes for the duration of the study, c) The use of recorded accompaniments with the control group, and d) Insufficient duration of treatment for students to show differences in achievement.

Blended Learning and Music Education

The term blended learning first appeared as early as 1999 (Friesen, 2012), though the definition was broad and imprecise. As the name implies, blended learning was first used to describe a combination of various pedagogical approaches, instructional technology, and/or web-based resources. By the mid 2000s, the definition of the term as we now understand it began to take shape. Garrison and Kanuka (2004) defined blended learning as "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (p. 96). In their 2012 report "Classifying K-12 Blended Learning," Staker and Horn provided an updated definition of blended learning that reflected the changes and innovations in the blended learning educational community: "Blended learning is a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace, and at least in part at a supervised brick and mortar location away from home" (p. 3).

The use of online videos and other online tools in conjunction with classroom learning has become a central focus for innovation in the educational community. *Flipped Classroom* is a well-known example of blended learning that has gained widespread attention in large part due to the innovative work of Salman Khan. In the early 2000s, Khan began posting math tutorials online to help his younger cousins who

lived across the country (TED, 2011). Many students around the world began to watch the videos, and gradually Khan realized the considerable potential for online video lessons to enhance education on a large scale. In 2006, he founded the non-profit Khan Academy with the mission "to provide a free world-class education for anyone, anywhere" (Khan Academy, 2018). Research on blended learning and online video instruction has shown overall positive effects for student learning. Means, Toyama, Murphy, and Baki (2013) published a meta-analysis of 45 blended learning research studies and concluded that "blended approaches have been more effective than instruction offered entirely in face-to-face mode" (p. 35).

Khan's first teaching videos, math tutorials created for his younger cousin Nadia, were posted in 2006 on the video-hosting website YouTube (Khan, 2012). The accessibility, free access, and wide viewership of YouTube have made it a popular site for teachers to post educational videos. Educational videos have become a significant segment of YouTube content, with over 500 million views of learning-related content each day (YouTube internal statistics, as cited in Ducard, 2017). Additionally, information-seeking is one of the top three reasons people view YouTube videos (Google, 2018).

Whitaker, Orman, and Yarbrough (2014) analyzed the content and characteristics of music education videos published on YouTube. Several cross-referenced searches of the term "music education" resulted in 1,761 videos, which were observed and sorted into the following categories: performance (n = 483), teaching (n = 381), public relations (n = 359), industry (n = 129). Videos classified as "irrelevant" (n = 265), and "no longer available" (n = 144) were removed from the study. Videos categorized as "teaching"

were further analyzed for teaching type, content, genre of music, age of participants, intended audience, and instrument. The most frequent type of teaching video was tutorial (n = 248), followed by classroom instruction (n = 83), lessons (n = 23), ensemble rehearsals (n = 18), and other (n = 9). A majority of the videos were related to developing performance skills (65%) on woodwind (30%), fretted (25%), and piano/keyboard (20%) instruments.

Citing statistics from 2012, Whitaker et al. (2014) note that "YouTube had 60 hours of video uploaded to the site every minute with 'more than 4 billion views globally every day' (YouTube, 2012b)" (p. 1). Since that time, YouTube content and viewership has grown exponentially, with current figures of 300 hours of video uploaded per minute and one billion hours watched daily (YouTube, 2018). The amount of music teaching videos and viewership has grown similarly, as can be seen by comparing another statistic from the 2014 study. According to Whitaker et al., the most-viewed video tutorial observed was a beginning guitar lesson with 274,704 views. A recent YouTube video for the term "beginning guitar lesson" conducted by the present researcher resulted in over 3,000,000 results, with the top video, "Absolute Super Beginner Guitar Lesson" listed at 9.3 million views (GuitarJamz, 2013).

Conclusion

Practicing is a key element in the development of musical skill. Development of high levels of musical skill requires not only substantial quantity of practice, but also the use of effective practice strategies, including structured practice, self-evaluation, and systematic work toward goals. For students to engage in effective

practice, they must be able to create an aural image of the music, self-evaluate, and detect errors on their own performance. Research overwhelmingly supports the benefits of teacher modeling in the classroom, and the importance of high-quality modeling for the achievement of students. Video and audio-recording technology allows teachers to extend modeling and instruction beyond the school day, allowing students to access high-quality models to emulate each time they practice. Through repeated listening, students can gain familiarity with the music, thereby increasing their confidence and ability to self-evaluate.

In an increasingly internet-connected culture, students are spending significant amounts of time with online technology as a source of entertainment, social interaction, and information-seeking (Anderson, 2015). Blended learning is an emerging trend in education that integrates the use of online learning videos and other resources into formal education program that gives students the ability to access information and instruction at their own time and pace. While numerous studies have explored the effects of recorded models in instrumental music, there is no extant research on the effectiveness of online music education videos as home practice aids in instrumental music.

Statement of Purpose

The purpose of this research was to explore the effect of online video instruction and modeling as a practice aid on the performance achievement of elementary band students. Pretest and posttest student performances of a researcher-designed eight-measure etude were evaluated.

Primary Research Question:

1) Will there be a significant difference in the performance achievement scores of fifth-grade instrumental students as a function of practice including online video modeling and instruction versus traditional practice methods?

Secondary Research Questions:

1) Are there significant differences between the two groups in the subcategories of the performance measure (pitch, rhythm, articulation, fluency)?
2) Are there significant differences in the performance achievement between the two different schools represented?
3) Are there significant differences in the performance achievement among the instrument categories?
4) Is there a significant difference in the amount of practice between the groups?

CHAPTER 3

METHOD

Design

This study followed a pretest-posttest control group experimental design.

Setting and Participants

Research activities were conducted in the Garnet Valley School District in Glen Mills, PA, within the following two district school buildings: Bethel Springs Elementary School (Garnet Valley, PA), and Garnet Valley Elementary School (Glen Mills, PA). Garnet Valley School District is a suburban public school district in southeastern Pennsylvania comprised of five schools, with approximately 5,000 students enrolled. A letter of permission to conduct research was granted from the school superintendent in May, 2017 (Appendix B).

Participants in this study *(n* = 84) were volunteers selected from students enrolled in fifth-grade band in Garnet Valley Elementary and Bethel Springs Elementary in the 2017-2018 school year. Participants were limited to those who play the following instruments: flute (*n* = 17), clarinet (*n* = 18), alto saxophone (*n* = 27), and trumpet (*n* = 22). All student participants had one year of instruction at the time of the research study, and attended 30-minute instrumental lessons once a week. All lesson groups were homogeneous and limited to no more than six students. Participants in the study were randomly assigned to either the Non-Video Practice control group (NVP) or the Video Practice treatment group (VP).

Independent Variables

The independent variable in this study was the home practicing condition. Students in the experimental Video Practice group (VP) were given access to an online video that included verbal instructions and aural/visual modeling of the etude. Students in the control Non-Video Practice group (NVP) were instructed to practice the etude as part of their normal home practice routine. Both groups received the same instruction and modeling during the weekly school lesson.

Dependent Variables

The dependent variables in this study were: 1) Student performance gain scores on a researcher-composed etude 2) Amount of reported practice time. Participants were recorded performing the etude at the start of the study (pretest) and again after the study (posttest). Both the pretest and posttest were scored using a researcher-designed Etude Scoring Form (Appendix J). Practice time was reported by students and approved by parent signature using a Weekly Practice Form (Appendices K and L).

Materials

Etude

The musical material used for this study was a short song composed by the researcher titled "Etude" (Figure 1). The difficulty of the etude was designed to align with the average musical achievement level of the participants at the time of the study. The curriculum method book for fourth and fifth grade students in the Garnet Valley

School District is *Tradition of Excellence, Book 1* (Pearson & Nowlin, 2010). The level of difficulty of the etude was based upon the musical components of exercise number 54 "Rio Con Brio," which represents an appropriate level of difficulty for fifth grade band students in Garnet Valley School District at the time of the study. Below are descriptions of the musical elements of the etude with rationale for inclusion:

Melody: The melodic range of the etude for alto saxophone, clarinet, and trumpet is concert $A_3 – G_4$. The melodic range for flute is concert A_4 - G_5. While nearly all student participants were familiar with the five-note range of concert B-flat - F, the range was extended by one pitch below and above to provide a level of challenge that would sustain the three-week long treatment period and show contrast of student achievement. The key signature of concert B-flat major was familiar to most students. In measure six, a non-diatonic note (concert E natural) was included to provide a challenge that would be unfamiliar to most students. The melodic contour was designed to contain a mixture of steps and skips. The melody was designed to avoid predictable harmonic structure to ensure that the etude melody was unfamiliar to participants.

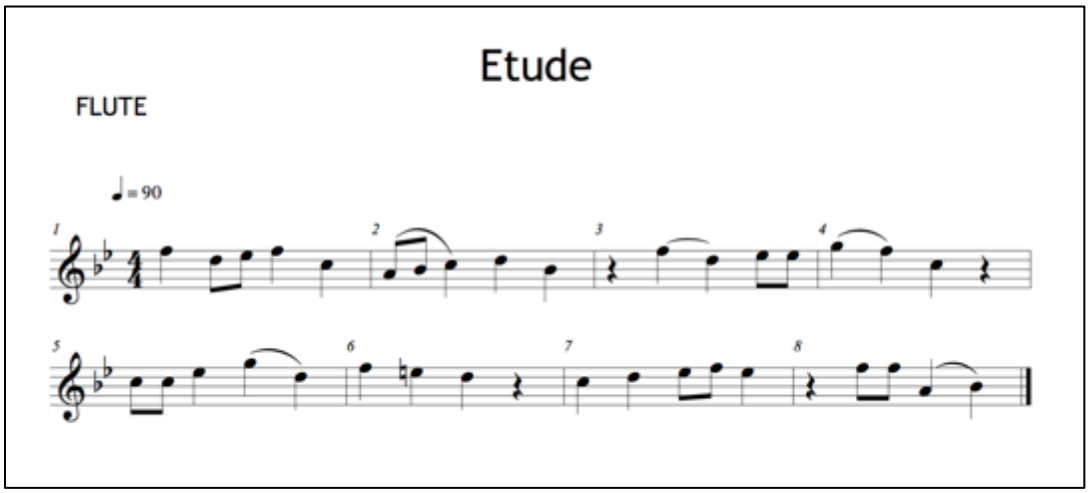

Figure 1. Flute Etude

Rhythm: The meter of the etude is 4/4, which was familiar to all participants. The rhythm content of the etude includes quarter notes, paired eight notes, and quarter note rests. Rhythmic values longer than one beat in length were excluded to better facilitate the scoring method of one point possible for each beat.

Articulation: The only articulation markings in the etude are four slur markings. Regular instruction in the first year of band lessons includes steady reinforcement of correct articulation applied to every note. Slurs are introduced approximately halfway through the first year of instruction in fourth grade, and continue to be reinforced through the second year of instruction in fifth grade.

Recording Devices

All participant pretest and posttest performances were recorded using a Zoom H1 Handy Recorder (Figure 2). All video excerpts were recorded using a Panasonic Lumix DMC-GH4 camera and a Shure MX184 Supercartoid lavalier microphone (Figure 2).

Figure 2. Recording Devices

Videos

A short video was created for each instrument group (alto saxophone, clarinet, flute, and trumpet) which included verbal instruction by the researcher and instrument modeling. Recording was conducted in August, 2017 using a Panasonic Lumix DMC-GH4 camera and a Shure MX184 Supercartoid lavalier microphone (Figure 2). Subjects were recorded in front of a plain white background with professional-quality lighting. The verbal instructions and guidance on the videos followed the teaching script, and varied slightly for individual instrument differences in transposition and fingerings (Appendix H). Using iMovie running on a 2016 MacBook Pro, four separate videos were edited and exported, one for each instrument type. Videos ranged in length from 3

minutes 32 seconds to 3 minutes 52 seconds. Figure 3 shows a sample screenshot of verbal instruction. During verbal instruction, key terms and musical symbols were shown on the screen for reinforcement.

Figure 3. Example Screenshot of Practice Video: Verbal Instruction

Figure 4 shows a sample screenshot of instrument modeling. Modeling on alto saxophone, clarinet, and flute was performed by the researcher, and modeling on trumpet was performed by a professional trumpet player with over 30 years' experience. During all modeling, music notation of excerpts appeared on the screen. Modeling excerpts were performed with a metronome set to 90 bpm with no accompaniment. All four videos were uploaded to www.youtube.com under the account of the researcher, https://www.youtube.com/user/MrSelfridge. All video settings were set to "unlisted", which means that the videos were only accessible through a direct URL link, and were not accessible through an internet search engine or YouTube site search. In addition to

the four videos for student home practice use, four additional videos were created which included the modeling excerpts only, with no verbal instructions. These videos were used during school lessons as a model during live instruction.

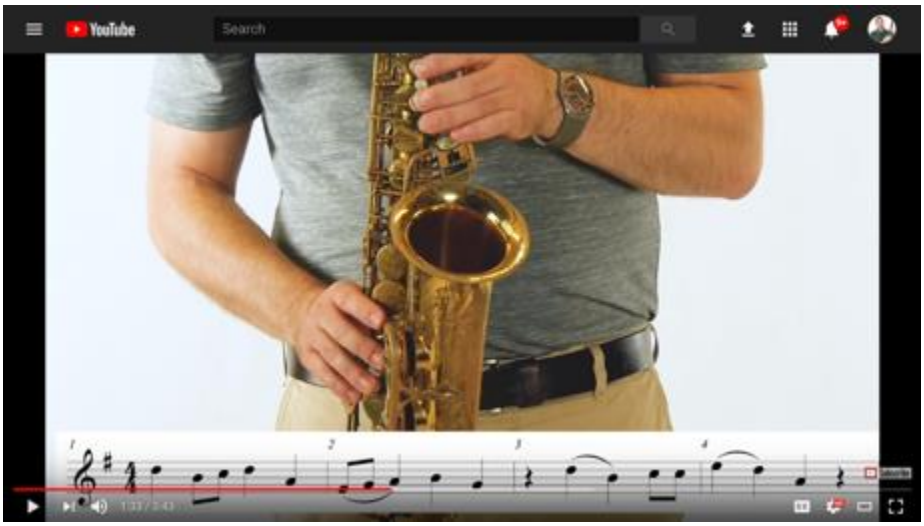

Figure 4. Example Screenshot of Practice Video: Modeling

Practice Record

Based on similar research by Zurcher (1975), Anderson (1981), and Linklater (1997), data on student practicing was collected using a researcher-designed Weekly Practice Report (Appendices K and L). Students were instructed at the weekly school lesson to complete the Weekly Practice Report throughout the week. To complete the practice report, students were instructed to write down the number of minutes each day of the week, indicate whether the practice video was used (for the treatment group only), calculate the total number of minutes, and obtain a parent signature.

Recruitment

In May, 2017, a letter of permission to conduct research was obtained from the school superintendent (Appendix B). In September, 2017 during the first several weeks of school, the researcher, Stephen Selfridge, and research assistant Jeffery VonDerStuck reviewed the complete list of students participating in fifth-grade band at Garnet Valley Elementary School and Bethel Springs Elementary School for the 2017-2018 school year. Students eligible to be included in the study were fifth grade students enrolled in band with one year of experience on the following instruments: alto saxophone, clarinet, flute, and trumpet. Of the total enrolled students, 110 students were identified as meeting the participation requirements. Information packets were distributed to all potential participants. The packets included the following: Parent Invitation Letter (Appendix D), Student Musician Invitation Letter (Appendix E), Informed Consent Form (Appendix F), and Informed Assent Form (Appendix G). These documents were also sent to parents of potential participants via e-mail. Of the total number of students invited, 11 opted to not participate in the study. Consent and Assent forms were collected for the remaining 99 participants.

Procedure

All student participants (n = 99) were assigned a three-digit ID number which was used for labeling all digital recording files and score sheets. Using the website www.graphpad.com, participants were randomly assigned to one of two groups. For the purposes of randomization, "A" represented the Non-Video Practice Group (NVP) and "B" represented the Video Practice Group (VP). Through this procedure, the total

participants (n = 99) were randomly assigned to either the NVP group (n = 49) or the VP group (n = 50).

As part of the normal instructional routine at each school, all students enrolled in band were assigned to small groups of three to six students, homogenous instrumentation, for weekly lessons. All research-related instruction and recording was conducted in the music lesson room of the respective schools in a familiar and comfortable setting for all student participants. Each music room was equipped with a television or Smartboard projector connected to an internet-connected MacBook laptop. Instruction and recording of students was conducted by the researcher the researcher (Stephen Selfridge) for student participants at Garnet Valley Elementary School, and research assistant Jeffery VonDerStuck for student participants at Bethel Springs Elementary School. Both instructors are certified music teachers with over thirteen years of experience teaching instrumental music.

In the first week of the study, all students were given instruction and modeling following the teaching script for lesson one (Appendix H). The teaching script includes verbal explanations of the etude, guidance regarding specific musical aspects of performing the etude, modeling of the etude, and opportunities for students to play the etude. During the in-person instruction, video excerpts (described on p. 37) were used to provide high-quality and consistent modeling of the etude excerpts across both schools and all lesson groups. After completing the teaching script and activities, the students were individually recorded performing the etude as a pretest. Student performances were recorded using a Zoom H1 Digital Recorder. Once making sure that the student was comfortable and ready to begin, the instructor started the recording, stated the three-digit

student ID number, then provided a verbal count-off for the student at an approximate tempo of 90 bpm. To prevent any issues of maturation or testing bias, students were recorded one at a time, and waited in a separate soundproof room while others were being recorded.

Before the conclusion of the lesson, students received a Weekly Practice Report (Appendices K and L) for week one, and were instructed on the expectations for practicing the etude at home during the week. The teacher explained to the students that there are two random groups in this study, Group Garnet or Group White[2]. Group Garnet represented the Non-Video (NV) Practice Group, and Group White represented the Video Practice (VP) Group. To avoid any demoralization of participants, students were told that they will have access to the video at different times. Students in Group White (VP) were given access to the video in weeks one through three, while the students in Group Garnet (NVP) were given access to the video in weeks four through six. Data was not collected beyond week three.

At the conclusion of the week one lesson, the researcher sent an e-mail (Appendix M) to the participants and their parents with reminders about the practicing assignment. For students in the Video Practice Group, the e-mail also contained a URL link to access the practice video specific to their instrument. On the day prior to the following week's lesson, the researcher sent a follow up e-mail (Appendix M) to parents and student participants to remind them to complete the practice report and bring it to school.

[2] Garnet and white are the school colors of Garnet Valley School District and were used as group names to avoid any bias students may associate with ordinal group names such as Group A and Group B.

In weeks two and three, the instructors collected the completed Weekly Practice Report from each student, distributed a blank Weekly Practice Report for the upcoming week, then followed the teaching script to review and practice the etude (Appendix H). Reminder e-mails were sent each week on the day of the lesson and on the day prior to the following lesson.

In the final week of the study, the instructor collected the final Weekly Practice Report from all participants, then reviewed the etude using the teaching script. Following this final round of instruction, the students were again recorded individually performing the etude as a posttest. The procedure for recording the posttests was the same as described above for the pretests.

During the course of the study, 15 of the original 99 participants were removed from the study for various reasons. Four participants withdrew from the study voluntarily, four participants withdrew from the band program during the course of the study, and seven participants were absent or otherwise unable to record a pretest or posttest.

Evaluation Procedures

All participant recordings were transferred to a MacBook Pro laptop and renamed with the three-digit participant code and either "pretest" or "posttest." Recordings were kept anonymous and scored in random order by the researcher using the researcher-designed Etude Scoring Form (Appendix J). The Etude Scoring Form was closely modeled on a design used by Russell (2016). Russell's design was based on the Watkins-Farnum Performance Scale (1954), a highly established and reliable measure of

instrumental sight-reading ability. Russell modified the Watkins-Farnum method to analyze student accuracy on each beat unit, rather than the full measure used by Watkins-Farnum, allowing a more accurate assessment of the number of errors in four different categories: pitch, rhythm, articulation, and fluency[3].

For this study, the researcher has retained the four categories of assessment used by Russell: pitch, rhythm, articulation, and fluency. Student recordings are evaluated by deducting one point for each mistake in these four categories on each beat. There are 32 total beats in the etude, with four total beats of rest. Since it is not possible to evaluate pitch, articulation, or fluency on a rest, these beats were subtracted from the total possible score in each category. Therefore, the maximum score possible for the etude is 116, comprised of pitch (28), rhythm (32), fluency (28), and articulation (28). Previous research has indicated that recorded models can improve student performance in additional categories including tone quality, intonation, and dynamics (Folts, 1973; Puopolo, 1971; Zurcher, 1971), however these elements were not measured in this study. It was decided that for the purposes of this study, evaluation would focus upon the more clearly quantifiable elements of pitch accuracy, rhythmic accuracy, fluency, and articulation.

Student performances on pretest and posttest were unaccompanied. The instructor cued the student to begin by counting "1-2-3-4" in a tempo of 90 bpm. Once beginning to play, many students set their own tempo whether faster or slower. Scoring

[3] B. Russell (2010) discussed this limitation of the Watkins-Farnum: "Only one error can be scored in any one measure. This binary state of correctness, present or not present, does not account for the intensity of an error within a measure" (p. 57).

was based on the student-determined tempo. If a sustained tempo shift was detected in the performance, rhythms and fluency were evaluated based on the new tempo.

During the scoring process, five recordings were determined to be incomplete or unable to be scored, and the data were removed from the study. Fifteen percent of the participant recordings were randomly selected to be scored by the assistant researcher as an independent reliability judge (Appendix O). Judges' scores were highly correlated for all four rating categories: Pitch ($r = .83$, $p < .000$), Rhythm ($r = .86$, $p < .000$), Fluency ($r = .85$, $p < .000$), and Articulation ($r = .91$, $p < .000$).

CHAPTER 4

RESULTS

The purpose of this research was to explore the effect of online video instruction and modeling as a practice aid on the performance achievement of elementary band students. Participants randomly assigned to a treatment group and control group were assigned an etude to practice. Participants' performance of the etude was measured at the start of treatment (pretest) and again after 3 weeks of treatment (posttest). Performance accuracy was assessed in four categories: pitch, rhythm, fluency, and articulation. Data on time spent practicing and use of the video practice aid were collected weekly. All data were analyzed using IBM Statistics Package for the Social Sciences (SPSS), using an alpha level of $p < .05$.

Pretest Score Comparison

An independent samples *t*-test was conducted to compare the pretest scores of the two practice groups (VP and NVP). The means and standard deviation for both groups pretest and posttest are displayed in Table 1. Results showed no significant difference between groups on pretest score totals; $t(82) = .44$, $p = .872$. Additionally, there were no significant differences between groups in any of the four subcategories of pitch; $t(82) = -.59$, $p = .87$, rhythm; $t(82) = .65$, $p = .885$, fluency; $t(82) = .96$, $p = .964$, and articulation; $t(82) = .27$, $p = .341$. These results indicate that student performance ability at the outset of the study were congruent.

Table 1

Pretest and Posttest Means and Standard Deviations by Practice Group

Group	*n*	Pretest Mean	Posttest Mean
Non-Video Practice	42	92.17 (*SD* = 11.65)	102.19 (*SD* = 13.48)
Video Practice	42	91.00 (*SD* = 12.86)	109.07 (*SD* = 8.32)
Both Groups	84	91.58 (*SD* = 12.21)	105.63 (*SD* = 11.66)

Pretest-Posttest Gain Score by Group

Mean pretest-posttest gain scores of the two practice groups were examined. A two-way repeated measures ANOVA was conducted to compare the effect of the independent variable, practice group (Video Practice vs. Non-Video Practice), on the dependent variable, student pretest-posttest gain scores. Results showed a significant main effect for Pre-Post ($F(1, 82) = 252.00$, $p < .001$, $\eta_p^2 = .754$), a non-significant main effect for practice group ($F(1,82) = 1.41$, NS), and a significant interaction ($F(1,82) = 20.68$, $p < .001$, $\eta_p^2 = .201$). The interaction is shown in Figure 5.

A simple effects analysis conducted on this interaction showed that both groups significantly improved between the pre-test and the post-test, but that the groups differed significantly at the post-test (pre-post for non-video group (NVP): $t = 8.73$, $p < .001$; for video group (VP): $t = 13.42$, $p < .001$; for posttest difference: $t = 6.88$, $p = .006$), with greater improvement gains being attained by the video group (VP).

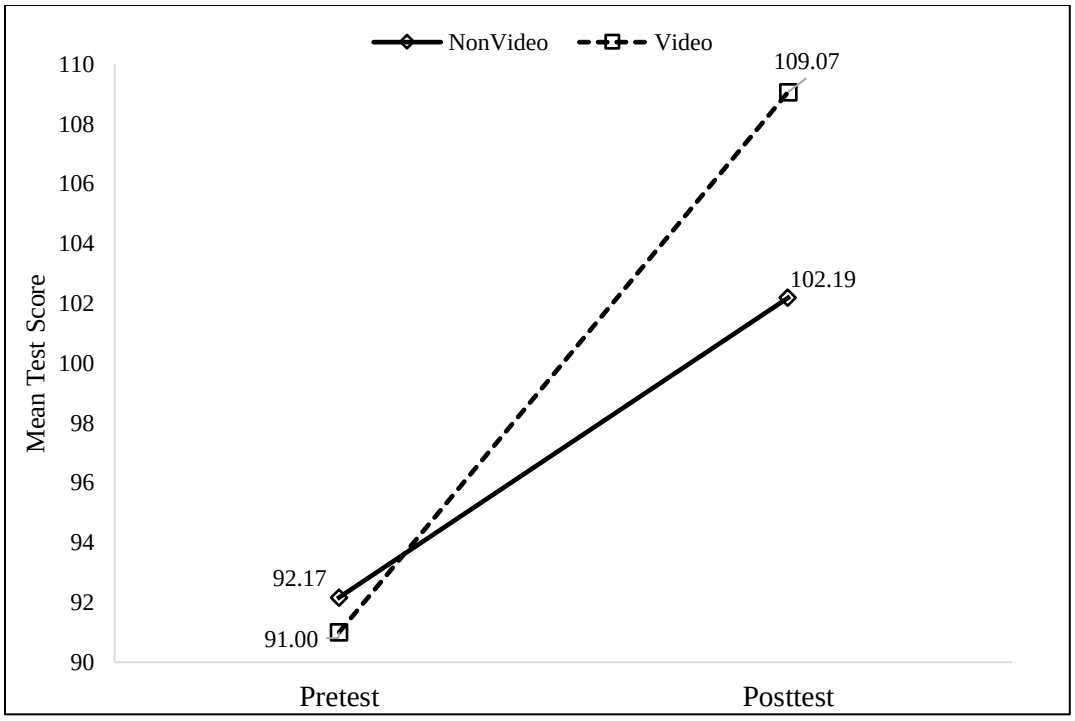

Figure 5. Mean Pretest-Posttest Gain by Practice Group

Pretest-Posttest Gain by Category

In addition to total pretest-posttest gain, the pretest-posttest gains in each evaluation category (pitch, rhythm, fluency, articulation) were examined for significant differences. Table 2 displays the means and standard deviations of pretest-posttest gain scores in each category. Repeated measures ANOVAs were conducted on each of the score subcategories showed significant interactions in rhythm, $F(1, 82) = 9.45$, $p = .003$), fluency, $F(1, 82) = 9.97$, $p = .002$), and articulation, $F(1, 82) = 8.07$, $p = .006$). There was no significant effect for pitch, $F(1, 82) = 3.41$, $p = .068$). Similar to the pattern seen in total pretest-posttest score, scores in each subcategory increased for both groups, with

a significantly larger increase observed in the Video Practice group for rhythm, fluency, and articulation. Mean pretest-posttest scores for pitch increased for both groups, but the difference between groups was not significant.

Table 2

Pretest-Posttest Gain Score Means and Standard Deviations for all Categories

	Mean Pretest-Posttest Gain	
Category	Non-Video Practice	Video Practice
Pitch	2.67 (*SD* = 3.96)	4.26 (*SD* = 3.96)
Rhythm	1.24 (*SD* = 2.47)	3.05 (*SD* = 2.91)
Fluency	4.71 (*SD* = 3.01)	7.26 (*SD* = 4.28)
Articulation	1.40 (*SD* = 3.66)	3.50 (*SD* = 3.07)
Total	10.02 (*SD* = 7.47)	18.07 (*SD* = 8.72)

Instrument Type

Further analysis was conducted to determine if there were any significant differences in the gain scores by instrument type. Table 3 displays the means and standard deviations of the pretest and posttest scores, viewed by instrument type and group. Results of a repeated measures ANOVA showed no significant effect for instrument type on pretest-posttest score, $F(3, 76) = .79$, $p = .505$, and no significant interaction of instrument type and practice group on pretest-posttest score, $F(3, 76) = 1.07$, $p = .369$.

Table 3

Pretest and Posttest Score Means and Standard Deviations by Instrument Type and Group

Instrument	Group	*n*	Pretest Mean	Posttest Mean
Alto Sax	Non-Video	13	91.15 *(SD* = 9.81)	100.08 (*SD* = 11.81)
	Video	14	88.50 (*SD* = 19.15)	107.79 (*SD* = 10.40)
Clarinet	Non-Video	9	91.67 (*SD* = 9.81)	103.67 (*SD* = 10.78)
	Video	9	97.00 (*SD* = 6.33)	111.89 (*SD* = 6.66)
Flute	Non-Video	9	99.00 (*SD* = 9.29)	109.78 (*SD* = 8.63)
	Video	8	89.13 (*SD* = 6.64)	111.38 (*SD* = 3.38)
Trumpet	Non-Video	11	88.18 (*SD* = 15.14)	97.27 (*SD* = 18.40)
	Video	11	90.64 (*SD* = 9.80)	106.73 (*SD* = 8.92)

School

Another secondary research question of this study was to determine if there is a significant difference in pretest-posttest gain by school, which would take into account differences encountered in initial instruction (researcher and research assistant). Table 4 displays means and standard deviations of pretest and posttest scores by school. Results of a repeated measures ANOVA showed no significant effect for school on pretest-posttest score, $F(1, 80) = .01$, $p = .913$, and no significant interaction of school and practice group on pretest-posttest score, $F(1, 80) = .67$, $p = .416$.

Table 4

Means and Standard Deviations of Pretest and Posttest Scores by School and Group

School	Group	*n*	Pretest Mean	Posttest Mean
BSES	Non-Video	17	93.65 (*SD* = 10.82)	104.71 (*SD* = 11.79)
	Video	13	91.77 (*SD* = 9.71)	108.92 (*SD* = 8.00)
GVES	Non-Video	25	91.16 (*SD* = 12.29)	100.48 (*SD* = 14.49)
	Video	29	90.66 (*SD* = 14.19)	109.14 (*SD* = 8.32)

Practice Time

Students' reported practice time was examined to determine if the total practice time of the two groups differed significantly. The total amount of reported practice minutes was higher for the Video Practice Group ($M = 71.76$, $SD = 53.77$) than the Non-Video Practice Group ($M = 54.17$, $SD = 77.88$), though a *t*-test revealed no significant difference between the two, $t(82) = -1.21$, $p = .883$. Pearson product-moment correlations were used to examine the relationship between reported practice minutes and performance achievement. The total amount of reported practice minutes was positively correlated with posttest scores ($r(82) = .346$, $p = .001$), indicating that as student self-reported practice time goes up, posttest scores also increase. There was no significant correlation found between reported practice minutes and student gain from pretest to posttest, $r(82) = .198$, $p = .07$, indicating that increased practice minutes were not associated with increased gain scores.

Video Use

Two metrics were used to track video use by participants in the Video Practice group: 1) self-reported student data and 2) analytic data provided by YouTube. Study participants were instructed to complete Weekly Practice Reports which detail the number of minutes spent practicing the etude. Additionally, participants in the VP group were instructed to indicate the number of practice sessions in which the practice video was used. For all participants in the VP group, the total amount of practice days with reported video use is 124. There are nine students in the VP group who reported using the video zero times. Mean usage for the remaining 33 students who reported using the video at least once was 3.75. YouTube provides detailed data on video statistics in the Analytics section of the "Creator Studio" page. Table 5 displays the YouTube Analytic data in comparison to the student self-reported data.

Table 5

Video View Data for Video Practice Group as Reported by Participants and YouTube Analytics

	Self-Reported Data	YouTube Analytics Data		
Instrument	Number of Times Video Used	Number of Views	Total Minutes Viewed	Average View Duration
Alto Sax	40	32	143	4:27
Clarinet	31	37	86	2:20
Flute	22	20	58	2:52
Trumpet	31	31	77	2:28

CHAPTER 5

DISCUSSION

This study examined the effects of online video modeling and instruction on the performance achievement of elementary band students. Video and audio recordings have been shown to be effective teaching and practicing aids in a variety of music teaching contexts, including: accompaniment for practice (Dickey, 1991; Sheldon, Reese, & Grashel, 1999), guided practice in school (Peightel, 1971; Puopolo, 1971; Shaw, 1971; Spohn, 1959), aid for home practice (Folts, 1973; Linklater, 1997; Zurcher, 1975), and effective practice aid in a controlled environment single practice session (Henley, 2001; Rosenthal 1984; Rosenthal et al, 1988).

In the aforementioned previous studies, researchers used recorded media concurrent with commonly available technology. The most recent study involving recorded models for home practice (Linklater, 1997) used Video Home System (VHS) tapes and audio cassette tapes to provide both visual and aural modeling for student practice. At the time, the VHS tape and Videocassette Recorder (VCR) were common technology in most American homes (Briggs & Burke, 2009). Since then, developments in digital and internet technology have changed how people interact with information and media. Currently, the distribution of music, television, and movies is shifting away from physical storage formats (CD, DVD, and digital files) toward increased consumer use of online streaming services such as Spotify®, Netflix, and Hulu (Faughnder, 2017; Sisario & Russell, 2016).

The use of online videos and other online tools in conjunction with classroom learning has become a central focus for innovation in the educational community, and research on blended learning and online video instruction has shown overall positive effects for student learning (Means, et al., 2013). The website YouTube, founded in 2005, has grown exponentially to become the world's leading online video hosting service, with over one billion users, and one billion hours of video watched daily (YouTube, 2018). Educational videos have become a significant segment of YouTube content, with over 500 million views of learning-related content each day (YouTube internal statistics, as cited in Ducard, 2017). Researchers have begun to explore online videos in relation to music education (Kruse & Veblen, 2012; Rudolph & Frankel, 2009; Waldron, 2012; Waldron, 2013a/2013b; Whitaker, Orman, & Yarbrough, 2014; Wise, Greenwood, & Davis, 2011). Presently no extant research exists that studies the effect of online videos as a home practice aid for instrumental students.

The present study used a randomized pretest-posttest control group design to explore the effect of an online instructional video as a home practice aid on the performance of fifth grade instrumental students. Participants practiced the researcher-composed song "Etude" for three weeks under one of two conditions: the control group (NVP) practiced the etude at home under normal practice conditions, without the aid of recorded model or instruction, and experimental group (VP) participants were given access an online video containing instruction and like-instrument modeling. Both groups received identical instruction on the etude during weekly small-group lessons. Participant pretest and posttest performances were scored on the categories of pitch,

rhythm, fluency, and articulation, using a researcher-designed Etude Scoring Form, based upon a similar instrument developed by Russell (2016).

Pretest-Posttest Scores

During the first week of the study, the etude was introduced to the students using a teaching script that included verbal instructions, teacher modeling (provided by video excerpt), and student imitations of the model performance. Immediately following this short instruction and practice sequence (approximately five minutes), the participants were individually recorded performing the etude as a pretest. Although the pretest was not a sight-reading test by definition (a piece of music performed with no preparation or study), the students had very little preparation or practice before performing the etude. Out of a possible perfect score of 116, the mean pretest score for the Non-Video Practice Group was 92.17 (SD = 11.65), and the mean pretest score for the Video Practice Group was 91.00 (SD = 12.86). The mean scores and standard deviations of the two groups are very similar, and an independent measures t-test confirmed no significant difference between groups on pretest score totals; $t(82) = .44$, $p = .872$. This indicates that the performance ability of the two groups was congruent at the start of the study.

Following the three-week treatment, the participants were individually recorded performing the same etude as a posttest. Out of a possible perfect score of 116, the mean posttest score for the Non-Video Practice Group was 102.19 (SD = 13.48), and the mean posttest score for the Video Practice Group was 109.07 (SD = 8.31). To address the primary question of the research, a repeated measures ANOVA conducted on the pretest-posttest scores of the participants. Results showed that both groups improved

significantly from pretest to posttest ($F(1, 82) = 252.00$, $p < .001$, $\eta_p^2 = .754$), which is an expected result following three weeks of practice both in school and at home. The repeated measures ANOVA also showed a significant interaction of practice group with pretest-posttest score, ($F(1,82) = 20.68$, $p < .001$, $\eta_p^2 = .201$). This result indicates that the use of an online video lesson during home practice had a significant positive effect on student performance compared to normal practice with no video.

In addition to a significantly higher posttest mean score, the Video Practice Group posttest standard deviation ($SD = 8.31$) was smaller than the posttest standard deviation of the Non-Video Practice Group ($SD = 13.48$), indicating that posttest scores were more consistent in the Video Practice Group. Previous research by Hewitt (2001) and Morrison, Montemayor, and Wiltshire (2004) has suggested that recorded models can help students form an aural model of an objective goal to measure themselves against, which may explain the higher levels of consistency in the Video Group posttest scores.

Further examination of the pretest-posttest scores revealed significant effect of practice group in the categories of rhythm, fluency, and articulation. There was no significant effect for pitch. Examination of the descriptive statistics for pretest-posttest gain reveals an interesting insight regarding fluency. The largest mean gain from pretest to posttest was in fluency, where the Video Practice Group mean gain was 7.26 ($SD = 4.28$). Fluency measures the ability of the student to perform with steady tempo, free of hesitations between beats. The Video Practice Group gain for rhythm ($M = 3.05$, $SD = 2.91$) was also significant. The significant improvement of the Video Practice Group in fluency and rhythm aligns with previous research that has shown recorded models to

improve rhythm and tempo stability (Hewitt, 2001; Rosenthal, 1984; Rosenthal et al., 1988).

Instrument Type

Previous research has shown recorded models and instruction to be effective in improving musical and performance skills of beginner brass (Peightel, 1971; Puopolo, 1971; Zurcher, 1975) and clarinet students (Linklater, 1997; Sperti, 1970), snare drum students (Shaw, 1971), and of students in mixed wind instrument settings (Folts, 1973). By contrast, Hodges (1974) found no effect of recorded models on skills improvement of beginner wind instrument players. Likewise, Anderson (1981) recorded similar results for beginner clarinet students. A secondary research question focused on the difference in effect of video modeling and instruction on the four different instruments represented: alto saxophone, clarinet, flute, and trumpet. For all instrument types, the pretest-posttest mean gain was larger for the Video Practice group than for the Non-Video Practice group. The largest gain from pretest to posttest was observed in flute students in the Video Practice Group (M = 22.25, SD = 7.98), followed by alto saxophone VP group (M = 19.29, SD = 10.94), trumpet VP group (M = 16.09, SD = 7.57), and clarinet VP group (M = 14.89, SD = 5.62). There was no significant interaction of instrument type and practice group on pretest-posttest score. These results indicate that there was no significant difference in the effect of the Video Practice based on instrument type, and the use of online practice videos had a positive effect on musical achievement across all four instrument types: alto saxophone, clarinet, flute, and trumpet.

School

Student participants were derived from two schools within the same school district. Although one of the schools (GVES) is significantly larger in student enrollment, the schools are otherwise very similar in terms of geographical location, socio-economics, and ethnic diversity. Both schools follow the same academic schedule and curriculum, and the curricula of the two instrumental music programs are likewise aligned. Effort was taken to control for the difference in instructors between the two schools through use of a written script for all verbal instruction, and video excerpts for all instrument modeling during instruction. Despite these measures, the possibility of participant bias remained. This threat to validity results when participants act either consciously or subconsciously in ways that they think the researcher wants them to act (Mitchell & Jolley, 2012). Participants in the study who attend GVES, where the primary researcher is their teacher, may have had tended to practice more or increase their effort to do well on the etude due to a perception that this project is important to their teacher. In addition, the students of the researcher may have been more likely to use the practice videos because their teacher appears in the video.

To explore the possibility of an effect for school, a repeated measures ANOVA was conducted on pretest-posttest scores by school. Results showed no significant effect for school on pretest-posttest score and no significant interaction of school and practice group on pretest-posttest score. Mean gain scores for both groups in both schools were similar. Results indicate that participant bias was not a factor in the present study, and the use of online video lessons had similar effect for students in both schools.

Practice

All student participants were given Weekly Practice Report sheets to record the number of minutes practiced on the etude at home during each week. Several closely-related studies involving home practice similarly required students to report practice time (Anderson, 1981; Linklater, 1997; Zurcher, 1975). Similar to Linklater (1997) and Anderson (1981), reported practice time in the present study was not significantly different between groups, and standard deviations were large, due to wide variances in student practicing and reporting. That reported practice time was not significantly different between the groups indicates that the availability of an online practice video was not a significant factor in motivating students to practice more. While this result may indicate that online videos do not lead to increased practice, it suggests that the time spent practicing with video instruction was more effective than traditional practicing, thus reinforcing the commonly held notion in research of practice strategies that *quality* of practice is more effective than *quantity* of practice (Duke, Simmons & Cash, 2009; Williamon & Valentine, 2000). Although amounts of reported practice minutes were not significantly different between groups, it is worth noting that the Non-Video practice group overall practiced less, with a large standard deviation ($M = 54.17$, $SD = 77.88$). This may indicate that students who had access to the online video were overall more consistent in their amount of practice at home. While practice time was positively correlated with posttest score, no significant correlation was found between practice time and gain scores. This may again serve to support the idea that the online video modeling and instruction helped students gain more from pretest to posttest by increasing the quality of the practice time rather than the quantity.

There was great variability in the amount of practice minutes reported. This perhaps should have been anticipated, as practice habits and home practicing expectations vary widely among students. Students were assured that their practice minutes would not be assessed for grading purposes, so they were encouraged to report honestly. Although some students were evidently diligent in their reporting of practice minutes, many reported either that they "forgot to practice" or "forgot to write down their practice minutes". Linklater (1997) relied on self-reported practice records from students, but also included a parent checklist of items to observe during student practice. Zurcher (1975) incentivized students to record practice time by offering M&M® candies as a reward (Dickey, 1992). Anderson (1981) took efforts to measure the reliability of student practice reports by requiring 20% of the students from both groups to tape-record their home practice. In retrospect, a similar approach in this study may have been advisable. Participants were not in the habit of recording practice minutes at home, so it was an added task outside of the normal family routine. For future research, it may be useful to take measures to control for the amount of student practice time through better monitoring home practice habits or limiting the practice time to the school day so it can be supervised.

Video Use

Although there was a significant effect for gain scores of students in the Video Practice Group, it was surprising that students did not access the video as often or as regularly as was anticipated. Regardless, the amount of times the students used the video

during practice appears to have increased their practice effectiveness. There are several factors that may have contributed to the less-than-expected video use.

After the first week of the study, participants reported some confusion about how to access the online video. Some indicated that they tried unsuccessfully to search for the video on YouTube. I explained to students that the videos could not be found through a YouTube search because the videos were "unlisted," and therefore only accessible through direct URL link. I reminded them that the video link was e-mailed to both their school-provided student e-mail account and the family contact e-mail account provided to me by their parents. More thorough explanations and communication of the technical aspects of accessing the video may have prevented this confusion and affected student video use in the first week of the study.

Just as student practice habits vary widely, so do parent attitudes and policies toward student use of technology at home. Although all student participants had access to the necessary technology for this study, the degree to which the technology was accessible varied by student. It was informally observed during the study that both students and parents had varying attitudes toward the use of technology outside of school. One student commented, "My parents don't let me use the computer when I'm doing homework," Even as technology and internet use are increasingly incorporated in classroom learning, some parents may consider the home computer or tablet as a source of entertainment, and a distraction from schoolwork. I encouraged these students to remind their parents that the use of the video was an important part of their practicing

assignment, and this message was reinforced as part of the weekly parent e-mail sent home.

All student participants in the study were offered the use of school-owned tablet devices if access to technology at home was not available. No students requested the use of a school owned tablet, yet it was evident that access to technology at home varied widely by student. Some students have their own internet-connected devices, while others share a family computer, or mentioned that they must wait until their parent's or sibling's device is available for use. Equal access to technology should be a consideration for future research so that there are no barriers to full student participation.

Motivation is an important factor that affects student practice, and by extension, student use of online practice videos. Factors that contribute to students' practice motivation include the establishment of clear goals, sense of personal relevance and meaningfulness, variety and diversity of tasks, and assignment of tasks with an optimal level of challenge (Berg & Austin, 2006; Maehr, Pintrich, & Linnenbrink, 2002). Clear goals were set for participants in this study, as students were instructed to practice and learn the etude to the best of their ability, yet student practice time and video use was overall less than anticipated. The etude was unfamiliar, which may have been a factor in students' motivation or lack of motivation to practice. Research has shown that familiarity with the given music is an important factor in the ability and motivation of novice musicians to practice (Harnischmacher, 1997; Oare, 2012). It is possible that while some students were motivated by the goals set for them in this study, others were less inclined to practice the etude due to unfamiliarity, or lack of personal relevance.

Further Research

While the benefits of recorded models for student practice are well-established, the effect of online video modeling and instruction on student learning in music demands further exploration. Researchers have studied the effect of online videos and blended learning in the context of varied subject matter, including mathematics, science, languages, social science, business, teacher education, medicine, and health care, showing overall benefits for student learning (Means, et al., 2013). It is recommended that similar research be conducted to study the effects of blended learning in various music education applications.

The current study was limited to 84 participants, assigned to control group (n = 42) and treatment group (n = 42). Treatment lasted for three weeks, and students were assessed based upon progress on a single etude in the domains of pitch, rhythm, fluency, and articulation. Future researchers may consider conducting a similar study with larger sample sizes, longer durations of treatment and broader assessment criteria to measure overall student growth.

Several of the issues raised in the current study suggest specific areas for future research. It was evident from participant practice records and verbal feedback that attitudes among students and parents toward internet use vary widely. Future research might explore parent and student attitudes toward technology in conjunction with schoolwork, homework, and music practice, and how these attitudes may change the effectiveness of online learning resources. Linklater (1997) explored the factor of parental involvement in student practice with recorded models. The effect of parental

involvement in conjunction with online video lessons would be a topic worthy of further study. Future research might also seek to ascertain the most effective structure for video music lessons (e.g., verbal instruction vs. modeling, shorter vs. longer videos, best practices for modeling), and the effect of multiple online video lessons applied in the context of a longer unit of study. It was notable in this study that students used the online practice video at a rate less than expected. Future research might investigate student motivation in relation to online video use, and explore student preference for different types of video lessons and models.

Implications for Music Education

The results of the current study support numerous previous findings that recorded models can be effective for improving student music learning and achievement. From phonograph records to mp3 files, recorded models have come in many forms, as educators constantly strive to use the best tools available to support students and facilitate learning. The emergence of online videos, blended learning, and flipped classroom methodologies are the latest innovations that allow music teachers to more effectively extend instruction beyond the classroom. For online video lessons to be effective, students must have access to the necessary technology, and must be motivated to learn. Teachers must also be aware that parent and student attitudes toward technology vary, and seek to communicate effectively with students and parents about the procedures and expectations for online learning resources at home.

Linklater (1997) conducted research similar to the present study using VHS and audio cassette tapes for student home practice. In the discussion, Linklater correctly anticipated that developments in technology (particularly computers) would change the delivery method of video models, providing further opportunity to enhance student practicing with modeling and instruction:

> The modeling concepts underlying this research should remain valid, regardless of technological changes in the medium of delivery. Indeed, should the day arrive when computers and television combine to form one larger interactive technology, the teaching and modeling approaches demonstrated in this study should be further enhanced." (p. 412)

At the time, Linklater may not have imagined the degree to which technology would transform the way we teach and share resources with students. With an internet-connected smartphone, tablet, or laptop, a single teacher can now reach millions of students across the world. This unprecedented ability to share and access information freely, at relatively low expense, has sparked a shift in educational philosophy. As Alison King argued in 1993, teachers no longer need be the "sage on the stage," lecturing students as if pouring knowledge into an empty container: "Such a view is outdated and will not be effective for the twenty-first century, when individuals will be expected to think for themselves, pose and solve complex problems, and generally produce knowledge rather than reproduce it" (King, 1993). Teachers instead can become a "guide on the side", empowering students to seek out information, make sense of it based upon their experience, and construct their own knowledge.

Giving students autonomy and choices increases motivation, persistence, and achievement (Patall, Cooper, & Robinson, 2008). By creating video lessons, or curating

the video lessons of other expert educators and musicians, teachers can provide students with numerous choices in their learning. Video lessons provide an opportunity for teachers to engage students through music they find relevant and meaningful, increasing both motivation and time spent practicing.

In a 1947 article in *Music Educators Journal*, University of Missouri Music Education Professor Paul Mathews extolled the benefits of phonograph recordings in the music classroom, urging music educators to work with record companies to increase the quality and quantity of educational recordings. Mathews hailed the phonograph as a "great gift to education" that holds "many and varied possibilities" for use in the music classroom, but also cautioned:

> It must be stated here that Mr. Edison did not invent a substitute for a good teacher. Rather, his discoveries made possible the development of instruments which, in the hands of good teachers, result in greater instructional efficiency and effectiveness. (Mathews, 1947, p. 25)

It remains as true today, as in 1947, that even the most technologically-enhanced music lesson is only as effective as the skill and care with which the teacher designs and implements it. Music educators, and educators in all disciplines, must continue our long tradition of embracing new technology and explore the potential of digital and internet technology to improve the way we teach and learn music.

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APPENDIX A
IRB PROTOCOL

1) Abstract of the study

Advances in technology have made it increasingly possible for teachers to extend instruction beyond the classroom through use of video recordings posted online. Teachers in varied fields of education have explored the use of instructional videos to enhance student learning both in and out of the classroom. The terms 'blended learning' and 'flipped classroom' have emerged to describe the different ways that teachers incorporate the use of videos in their curriculum. Blended learning refers to the use of any digital online media combined with a traditional classroom approach. Flipped classroom describes a specific type of blended learning where instruction is delivered through video lessons that the students view outside the classroom, while the resulting classroom time is spent in interactive engagement with the material.

Instructional videos have been in use in music education for decades. The emergence of internet technology and ubiquitous recording devices have brought about unprecedented possibilities for creating and sharing content. Two of the most important teaching modes of the instrumental music teacher are modeling and direct instruction. Effective instrumental teachers often use modeling to demonstrate correct performance of pitches, rhythms, and expressive elements for students to imitate. As the teacher models the performance of the music, he or she also provides the students with important verbal instruction to help students achieve the desired goals. Through repeated listening to the teacher model, students gain familiarity with the piece to be performed, and this familiarity helps students as they practice and self-assess at home. Through the use of video recorded lessons posted online, teachers can provide students with access to proper modeling and instruction at any time during their practicing outside of class.

This study will examine the effect of instructional videos on the performance achievement of fifth grade instrumental students. The study uses a pretest-posttest control group quasi-experimental design. Participants (n = 100) will be selected from fifth grade students enrolled in Garnet Valley School District in Glen Mills, PA. Students will be assigned an etude to practice for an evaluation. Prior to treatment, all students will perform the etude to be and be audio recorded as a pretest. All students will receive identical instruction and modeling of the etude during their weekly school lesson. In addition to their regular instruction, a Video Instruction Practice Group (VI) (n = 50) will have access to a video of teacher instruction and modeling of the etude for use during home practice, and the Non-Video Practice Control Group (NVI) (n = 50) will practice

the etude under usual practice conditions. Each week, participants will submit a practice record detailing the amount of time spent practicing the etude. Following three weeks of treatment, all participants will record a performance of the etude. The performances will be evaluated by the researcher using the researcher-designed Etude Scoring Form (Appendix G). One additional certified music teacher will evaluate a random selection of 15% of the student recordings as a reliability judge. Data will be analyzed to compare pretest and posttest scores and determine if there is a significant difference between the control group and experimental group.

2) Protocol Title

The Effect of Video Instruction on the Performance Achievement of Fifth Grade Instrumental Music Students

3) Investigators

Principal Investigator
Dr. Deborah Confredo, Professor, Department of Music Education

Student Investigator
Stephen Selfridge, Ph.D. Candidate, Department of Music Education

Research Assistant/Reliability Coder
Jeffery VonDerStuck, Music Teacher, Garnet Valley School District

4) Objectives

The objective of this study is to determine the effectiveness of video modeling and instruction as a practice aid for instrumental students. The hypothesis to be tested is: H_1: There will be a significant difference in the performance achievement scores of fifth-grade instrumental students as a function of practice including video modeling and instruction versus traditional practice methods. Secondary questions to be investigated are: 1) Are there significant differences between the two groups in the subcategories of the performance measure (pitch, rhythm, articulation, fluency)? 2) Are there significant differences in the performance achievement between the two different schools represented? 3) Is there a significant difference in the amount of practice between the groups? 4) Are there significant differences in the amount of practice reported between the two different schools represented?

5) Rationale and Significance

Practicing is universally viewed as an essential element for student achievement in playing a musical instrument. When practicing, students are expected to apply and reinforce the concepts learned during class or private instruction. Researchers have studied the practice habits and the relationship between practice and performance achievement in primary students, secondary students, and professional musicians. Increased practice time, coupled with high level of dedication to playing an instrument, has been correlated with increased performance achievement (McPherson, 2000; Sloboda, Davidson, Howe & Moore, 1996). Numerous studies have noted that the *quality* of practice, i.e., the use of effective practice strategies, is a more significant predictor of success than *quantity* of practice (Duke, Simmons & Cash, 2009; Williamon & Valentine, 2000). Practice is most effective when it is structured, where the practicer employs specific strategies for improvement (Ericcson, Krampe, & Tesch-Römer, 1993). In contrast to practicing that is informal or playful, Ericcson et al. (1993) identified "deliberate practice" as a "highly structured activity" in which "specific tasks are invented to overcome weaknesses, and performance is carefully monitored...for ways to improve it further" (p.10). While expert musicians are often adept at employing structured and effective practice techniques, research suggests that less-experienced musicians are less effective at self-regulating practice (Austin & Berg, 2006; Hallam, 1997; McPherson & Davidson, 2002; McPherson & Renwick, 2001; Miksza, Prichard & Sorbo, 2012).

Effective practicing is a skill that must be taught and reinforced (Byo, 2004; Rosenshine, Froehlich, & Fakhouri, 2002; McPherson & Davidson, 2002; Zhukov, 2009). Byo (2004) stresses the importance of teaching students to become "accomplished practicers" (p. 34) and sets forth a series of steps to assist students in organizing their practice sessions. This practice protocol instructs students to identify areas that need to be practiced, isolate them, and work to improve these areas with the goal of achieving several repetitions of the excerpt free of mistakes. A key element of effective practice, then, is the student's ability to identify mistakes in their own playing and work toward the achievement of an accurate aural model.

One of the primary goals of music education is to cultivate audiation skills within children (the ability to create within their own minds or "hear" music that is not physically present). With these abilities, young musicians can generate an aural model of how printed music should be performed. As these skills are in need of cultivation in developing musicians, limited ability in this area presents an obstacle to effective practicing (Barry & Hallam, 2002; Oare, 2014). Among the many ways that musicians

can audiate, Gordon (2003) identified "notational audiation" as a musician's ability to hear musical sound, and give meaning to musical notation before it is heard aloud (p. 8).

Steve Oare (2014) found that aural image was a key factor in the ability of middle school instrumental students to practice effectively. Students commonly expressed the need to hear a model of a given piece of music before they felt comfortable performing. Students were more confident performing, and more likely to practice songs for which they had an aural image. This tendency for students to struggle with reading notation of unfamiliar songs supports Gordon's assertion that "notation can only assist us in recalling what we have already audiated" (p. 113). Research shows that when singing and performing familiar songs, students demonstrate a strong ability to detect melodic errors (Thornton, 2008) and show increased performance achievement (Cash, Allen, Simmons, & Duke, 2014; Frewen, 2010).

When teaching a new piece of music in an instrumental setting, effective teachers often engage in modeling to demonstrate the accurate performance of pitches, rhythms, and expressive elements. Students are then invited to imitate the performance of the teacher. Learning through imitation is a fundamental component of human behavior. As defined by Encyclopedia Brittanica (2015), imitation is "the reproduction or performance of an act that is stimulated by the perception of a similar act by another animal or person." Imitation plays a key role in the Bandura's Social Learning Theory (1971), which describes how people learn from observing others. Imitation and rote-learning are key elements of several major music education theories, including Suzuki and Orff. While Music Learning Theory also incorporates these components, Gordon reinforces that audiation must be developed, thus enabling students to move beyond rote-learning for a deeper understanding of music (2003).

Imitation is the foundation of modeling. Dickey (1992) defines modeling in music education as simply "…alternations of teacher demonstrations and student imitations" (p. 27). Research overwhelmingly supports that modeling is a fundamental and effective mode of instruction in music (Delzell, 1989; Dickey, 1991; Rosenthal,1984; Sang,1987; Zurcher, 1975). Effective modeling can be characterized through demonstration of: 1) basic music performance behaviors; 2) subtle aspects of musical performance (e.g., phrasing, vibrato); 3) musically-related executive skills (e.g., posture, playing position), and; 4) various melodic and rhythmic sequences by ear (for the purpose of imitating incorrect student performances as well as provide a correct model) (Sang, 1987). Teachers with stronger modeling skills are more likely to use modeling in their teaching. This often results in significant positive effects on student achievement (Sang, 1987).

The use of technology such as video/audio recordings and computer software offers opportunities for teachers to extend modeling beyond the music classroom. Sang (1987) noted the importance of teacher ability to model accurately for students, and found that student achievement is correlated with teacher modeling skills. With recordings, teachers can offer students high-quality models of musical performances on all musical instruments, regardless of the teacher's performance skills. Research supports that the use of a recorded model is more effective than no model in practicing (Fortney, 1992; Linklater, 1997; Rosenthal, 1984; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Zurcher , 1975). Additionally, Linklater (1997) found that students receiving both audio and visual modeling via video scored significantly higher on visual performance criteria than groups receiving aural or video modeling alone. Linklater (1997) found no effect on amount of time practicing, while Zurcher (1975) found that use of model led to increased practice time. Rosenthal (1984) compared groups receiving modeling with verbal instruction and modeling alone, and found no significant difference.

Practicing is a key element in the development of musical skill. Development of high levels of musical skill requires not only substantial quantity of practice, but also the use of effective practice strategies, including structured practice, self-evaluation, and systematic work toward goals. In order for students to engage in effective practice, they must be able to create an aural image of the music, self-evaluate, and detect errors on their own performance. Research overwhelmingly supports the benefits of teacher modeling in the classroom, and the importance of high-quality modeling on the achievement of students. Video and audio-recording technology allows teachers to extend modeling beyond the school day, allowing students to access high-quality models to emulate each time they practice. Through repeated listening, students can gain familiarity with the music, thereby increasing their confidence and ability to self-evaluate. The purpose of the present research is to explore the following questions: What is the effect of video tutorials on the achievement of fifth-grade instrumental students? What is the effect of video tutorials on the practice time of instrumental music students?

6) Resources and Setting

Research activities will be conducted in the Garnet Valley School District in Glen Mills, PA, specifically within following two district school buildings: Bethel Springs Elementary School (Garnet Valley, PA), and Garnet Valley Elementary School (Glen Mills, PA). Garnet Valley School District is a suburban public school district in southeastern Pennsylvania comprised of five schools, with approximately 5,000 students enrolled.

Participants in this study *(n* = 100) will be selected from students enrolled in fifth-grade band in Garnet Valley Elementary and Bethel Springs Elementary in the 2017-2018 school year. Student musicians will be volunteers and will have had one year of instruction at the time of the testing period. Participants will include those who play the following instruments: flute, clarinet, alto saxophone, and trumpet. Participants will be recruited during the first month of the school year. Information letters (attached) with assent/consent forms will be distributed to all potential participants. Students will be randomly assigned to one of two groups: Non-Video Practice Control Group(NVI) (*n* = 50) and Video Instruction (VI) Practice Group (*n* = 50).

The duration of the treatment period will be three weeks. As part of the normal instructional routine at each school, students are assigned to small groups of three to six students, homogenous instrumentation, for weekly lessons. The research will be conducted within these normally scheduled weekly school lessons, with some additional time on the first and last day of the study for pretest and posttest audio recording. During the regularly scheduled weekly lesson, students in both groups will receive in-person instruction on how to perform a short song composed by the researcher, titled *Etude*. Total instruction time spent on this task in each weekly lesson will be approximately five minutes. Instruction will be provided by the researcher (Stephen Selfridge) for student participants at Garnet Valley Elementary School, and Jeffery VonDerStuck for student participants at Bethel Springs Elementary School. Both instructors are certified music teachers with over ten years of experience teaching instrumental music. The instruction will be scripted to ensure a uniform experience for participants in all lesson groups in both schools. To insure uniform modeling of musical excerpts during the lessons, the instructors will use video excerpts from the treatment video (described below).

Student participants in both groups will be asked to practice the etude as part of their normal home practice routine. Additionally, students in the VI group will be given access to a teaching video created by the researcher and will be invited to use the video to help with their home practice. To prevent demoralization or resentment in the control group, participants in the NVI group will be told that the two groups will "switch" after three weeks, and they will be given access to the video while the other group will no longer have access. A separate video will be recorded for each instrument type (flute, clarinet, alto saxophone, trumpet), and the same scripted instruction will be used for both in-person instruction and the videos.

Videos will be recorded by the researcher using a Panasonic Lumix GH4 Camera with audio recorded on a Zoom H1 Handy Recorder with a Pro JK MIC-J 044 Lavalier Lapel External Microphone. Videos will be recorded at the home of the researcher with the instructor speaking to the camera in front of a plain white background. The videos will

be edited using iMovie software and uploaded to YouTube via the account of the researcher (https://www.youtube.com/user/MrSelfridge/). All videos will be set to "unlisted" which means the videos can only be accessed by using a specified URL link. This link will be e-mailed to the e-mail address of both the student participant and a parent.

The researcher will confirm that all participants in the Video Instruction Group will have access to internet and a device for viewing the video during home practice. For participants lacking either a device or internet access at home, a device with the video pre-loaded will be provided for use at home during the course of the study.

Participants will be asked to record the number of minutes practiced each week and submit a Weekly Practice Report (Appendix H), signed by a parent, to the researcher each week.

All lessons and pretest-posttest audio recordings will be conducted in the lesson instruction room of the respective schools in a setting familiar to all student participants. Pretest and posttest performances will be audio recorded using a Zoom H1 Handy Recorder. All pretest and posttest recordings will be scored by the researcher using a researcher-designed Etude Scoring Form (ESF) (see attached). Fifteen percent of the recordings will be randomly selected to be scored by an independent reliability judge.

7) Prior Approvals

Dr. Marc Bertrando, Superintendent of Schools
Garnet Valley School District
80 Station Road
Glen Mills, PA 19342

Dr. Jason Kotch, Principal
Garnet Valley Elementary School
599 Smithbridge Road
Glen Mills, PA 19342

Mr. Steven Piasecki, Principal
Bethel Springs Elementary School
3280 Foulk Road
Garnet Valley, PA 19060

8) Study Design

This study uses a two-group pretest-posttest quasi-experimental design.

a) Recruitment Methods

In September 2017, participants will be recruited from fifth grade band members of Garnet Valley Elementary School and Bethel Springs Elementary School. Participants will be those who play flute, clarinet, alto saxophone, or trumpet, and have participated in the school band program the year prior. It is projected that approximately 128 students will qualify as participants, and approximately 100 will volunteer to participate. In mid-September, information packets including invitation letters (attached) and consent/assent forms (attached) will be sent home with all potential participants. An e-mail invitation (attached) will also be sent to the parents of all potential participants.

Students will receive the following:
- a copy of the invitation letter for parent/legal guardian
- a copy of the invitation letter for minor students
- a parent/legal guardian consent form to allow student to participate in the study
- an assent form for the minor student to agree to participate

(Please see attached in Appendix A, B, C, and D.)

When the information packets are distributed to students in lessons, the instructor will read aloud the invitation letter to all potential participants and will encourage students to ask questions at any time. Parents will be encouraged to ask questions about the research study at any time. Parents will be asked to return signed consent and assent forms to the band director of their school (Jeffery VonDerStuck at Bethel Springs Elementary School and the researcher, Stephen Selfridge, at Garnet Valley Elementary School). The researcher will keep the forms at least three years for reference.

b) Inclusion and Exclusion Criteria

Students shall be included in the study if they meet the following criteria:

- The student is enrolled in fifth grade in either Garnet Valley Elementary School or Bethel Springs Elementary School as of September, 2017.

- The student is enrolled in the fifth grade band AND has participated in instrument lessons on the same instrument the previous year.
- The student plays one of the following instruments: flute, clarinet, alto saxophone, or trumpet.
- The student has submitted signed consent and assent forms.

c) Study Timelines

The duration of a subject's participation in the study will be approximately three weeks. (Table 1)

Table 1 - Research Study Timeline

Month/Week	*Task*
August	Record, edit and upload instruction video on the song "Etude" for flute, clarinet, alto saxophone, and trumpet.
Early September	Distribute information packets to potential participants
Late September	Collect all signed consent and assent forms
Oct 10-16	Lesson One - Introduce Etude, Distribute Practice Logs, Audio-Record Pretests
Oct 17-23	Lesson Two - Collect Week 1 Practice Logs, Etude Group Instruction (script),
Oct 24-30	Lesson Three - Collect Week 2 Practice Logs, Etude Group Instruction (script)
Oct 31-Nov 6	Lesson Four - Collect Week 3 Practice Logs, Etude Group Instruction (script), Audio-Record Posttests
November	Data Analysis - to be completed by Dec, 2017

d) Study Procedures and Data Analysis

Subjects (n=100) are volunteer student musicians enrolled in fifth-grade band who have had one year of instrumental instruction at the time of the testing period. Student participants will be limited to the following instruments: flute, clarinet, alto saxophone, and trumpet. Students enrolled in instrumental lessons in the Garnet Valley Elementary School and Bethel Springs Elementary School receive 30-minutes of small-group instruction once a week, where they are pulled from their regular academic class. As per the normal instrumental program procedures, students are assigned to homogenous lesson groups ranging in size from three to seven students. Participants will be randomly assigned to one of two groups:

Non-Video Practice Control Group (NVI) (n = 50) and Video-Instruction Practice Group (VI) (n = 50).

Prior to the first week of the study, the researcher will record, edit, and upload separate instructional videos for each of the following instruments: flute, clarinet, alto saxophone, and trumpet. Each video will follow the Etude Teaching Script (Appendix E). The videos will be recorded by the researcher using a Panasonic Lumix GH4 Camera with audio recorded on a Zoom H1 Handy Recorder with a Pro JK MIC-J 044 Lavalier Lapel External Microphone. Videos will be recorded at the home of the researcher with the instructor speaking to the camera in front of a plain white background. The videos will be edited using iMovie software and uploaded to YouTube via the account of the researcher (https://www.youtube.com/user/MrSelfridge/). All videos will be set to "unlisted" which means the videos can only be accessed by using a specified URL link. This link will be e-mailed to the e-mail address of both the student participant and a parent.

In the first week of the study (Lesson One), the song *Etude* (Appendix F) will be distributed to each student during their regularly scheduled band lesson. The instructor (researcher Stephen Selfridge at Garnet Valley Elementary School and Jefferey VonDerStuck at Bethel Springs Elementary School) will lead the students in a brief practice session of *Etude*, following a teaching script (Appendix E). When the instruction is complete, the students will individually perform the etude and be audio-recorded. Following the pretest instructions script (Appendix E), the instructor will explain to the students the procedure for completing the pretest audio recordings. The pretest procedure is as follows: 1) Pretest performances will be recorded in the lesson room with only the student and the instructor present. 2) Students will perform the pretest in alphabetical order by last name. 3) Students awaiting their turn to perform the pretest will be supervised in a separate room out of hearing range of the lesson room. 4) Students awaiting their turn will not have copies of the etude to study.

Before the conclusion of the lesson, students will receive a Weekly Practice Report (Appendix H and I) for week one. The instructor will follow the Practice Group Script (Appendix E) to instruct the students on the expectations for practicing the etude at home during the week. Students will be told whether they are in Group Garnet or Group White. Garnet and White are the school colors of Garnet Valley School District and will be used as group names to avoid any bias students may associate with ordinal group names such as Group 1 and Group 2, or Group A and Group B. Group Garnet will be the Non-Video Practice Group, and

Group White will be the Video Instruction Practice Group. To avoid any demoralization of participants, both groups will be told that they will have access to the video at different times. Students in Group White (Video Instruction Practice Group) will have access to the video in weeks one through three, while the students in Group Garnet (Non-Video Practice Group) will have access to the video in weeks four through six. Data will not be collected beyond week three.

At the conclusion of each day in Week One, the researcher will send a Practice Assignment e-mail (Appendix J) to the parents and students who are participants in the study. This e-mail will contain instructions and for the participants in the Video Instruction Practice Group, a link to the practice video for their instrument. The researcher will send a follow up e-mail (Appendix J) to parents and student participants on the day before the following week's lesson to remind them to complete the practice report and bring to school.

In Weeks 2 and 3, the instructor will review the etude during the school lesson using the same teaching script (Appendix E). The researcher will collect the completed Weekly Practice Report from each student and distribute a blank Weekly Practice Report for the upcoming week. Each week, the researcher will send a practice assignment reminder e-mail on the day of the student lesson to the parents and student participants, and a follow-up reminder e-mail on the day before the following week's lesson. Week 4 will be the final week of instruction and data collection on the etude. During this week of lessons, the instructor will collect the final Weekly Practice Report (Week 3 of 3) from all participants. The instructor will review the etude with the students using the teaching script. Students will then individually perform the etude as a posttest and be audio-recorded. The procedure for recording the posttests will be the same as described above for the pretests.

The pretest and posttest recordings will be scored by the researcher using the researcher-designed Etude Scoring Form (Appendix G). All recordings will be coded for anonymity and randomized to control for order effect. Fifteen percent of the recordings will be randomly selected to be scored by an independent reliability judge. The independent reliability judge will be Mr. Jeffery VonDerStuck, a member of the research team with over ten (10) years' experience as an instrumental music teacher. The Etude Scoring Form was closely modeled on a design used by Russell (2016) which was based on the Watkins-Farnum Performance Scale (1954), a highly established and reliable measure of instrumental sight-reading ability. Russell modified the Watkins-Farnum method to analyze student accuracy on each beat unit, rather than the full

measure used by Watkins-Farnum, allowing a more accurate assessment of the number of errors in four different categories: pitch, rhythm, articulation, and fluency.

For this study, the researcher has retained the four categories of assessment used by Russell: pitch, rhythm, articulation, and fluency. Although other elements of instrumental instruction such as tone quality, intonation, and expression, are important to the development of young instrumentalists, they will not be considered in this study. It may be hypothesized that the video modeling of characteristic tone, intonation, and expression may improve student performance in these areas, however these effects are less likely to be evident in a treatment lasting only three weeks.

Student pretest and posttest data will be analyzed using an analysis of variance (ANOVA) as a unit of analysis comparing performance scores between the two treatment groups, as well as the between the two schools and four instrument groups. Practice data will also be analyzed for significant differences between groups. A post-hoc Tukey multiple comparison test will also be used to determine any differences among groups.

e) Withdrawal of Subjects

Participation in this study is voluntary. Subjects may choose to withdraw from the study at any time without penalty or prejudice. Any collected data will be removed from the study upon a subjects' desire to withdraw.

f) Privacy & Confidentiality

Once student musicians agree to participate, each participant and school will be assigned a pseudonym. All consent forms and data will be held by the secondary investigator. The primary investigator is the only other person who will have access to these materials. All collected data will be stored in a password-protected manner. Following the completion of the study, this data will be kept in computer files, password-protected, stored on the computers of the principal investigator and the student investigator.

9) Risks to Subjects

The subjects face no long-term risks. No aspects of this study should cause discomfort, inconvenience, or physical danger to the subjects.

10) Potential Benefits to Subjects

There are no guaranteed benefits for subjects of the study. Participants may feel self-satisfaction in knowing that the information they provide will contribute to richer experiences for others in music education.

11) Costs to Subjects N/A.

12) Informed Consent

The investigators will abide by HRP-802 INVESTIGATOR GUIDANCE - Informed Consent and HRP - 803 INVESTIGATOR GUIDANCE - Documentation of Informed Consent. As described in part 8-a, information packets including invitation letters (attached) and consent/assent forms (attached) will be sent home with all potential participants. An e-mail invitation (attached) will also be sent to the parents of all potential participants.

Students will receive the following:

- a copy of the invitation letter for parent/legal guardian
- a copy of the invitation letter for minor students
- a parent/legal guardian consent form to allow the student to participate in the study
- an assent form for the minor student to agree to participate

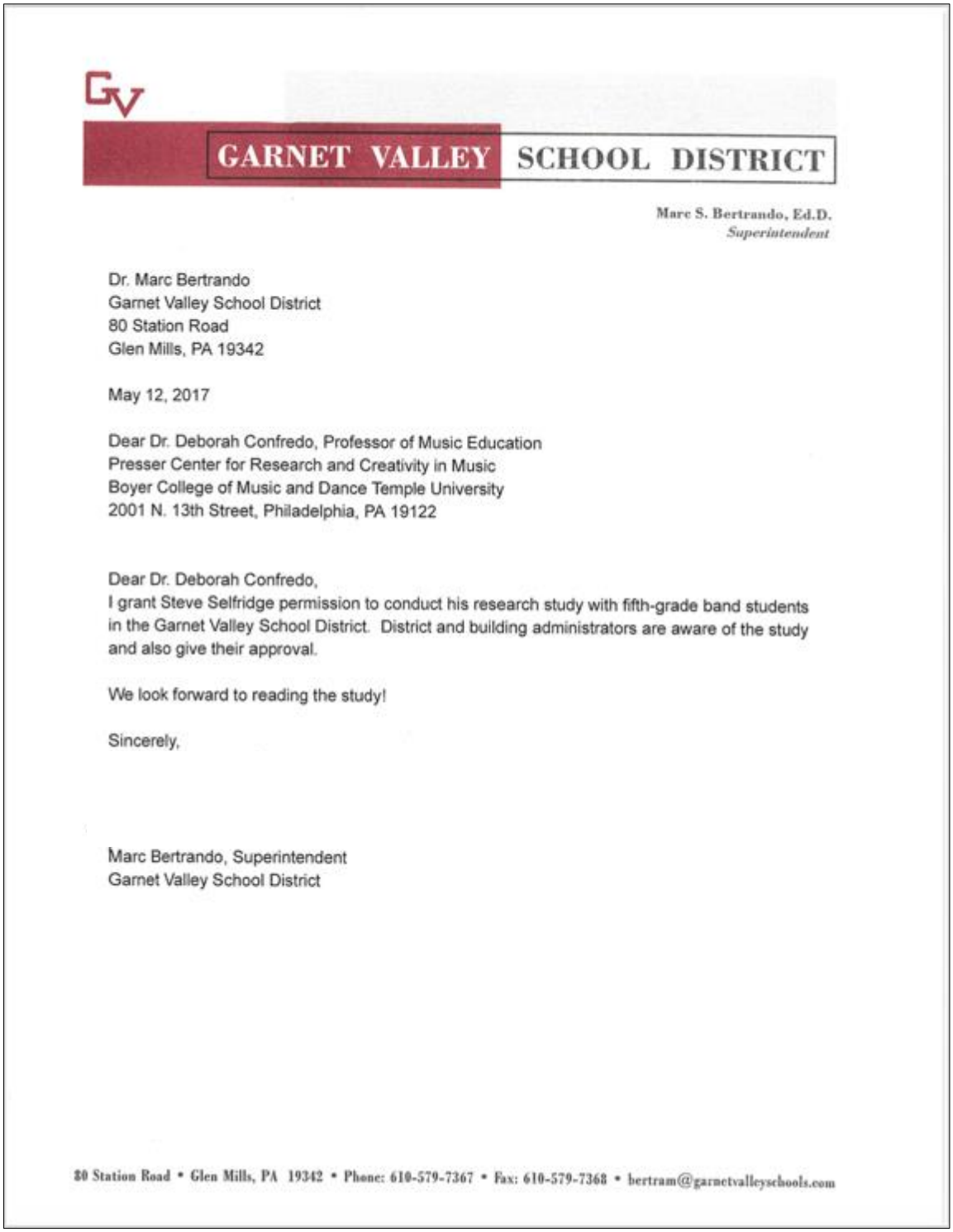
(Please see attached in Appendix A, B, C, and D.)

When the information packets are distributed to students in lessons, the instructor will read aloud the invitation letter to all potential participants and will encourage students to ask questions at any time. Parents will be encouraged to ask questions about the research study at any time. Parents will be asked to return signed consent and assent forms to the band director of their school (Jeffery VonDerStuck at Bethel Springs Elementary School and the researcher, Stephen Selfridge, at Garnet Valley Elementary School). The researcher will keep the forms at least three years for reference.

13) Vulnerable Populations

Potential subjects include student musicians between the ages of 9 and 11. Potential subjects will be students of the student investigator. Great care will be taken to assure students that their participation or non-participation in the study will not affect how they are treated by the teacher or school. Participation is completely voluntary and the children or their parents can withdraw from the research at any time

APPENDIX B
APPROVAL LETTER OF SUPERINTENDENT



GARNET VALLEY SCHOOL DISTRICT

Marc S. Bertrando, Ed.D.
Superintendent

Dr. Marc Bertrando
Garnet Valley School District
80 Station Road
Glen Mills, PA 19342

May 12, 2017

Dear Dr. Deborah Confredo, Professor of Music Education
Presser Center for Research and Creativity in Music
Boyer College of Music and Dance Temple University
2001 N. 13th Street, Philadelphia, PA 19122

Dear Dr. Deborah Confredo,
I grant Steve Selfridge permission to conduct his research study with fifth-grade band students in the Garnet Valley School District. District and building administrators are aware of the study and also give their approval.

We look forward to reading the study!

Sincerely,

Marc Bertrando, Superintendent
Garnet Valley School District

80 Station Road • Glen Mills, PA 19342 • Phone: 610-579-7367 • Fax: 610-579-7368 • bertram@garnetvalleyschools.com

APPENDIX C
IRB APPROVAL LETTER

TEMPLE UNIVERSITY
Research Administration

Research Integrity & Compliance
Student Faculty Center
3340 N. Broad Street, Suite 304
Philadelphia PA 19140

Institutional Review Board
Phone: (215) 707-3390
Fax: (215) 707-9100
e-mail: irb@temple.edu

Certification of Approval for a Project Involving Human Subjects

Date: 07-Jul-2017

Protocol Number:	24540
PI:	CONFREDO, DEBORAH
Review Type:	EXEMPT
Approved On:	06-Jul-2017
Approved From:	
Approved To:	
Committee:	A2
School/College:	BOYER COLLEGE OF MUSIC & DANCE (2200)
Department:	MUSIC:EDUCATION (22060)
Sponsor:	NO EXTERNAL SPONSOR
Project Title:	The Effect of Video Instruction on the Performance Achievement of Fifth Grade Instrumental Music Students

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The IRB approved the protocol 24540.

If the study was approved under expedited or full board review, the approval period can be found above. Otherwise, the study was deemed exempt and does not have an IRB approval period.

If applicable to your study, you can access your IRB-approved, stamped consent document or consent script through ERA. **Open the Attachments tab and open the stamped documents by clicking the Latest link next to each document**. The stamped documents are labeled as such. Copies of the IRB approved stamped consent document or consent script must be used in obtaining consent.

Before an approval period ends, you must submit the Continuing Review form via the ERA module. Please note that though an item is submitted in ERA, it is not received in the IRB office until the principal investigator approves it. Consequently, please submit the Continuing Review form via the ERA module at least 60 days, and preferably 90 days, before the study's expiration date.

Note that all applicable Institutional approvals must also be secured before study implementation. These approvals include, but are not limited to, Medical Radiation Committee (“MRC”); Radiation Safety Committee (“RSC”); Institutional Biosafety Committee ("IBC"); and Temple University Survey Coordinating Committee ("TUSCC"). Please visit these Committees’ websites for further information.

Finally, in conductiing this research, you are obligated to submit the following:

- **Amendment requests - all changes to the study must be approved by the IRB prior to the implementation of the changes unless necessary to eliminate apparent immediate hazards to subjects**

APPENDIX D
PARENT INVITATION LETTER

Title of Project: Effects of Video Instruction on the Performance Achievement of Fifth-Grade Instrumental Music Students

Dear Parents/ Guardians,

As you may know, for several years I have been pursuing a Ph.D. in Music Education at Temple University. I am preparing to launch a study for my dissertation work. My study will investigate the effect of video music lessons on how students learn music. I would like to describe this study to you and invite your child to consider participating in this project. It will not take any time outside of your child's normal band lesson and usual practice routine at home.

One of the challenges for young band students is that they often need the support and model of a music teacher as they learn basic skills. With a lesson only once a week, many students struggle to play their instrument correctly when they practice at home without teacher guidance. I am interested in exploring whether a video lesson available to students at home will help students practice more effectively and improve faster.

How the Study Will Work:

The entire study will last three weeks. Students participating in the study will be randomly assigned to either a video group or a non-video group. All students will practice a short song called *Etude*. At the start of the study, all students will be audio recorded as they perform the song, and I, as well as one other music teacher, will evaluate the recordings for musical accuracy. All recordings and data will be kept completely anonymous. (My goal is not to evaluate your child, only to study the effects of video instruction). During our normally scheduled school lessons, we will spend a few minutes practicing *Etude* as a group, and the students will be asked to practice *Etude* at home during the week. If your child is in the video group, they will be given a link to a video lesson to use as they practice at home. If your child is in the non-video group, they will be asked to practice the etude at home as they normally would with any band assignment. (The students in the non-video group will be given access to the video after three weeks.) Parents and students will be asked to keep a record of the amount of minutes spent practicing the etude at home.

After three weeks of lessons and practicing at home, the students will again perform the etude and be audio recorded. The recordings will be scored for musical

accuracy by myself and one other music teacher, and the data will be compared to determine the effectiveness of the video lessons. We are very careful to safeguard the well-being and anonymity of anyone who participates in research, particularly children.

How to Give Permission for Your Child to Participate:

Only students whose parents consent to having their child participate in the project will be involved. If you or your child decide to not participate in the study, there will be no change in how the teacher or school will treat your child. Participation is completely voluntary and the children or their parents can withdraw from the research at any time. Your child has been given the packet that contains all of the necessary forms including a consent forms for parents and assent forms for the students. All you need to do is complete your form, have your child complete the assent form, and bring everything to your band director before _____. I know that you are very busy and thank you for taking time to review this information and consider this request. If you have any questions regarding any detail of this proposal, please feel free to contact me at (610) 579-4014 or selfris@garnetvalley.org.

Sincerely,

Mr. Stephen Selfridge, Ph.D. Candidate, Music Education
Presser Center for Research and Creativity in Music
Boyer College of Music and Dance Temple University
2001 N. 13th Street, Philadelphia, PA 19122
Contact Information: 610.579-4104 email: selfris@garnetvalley.org

Dr. Deborah Confredo, Professor of Music Education
Presser Center for Research and Creativity in Music
Boyer College of Music and Dance Temple University
2001 N. 13th Street, Philadelphia, PA 19122
Contact Information: 215. 204. 8649 email: deborah.confredo@temple.edu

APPENDIX E
STUDENT MUSICIAN INVITATION LETTER

Title of Project: Effects of Video Instruction on the Performance Achievement of Fifth-Grade Instrumental Music Students

Dear Students:

You may have heard that I (Mr. Selfridge) am taking classes at Temple University to earn a Ph.D. in Music Education. As part of my studies at Temple University, I am getting ready to carry out a research study, and I am asking students at Garnet Valley Elementary and Bethel Springs to consider participating in my project. The goal of my research is to learn more about the best ways to teach music. Here is how my research study will work:

In band lessons, we will spend a few minutes working on a short song called *Etude*. After practicing for a few minutes, you will play the song and you will be audio-recorded. In between our weekly school lessons, you will be asked to practice the song *Etude* at home as part of your normal practicing. You and your parents will write down the of amount of minutes that you spend practicing at home. There will be a video lesson that you can use when you practice at home. Some students will be asked to use the video in the first few three weeks of the study, and other students will use the video in the second part of the study. After three weeks of practicing, you will play the song at your school lesson and be audio-recorded again.

Mr. Selfridge and one other music teacher will listen to your recordings BUT we won't know who is playing and your name will not be used. You'll be anonymous! In fact, your name will never be used in this project at all. The goal of the research is not to evaluate you or grade you, my only goal is to learn more about the best way to teach music.

It is very important to me and my college advisor, Dr. Confredo, that anyone who participates in research is protected. That means that we will do everything we can to make this a good experience for you and won't reveal your names. Please take this packet home and share it with your parents. It includes all of the necessary permission forms including a form of agreement (Assent Form) for you. If you agree to participate in the study, just fill it out and return it to school along with your parents' permission form. If you decide not to participate in the study, that is OK, and there will be no change in how the teacher or school will treat you. Participation is completely voluntary and the children or their parents can withdraw from the research at any time. Thanks for considering being

a part of this project! If you or your parents have any questions, please feel free to contact me at (610) 579-4104 or selfris@garnetvalley.org.

Sincerely,

Mr. Stephen Selfridge, Ph.D. Candidate, Music Education
Presser Center for Research and Creativity in Music
Boyer College of Music and Dance Temple University
2001 N. 13th Street, Philadelphia, PA 19122
Contact Information: (610) 579-4104 email: selfris@garnetvalley.org

Dr. Deborah Confredo, Professor of Music Education
Presser Center for Research and Creativity in Music
Boyer College of Music and Dance Temple University
2001 N. 13th Street, Philadelphia, PA 19122
Contact Information: 215. 204. 8649 email: deborah.confredo@temple.edu

APPENDIX F
INFORMED CONSENT FOR MINIMAL RISK SOCIAL AND BEHAVIORAL RESEARCH

Consent Form

(to be completed by the parent/ legal guardian of minor students involved in this project)

Title of research: *The Effect of Video Instruction on the Performance Achievement of Fifth-Grade Instrumental Music Students - 24540*

Investigator and Department:

Principal Investigator: Dr. Deborah Confredo, Professor of Music Education
Boyer College of Music & Dance
Temple University, Philadelphia PA

Student Investigator: Stephen Selfridge, Ph.D. Candidate, Music Education
Boyer College of Music & Dance
Temple University, Philadelphia PA

Why am I being invited to take part in this research?

We invite your child to take part in this research study because your child is a student in Fifth Grade Band who plays one of the following instruments: flute, clarinet, saxophone, trumpet.

What should I know about this research?

- Someone will explain this research to you and your child.
- Whether or not you take part is up to your child.
- Your child can choose not to take part.
- Your child can agree to take part and later change his/her mind.
- Your child's decision will not be held against them.
- You and your child can ask all the questions you want before you decide.
- *Not participating in the study will not change how the teacher or school will treat your child. Participation is completely voluntary and the children or their parents can withdraw from the research at any time.*

Who can I talk to about this research?

If you have questions, concerns, or complaints, or think the research has hurt your child, contact the research team at:

Dr. Deborah Confredo, Principal Investigator
Presser Hall, 2001 N. 13th Street, Phila, PA
phone: 215-204-8649 e-mail: deborah.confredo@temple.edu

Mr. Stephen Selfridge, Student Investigator
Garnet Valley Elementary School, 599 Smithbridge Road, Glen Mills, PA
Phone: 610-579-4104 e-mail: selfris@garnetvalley.org

Mr. Jeffery VonDerStuck, Research Assistant
Bethel Springs Elementary School, 3280 Foulk Road, Garnet Valley, PA
Phone: 610-579-3068 e-mail: vonderj@garnetvalley.org

Document Revision Date: September 10, 2014

This research has been reviewed and approved by an Institutional Review Board. You may talk to them at (215) 707-3390 or e-mail them at: irb@temple.edu for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

Why is this research being done?

Teachers in many different subject areas are exploring how our current age of technology can enhance the way we teach and learn. My study will investigate the effect of video music lessons on how students learn music. One of the challenges for young band students is that they often need the support and model of a music teacher as they learn basic skills. With a lesson only once a week, many students struggle to play their instrument correctly when they practice at home without teacher guidance. I am interested in exploring whether a video lesson available to students at home will help students practice more effectively and improve faster. As part of this research study, students will practice a short musical piece during the school lesson, and also at home.

We expect that you will be in this research for three (3) weeks.

What happens if I agree to be in this research?

The procedures of this study are as follows: Your child will practice a short musical piece in weekly band lessons called "Etude". The student lesson groups will be randomly assigned to either Group "White" or Group "Garnet". The groups will be assigned randomly, like flipping a coin. Both groups will receive identical instruction during the school lesson. At the first lesson, the students will be audio recorded as they perform the etude alone. Students in Group White will be asked to practice the etude at home using a video lesson. Students in Group Garnet will be asked to practice the etude at home without the video lesson. (The students in the non-video group will be given access to the video after three weeks.) Parents and students will be asked to keep a record of the amount of minutes spent practicing the etude at home. The Research Team will send reminder e-mails periodically throughout the three week study. At the conclusion of three weeks, your child will again be audio recorded playing the etude alone. All recordings, student names and their schools will remain anonymous at all times.

Will being in this research help me in any way?

We cannot promise any benefits to you or others from taking part in this research. However, possible benefits include you and your child knowing their participation has contributed to the understanding of this topic.

What happens to the information collected for this research?

To the extent allowed by law, we limit the viewing of your personal information to people who have to review it. We cannot promise complete secrecy. The IRB, Temple University, Temple University Health System, Inc. and its affiliates, and other representatives of these organizations may inspect and copy your information. All data collected in this study will be stored in a password-protected manner and will be stored for the 3 years after the completion of the study.

PARENTS: Your signature documents your permission for the child named below to take part in this research.

Printed name of child

Signature of parent or individual legally authorized to consent to the child's general medical care

Date

Printed name of parent or individual legally authorized to consent to the child's general medical care

Signature of second parent

Date

Printed name of second parent

If signature of second parent not obtained, indicate why: (select one)

- ❑ Second parent is deceased
- ❑ Second parent is unknown
- ❑ Second parent is incompetent
- ❑ Second parent is not reasonably available
- ❑ Only one parent has legal responsibility for the care and custody of the child

Signature of person obtaining consent

Date

Signature of person obtaining consent

Document Revision Date: September 10, 2014

APPENDIX G
INFORMED ASSENT FOR MINIMAL RISK SOCIAL AND BEHAVIORAL RESEARCH

Assent Form

(to be completed by the minor students involved in this project)

Title of research: *The Effect of Video Instruction on the Performance Achievement of Fifth-Grade Instrumental Music Students - 24540*

Investigator and Department:

Principal Investigator: Dr. Deborah Confredo, Professor of Music Education
Boyer College of Music & Dance
Temple University, Philadelphia PA

Student Investigator: Stephen Selfridge, Ph.D. Candidate, Music Education
Boyer College of Music & Dance
Temple University, Philadelphia PA

Why am I being invited to take part in this research?

We invite you to take part in this research study because you are a student in fifth grade band who plays one of the following instruments: flute, clarinet, saxophone, trumpet.

What should I know about this research?

- Someone will explain this research to you.
- Whether or not you take part is up to you.
- You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you.
- You can ask all the questions you want before you decide.
- *Not participating in the study will not change how the teacher or school will treat you! Participation is completely voluntary and you can withdraw from the research at any time.*

Who can I talk to about this research?

If you have questions, concerns, or complaints, or think the research has hurt you, contact the research team at:

Dr. Deborah Confredo, Principal Investigator
Presser Hall, 2001 N. 13th Street, Phila, PA
phone: 215-204-8649 e-mail: deborah.confredo@temple.edu

Mr. Stephen Selfridge, Student Investigator
Garnet Valley Elementary School, 599 Smithbridge Road, Glen Mills, PA
Phone: 610-579-4104 e-mail: selfris@garnetvalley.org

Mr. Jeffery VonDerStuck, Research Assistant
Bethel Springs Elementary School, 3280 Foulk Road, Garnet Valley, PA
Phone: 610-579-3068 e-mail: vonderj@garnetvalley.org

Document Revision Date: September 10, 2014

This research has been reviewed and approved by an Institutional Review Board. You may talk to them at (215) 707-3390 or e-mail them at: irb@temple.edu for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

Why is this research being done?

Teachers in many different subject areas are exploring how our current age of technology can enhance the way we teach and learn. My study will investigate the effect of video music lessons on how students learn music. One of the challenges for young band students is that they often need the support and model of a music teacher as they learn basic skills. With a lesson only once a week, many students struggle to play their instrument correctly when they practice at home without teacher guidance. I am interested in exploring whether a video lesson available to students at home will help students practice more effectively and improve faster. As part of this research study, students will practice a short musical piece during the school lesson, and also at home.

How long will I be in this research?

We expect that you will be in this research for three (3) weeks.

What happens if I agree to be in this research?

Here is how the research project will work: You will practice a short musical piece in weekly band lessons called "Etude". The student lesson groups will be randomly assigned to either Group "White" or Group "Garnet". The groups will be assigned randomly, like flipping a coin. Both groups will receive the same instruction during the school lesson. At the first lesson, you will be audio recorded in a separate room as you perform the etude alone. Students in Group White will be asked to practice the etude at home using a video lesson. Students in Group Garnet will be asked to practice the etude at home without the video lesson. (If you are in the Garnet Group, you WILL get to use the videos after the first three weeks) Parents and students will be asked to keep a record of the amount of minutes spent practicing the etude at home. The Research Team will send reminder e-mails periodically throughout the three week study. At the conclusion of three weeks, you will again be audio recorded playing the etude alone. All recordings, student names and their schools will remain anonymous at all times.

Will being in this research help me in any way?

We cannot promise any benefits to you or others from taking part in this research. However, possible benefits include knowing that your participation has contributed to the understanding of this topic.

What happens to the information collected for this research?

To the extent allowed by law, we limit the viewing of your personal information to people who have to review it. We cannot promise complete secrecy. The IRB, Temple University, Temple University Health System, Inc. and its affiliates, and other representatives of these organizations may inspect and copy your information. All data collected in this study will be stored in a password-protected manner and will be stored for the 3 years after the completion of the study.

STUDENT: Your signature documents your permission to take part in this research.

_____

Student: Please print your name (clearly) above

_____ _____

Student: Please sign your name above | Date

_____ _____

Signature of person obtaining assent | Date

_____

Signature of person obtaining assent

Document Revision Date: September 10, 2014

APPENDIX H
TEACHING AND PRETEST/POSTTEST SCRIPTS

TEACHING SCRIPT - LESSON ONE

"Thank you again for volunteering to participate in Mr. Selfridge's research project. Now I will hand out the song that we will be practicing. It's called *Etude*.

[T. distributes sheet music for *Etude* to each student].

"This song is 8 measures long. Notice that the time signature of this song is 4/4. That means there are 4 counts in every measure. So as we play, we are going to tap our toe, and think 1-2-3-4, all the way through the song."

FLUTE: "Notice the key signature has two flats, B-flat and E-flat. That means every time we see a B, we play B flat, and every time we see an E we play E-flat."

CLARINET: (no need to mention key signature)

ALTO SAXOPHONE: "Notice the key signature has one sharp - F sharp on the top line. That means that every time we see and F, we play F-sharp."

TRUMPET: (no need to mention key signature)

"Now listen to the first four measures, and follow along by watching your music"

[Teacher plays video excerpt of ETUDE, measures 1-4]

"I want you to notice a few important things. Every note you play should start with the 'too' sound of your tongue. This is called tonguing. Some notes are marked with a curved line over them, and this is called a SLUR. When you see a slur, you tongue the first note, and move your fingers into the other notes that are under the curved line, without any break in the sound."

[Teacher plays video excerpt of m. 2]

"Notice in measure 3, there is a rest on beat one. This can be a little tricky because we're not always used to having a rest on beat one, so make sure you tap your toe, and you're careful when you're counting your beats."

"Now we'll try the first 4 measures again, and I want you to try playing along. Remember to sit tall with proper posture, good band face, and tap your toe as we play."

[Teacher plays video excerpt of ETUDE measures 1-4, students play along]

"Now, listen to measures 5 through 8. Follow along by watching your music."

[Teacher plays video excerpt of ETUDE, measures 5-8]

"Remember, as we mentioned before, every note should be tongued, unless it has a slur marking, which is a curved line. When you see that curved line slur marking, you tongue the first note, and you move your fingers to the other notes under the curved line, without any break in the sound."

"Notice in measure 6 there is a marking on one of the notes. It's a sharp sign, and it's on the note F. So that means, for that one time when you play the F, instead of playing the normal F with our thumb, we're going to play F-sharp by pressing down our first finger only.

[Teacher plays video excerpt of measure 6]

"Now I want you to play along with measures 5-8. Sit tall with proper posture, good band face, and tap your toe as we play together."

[Teacher plays video excerpt of ETUDE, measures 5-8, students play along]

"Now let's try playing the whole song from beginning to end"

[Teacher plays video excerpt of ETUDE, measures 1-8, students play along]

"We will work on this song at our next lesson. At home this week, please practice this song and do your best to play it correctly. If you are in Group White, you will have access to a practice video to help you practice. Please do not share your link to the Etude video with anyone else. If you are in Group Garnet, you will have the video to use in a few weeks. For now, do your best to practice the Etude without the video. Remember to keep track of your practice minutes on the Practice Report Sheet. I will collect it next week."

SCRIPT FOR PRETEST

- "Now we are going to take some time for each of us to play the etude one at a time. Don't worry, you are not getting a grade for this, I just want you to give it your best try. We will take turns in random order. Everyone who is waiting for their turn will wait in Room _____."
- *T. names first student. The other students go to the waiting room.*
- "OK, _____, let's get ready to play the etude! I just want you to give it your best try. One thing that is very important is that you play the entire song from

beginning to end. If you make a mistake, don't go back and try to fix it. Just keep going until the end and do your best."

- "I'll start the recording and count you in by saying 1-2-3-4. Ok?"
- "Ready? 1-2-3-4"
- "Great job! Now, can you please go to the waiting room and tell _____ to come down?"

TEACHING SCRIPT - VIDEO

Same as Teaching Script - Lesson One

TEACHING SCRIPT - LESSON TWO AND THREE

"OK everyone, do we have our Practice Sheets from this past week?"
T. collects Practice Sheets

"Let's practice our etude song. This song is 8 measures long. Notice that the time signature of this song is 4/4. That means there are 4 counts in every measure. So as we play, we are going to tap our toe, and think 1-2-3-4, all the way through the song."

FLUTE: "Notice the key signature has two flats, B-flat and E-flat. That means every time we see a B, we play B flat, and every time we see an E we play E-flat."

CLARINET: (no need to mention key signature)

ALTO SAXOPHONE: "Notice the key signature has one sharp - F sharp on the top line. That means that every time we see and F, we play F-sharp."

TRUMPET: (no need to mention key signature) "Now listen to the first four measures, and follow along by watching your music"

[Teacher plays video excerpt of ETUDE, measures 1-4]

"I want you to notice a few important things. Every note you play should start with the "too" sound of your tongue. This is called tonguing. Some notes are marked with a curved line over them, and this is called a SLUR. When you see a slur, you tongue the first note, and move your fingers into the other notes that are under the curved line, without any break in the sound."

[Teacher plays video excerpt of m. 2]

"Notice in measure 3, there is a rest on beat one. This can be a little tricky because we're not always used to having a rest on beat one, so make sure you tap your toe, and you're careful when you're counting your beats."

"Now we'll try the first 4 measures again, and I want you to try playing along. Remember to sit tall with proper posture, good band face, and tap your toe as we play."

[Teacher plays video excerpt of ETUDE, measures 1-4, students play along]

"Now, listen to measures 5 through 8. Follow along by watching your music."

[Teacher plays video excerpt of ETUDE, measures 5-8]

"Remember, as we mentioned before, every note should be tongued, unless it has a slur marking, which is a curved line. When you see that curved line slur marking, you tongue the first note, and you move your fingers to the other notes under the curved line, without any break in the sound."

"Notice in measure 6 there is a marking on one of the notes. It's a sharp sign, and it's on the note F. So that means, for that one time when you play the F, instead of playing the normal F with our thumb, we're going to play F-sharp by pressing down our first finger only.

[Teacher plays video excerpt of measure 6]

"Now I want you to play along with measures 5-8. Sit tall with proper posture, good band face, and tap your toe as we play together."

[Teacher plays video excerpt of ETUDE, measures 5-8, student splay along]

"Now let's try playing the whole song from beginning to end"

[Teacher plays video excerpt of ETUDE, measures 1-8, students play along]

"We will work on this song at our next lesson. At home this week, please practice this song and do your best to play it correctly. If you are in Group White, you will have access to a practice video to help you practice. Please do not share your link to the Etude video with anyone else. If you are in Group Garnet, you will have the video to use in a few weeks. For now, do your best to practice the Etude without the video. Remember to keep track of your practice minutes on the Practice Report Sheet. I will collect it next week."

TEACHING SCRIPT - LESSON FOUR

"OK everyone, do we have our Practice Sheets from this past week?"

T. collects Practice Sheets

"Let's practice our etude song. This song is 8 measures long. Notice that the time signature of this song is 4/4. That means there are 4 counts in every measure. So as we play, we are going to tap our toe, and think 1-2-3-4, all the way through the song."

FLUTE: "Notice the key signature has two flats, B-flat and E-flat. That means every time we see a B, we play B flat, and every time we see an E we play E-flat."

CLARINET: (no need to mention key signature)

ALTO SAXOPHONE: "Notice the key signature has one sharp - F sharp on the top line. That means that every time we see and F, we play F-sharp."

TRUMPET: (no need to mention key signature)

"Now listen to the first four measures, and follow along by watching your music"

[Teacher plays video excerpt of ETUDE, measures 1-4]

"I want you to notice a few important things. Every note you play should start with the "too" sound of your tongue. This is called tonguing. Some notes are marked with a curved line over them, and this is called a SLUR. When you see a slur, you tongue the first note, and move your fingers into the other notes that are under the curved line, without any break in the sound."

[Teacher plays video excerpt of m. 2]

"Notice in measure 3, there is a rest on beat one. This can be a little tricky because we're not always used to having a rest on beat one, so make sure you tap your toe, and you're careful when you're counting your beats."

"Now we'll try the first 4 measures again, and I want you to try playing along. Remember to sit tall with proper posture, good band face, and tap your toe as we play."

[Teacher plays video excerpt of ETUDE, measures 1-4, students play along]

"Now, listen to measures 5 through 8. Follow along by watching your music."

[Teacher plays video excerpt of ETUDE, measures 5-8]

"Remember, as we mentioned before, every note should be tongued, unless it has a slur marking, which is a curved line. When you see that curved line slur marking, you tongue the first note, and you move your fingers to the other notes under the curved line, without any break in the sound."

"Notice in measure 6 there is a marking on one of the notes. It's a sharp sign, and it's on the note F. So that means, for that one time when you play the F, instead of playing the normal F with our thumb, we're going to play F-sharp by pressing down our first finger only.

[Teacher plays video excerpt of measure 6]

"Now I want you to play along with measures 5-8. Sit tall with proper posture, good band face, and tap your toe as we play together."

[Teacher plays video excerpt of ETUDE, measures 5-8, student play along]

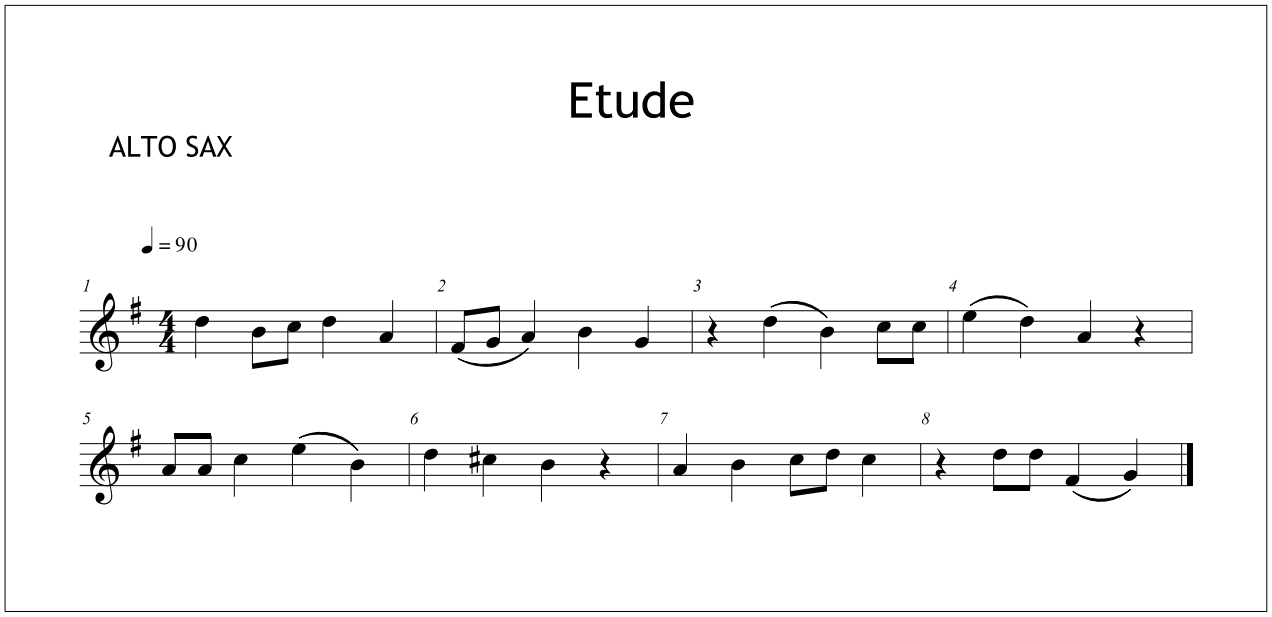
"Now let's try playing the whole song from beginning to end"

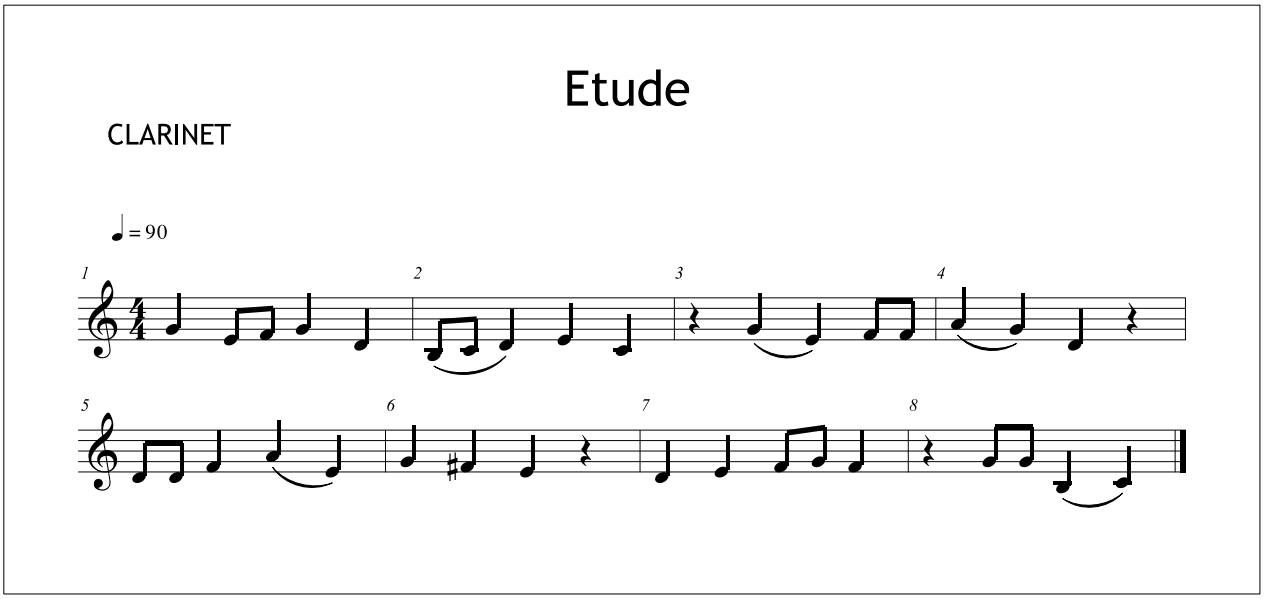
[Teacher plays video excerpt of ETUDE, measures 1-8, students play along]

SCRIPT FOR POSTTEST

- "Now we are going to take some time for each of us to play the etude one at a time. Don't worry, you are not getting a grade for this, I just want you to give it your best try. We will take turns in random order. Everyone who is waiting for their turn will wait in Room _____."
- *T. names first student. The other students go to the waiting room.*
- "OK, _____, let's get ready to play the etude! I just want you to give it your best try. One thing that is very important is that you play the entire song from beginning to end. If you make a mistake, don't go back and try to fix it. Just keep going until the end and do your best."
- "I'll start the recording and count you in by saying 1-2-3-4. Ok?"
- "Ready? 1-2-3-4"
- "Great job! Now, can you please go to the waiting room and tell _____ to come down?

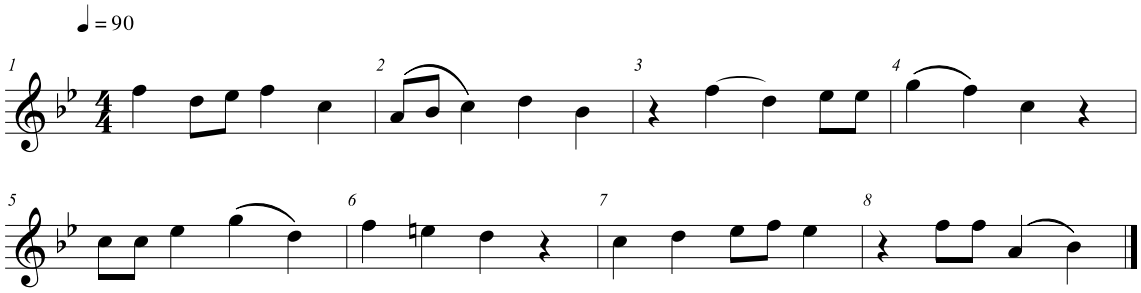
APPENDIX I
ETUDE





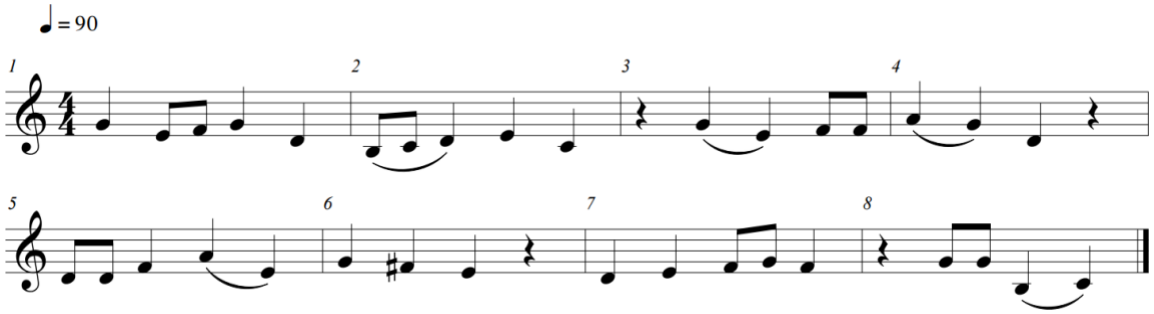
Etude

FLUTE



Etude

TRUMPET



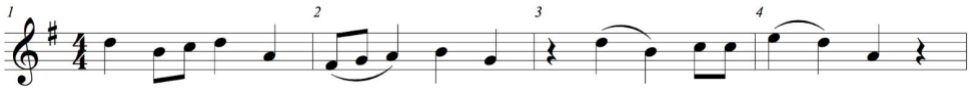
APPENDIX J
ETUDE SCORING FORMS AND INSTRUCTIONS

Etude Scoring Form - ALTO SAX

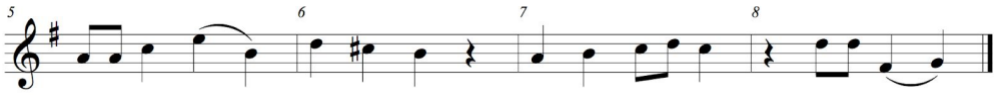
Title of Study: *The Effect of Video Instruction on the Performance Achievement of Fifth Grade Instrumental Music Students*

Researcher: Stephen Selfridge

RECORDING ID#_____ JUDGE_____ DATE_____



	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4
Pitch																
Rhythm																
Fluency																
Articulation																



	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4	8-1	8-2	8-3	8-4
P																
R																
F																
A																

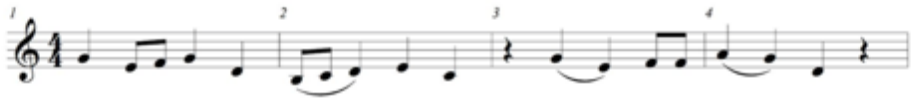
	Deductions	Possible	Total
Pitch		28	
Rhythm		32	
Fluency		32	
Articulation		28	

Etude Scoring Form - CLARINET/TRUMPET

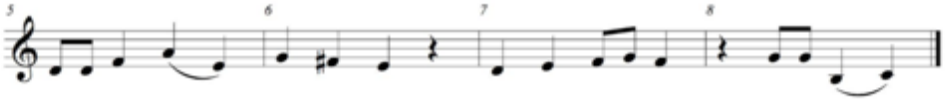
Title of Study: *The Effect of Video Instruction on the Performance Achievement of Fifth Grade Instrumental Music Students*

Researcher: Stephen Selfridge

RECORDING ID#_____ JUDGE_____ DATE_____



	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4
Pitch																
Rhythm																
Fluency																
Articulation																



	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4	8-1	8-2	8-3	8-4
P																
R																
F																
A																

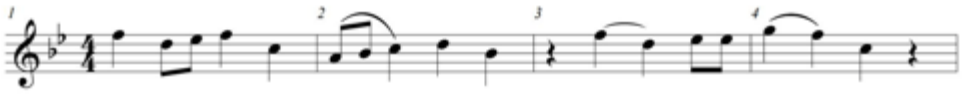
	Deductions	Possible	Total
Pitch		28	
Rhythm		32	
Fluency		32	
Articulation		28	

Etude Scoring Form - FLUTE

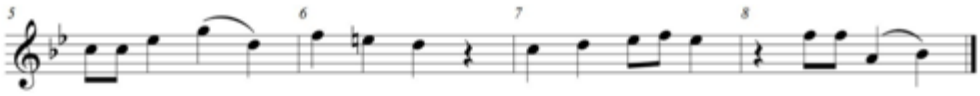
Title of Study: *The Effect of Video Instruction on the Performance Achievement of Fifth Grade Instrumental Music Students*

Researcher: Stephen Selfridge

RECORDING ID#_____ JUDGE_____ DATE_____



	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4
Pitch																
Rhythm																
Fluency																
Articulation																



	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4	8-1	8-2	8-3	8-4
P																
R																
F																
A																

	Deductions	Possible	Total
Pitch		28	
Rhythm		32	
Fluency		32	
Articulation		28	

Etude Scoring Form Instructions

(Adapted from Russell, 2015)

You will be listening to audio files and scoring them for rhythm, pitch, articulation, and fluency accuracy. The scoring unit will be the beat. For this study, each element (pitch, rhythm, fluency, articulation) will be assessed independently and judged as either right or wrong. Therefore a participant could earn credit for playing one of the elements correctly even if there were mistakes in another element.

Please use the following guidelines in your scoring:

Pitch errors

A. Tones added or omitted will count as an error. Repeated tones will not count as an error (see Fluency errors)
B. Tones played on the wrong pitch will count as an error
C. Fuzzy attacks, minor irregularities, and poor intonation will not count as errors as long as most of the note is recognizable as the correct pitch
D. If the wrong pitch is sounded on the attack, but it is fingered correctly and immediately corrected without re-tonguing, it should not be counted as an error. (i.e., wrong partial, wrong octave)

Rhythm errors

A. Any note not given its correct value in relation to the notes around it will count as an error. (see Fluency errors)

Fluency errors

A. An error in fluency will be assigned to beats in which there is a disruption to the pulse in one of the following ways
B. Pauses or hesitations between notes within or between beats – assign an error to the beat in which the error was made (within) or to the beat that did not occur in time (between)
C. Pauses or hesitations between measures – assign an error to the second of the two measures
D. Repetition of notes in a measure (going back and replaying a note, not adding notes) – assign an error to the beat immediately following where the break to repeat occurred
E. Radical/abrupt change in tempo (more than 12 bpm) – count an error for the beat in which it happens

Articulation

A. Any note not given the correct articulation (tongued or slurred) will count as an error.

B. Imperfections in tonguing technique will not be counted as errors if the use of the tongue is evident. Air-attacks and throat-tonguing will count as errors.

Other musical elements

A. Do not mark errors for any other musical element.

How to use the score sheet:

1. Mark the audio file # on the appropriate line.
2. For each beat there are boxes for pitch (P), rhythm, (R), fluency (F), and articulation (A) Please place a mark in the appropriate column if you hear an error on that beat.
3. Leaving a box blank indicates that the element was played correctly in that beat.
4. You may listen to each recording as many times as necessary to score each file.
5. Score all music as it is played the first time. If a student repeats any part of the music, disregard the repeated material and begin scoring again when they reach new material.
6. Leave the spaces at the bottom for rhythm, pitch, articulation, and fluency blank. I will fill them in later.

APPENDIX K
WEEKLY PRACTICE REPORT - VIDEO PRACTICE GROUP

Weekly Practice Report

Week 1 of 3

Dear Parents and Students:

Thank you for volunteering to be a part of this study! It is very important to the research study for me to know how much you practice on the song *Etude* at home during the week in between your school lessons. **You will not be judged on how much or how little you practice, so please be as accurate as possible** as to the amount of minutes that you practiced, even if it is zero minutes. Any time that you spend playing the etude, studying the etude, or watching the lesson video counts as practice time. Parents, please verify that the information is correct to your knowledge by signing each entry.

You are encouraged to use the video to help you practice. Please indicate on the table below Yes or No to show if you used the video during your practice on that day.

MONDAY LESSON

Day	Number of Minutes Spent Practicing the Etude *(Not counting the school lesson)*	Did you use the video during your practice today? (Y/N)	Parent Signature
Mon			
Tues			
Wed			
Thu			
Fri			
Sat			
Sun			

TOTAL MINUTES this week: _____

APPENDIX L
WEEKLY PRACTICE REPORT - NON-VIDEO PRACTICE GROUP

Weekly Practice Report

Week 1 of 3

Dear Parents and Students:

Thank you for volunteering to be a part of this study! It is very important to the research study for me to know how much you practice on the Etude at home during the week in between your school lessons. **You will not be judged on how much or how little you practice, so please be as accurate as possible** as to the amount of minutes that you practiced, even if it is zero minutes. Any time that you spend playing the etude or studying the etude counts as practice time. Parents, please verify that the information is correct to your knowledge by signing each entry.

MONDAY LESSON

Day	Number of Minutes Spent Practicing the Etude *(Not counting the school lesson)*	Parent Signature
Mon		
Tues		
Wed		
Thu		
Fri		
Sat		
Sun		

TOTAL MINUTES this week: _____

APPENDIX M
E-MAIL SCRIPTS

E-MAIL TO PARENTS - DAY OF LESSON - NON-VIDEO PRACTICE GROUP

Hello Parents - Thank you again for giving permission for your child to participate in my research study. Today in our band lesson we practiced the song *Etude*. Your child's assignment this week is to practice the song *Etude* at home. An important part of this study is that I have accurate records of how much each child practiced the song *Etude* at home. Please do your best to complete the Practice Record Sheet that was given to your child at the lesson. Students will not be judged or evaluated on how much or how little they practice, so please be as accurate as possible, even if your child practiced very little or not at all. Thank you so much for your help. These practice reports will only be needed for the next three weeks.

Please let me know if you have any questions or concerns, or if you need a new copy of the Practice Record Sheet or *Etude* song sheet. Thank you!

E-MAIL TO PARENTS - DAY BEFORE FOLLOWING LESSON - NON-VIDEO PRACTICE GROUP

Hello Parents - This is a quick reminder to please be sure your child brings their completed Practice Record Sheet to their band lesson tomorrow. An important part of this study is that I have accurate records of how much each child practiced the song *Etude* at home. Students will not be judged or evaluated on how much or how little they practice, so please be as accurate as possible, even if your child practiced very little, or not at all.

For this study, your child is in "Group Garnet" which means for the first three weeks, they will practice the Etude without the video lesson. In three weeks, the groups will switch and your child will have access to the video.

Thank you so much for your help. These practice reports will only be needed for the next (three) weeks. Please let me know if you have any questions or concerns, or if you need a new copy of the Practice Record Sheet or Etude song sheet. Thank you!

E-MAIL TO PARENTS - DAY OF LESSON - VIDEO PRACTICE GROUP

Hello Parents - Thank you again for giving permission for your child to participate in my research study. Today in our band lesson we practiced the song *Etude*. Your child's assignment this week is to practice the song *Etude* at home. For this study, your child is in "Group White" which means for the first three weeks, your child has access to a video to help when they practice the song. The link to the Practice Video is below. Your child is encouraged to use this video when they practice. Please do not share this link with any other parent or student.

Practice Video Link: <link>

An important part of this study is that I have accurate records of how much each child practiced *Etude* at home. Please do your best to complete the Practice Record Sheet that was given to your child at the lesson. Students will not be judged or evaluated on how much or how little they practice, so please be as accurate as possible, even if your child practiced very little or not at all. Thank you so much for your help. These practice reports will only be needed for the next three weeks.

Please let me know if you have any questions or concerns, or if you need a new copy of the Practice Record Sheet or Etude song sheet. Thank you!

E-MAIL TO PARENTS - DAY BEFORE FOLLOWING LESSON - VIDEO PRACTICE GROUP

Hello Parents - This is a quick reminder to please be sure your child brings their completed Practice Record Sheet to their band lesson tomorrow. An important part of this study is that I have accurate records of how much each child practiced *Etude* at home. Students will not be judged or evaluated on how much or how little they practice, so please be as accurate as possible, even if your child practiced very little or not at all.

In case you need it, here again is the link to the Practice Video. Please do not share this link with any other parent or student.

Practice Video Link: <link>

Thank you so much for your help. These practice reports will only be needed for the next (three) weeks. Please let me know if you have any questions or concerns, or if you need a new copy of the Practice Record Sheet or Etude song sheet. Thank you!

APPENDIX N
RAW DATA – SCORES, PRACTICE MINUTES, VIDEO USE

ID	School	Instr	Group	Pre Pitch	Pre Rhy	Pre Fluen	Pre Artic	Pre Total	Post Pitch	Post Rhy	Post Fluen	Post Art	Post Total	Prac1	Prac2	Prac3	Total Prac	Vid1	Vid2	Vid3	Total Video
001	GV	TR	VP	15	32	23	22	92	25	32	23	24	104	0	0	15	15	0	0	3	3
002	GV	AS	NVP	20	28	12	21	81	19	29	20	25	93	0	20	6	26				
003	BS	FL	NVP	25	32	22	27	106	28	32	28	28	116	3	0	6	9				
004	BS	FL	VP	25	29	12	22	88	28	31	27	26	112	0	0	80	80	0	0	0	0
005	GV	FL	NVP	28	32	26	28	114	28	32	27	28	115	42	15	0	57				
006	BS	AS	NVP	20	30	15	27	92	26	32	22	28	108	30	0	5	35				
008	GV	AS	VP	24	29	15	19	87	28	31	28	28	115	31	71	45	147	2	5	3	10
009	GV	TR	VP	13	30	16	26	85	26	32	26	27	111	32	48	25	105	1	0	1	2
010	BS	AS	NVP	25	27	24	22	98	26	29	24	19	98	2	0	0	2				
011	BS	AS	NVP	23	26	12	24	85	24	27	18	25	94	0	10	0	10				
012	GV	AS	VP	26	29	23	24	102	27	32	26	27	112	25	40	0	65	2	1	0	3
013	GV	CL	VP	25	31	21	23	100	28	32	27	27	114	25	55	40	120	0	1	0	1
014	BS	TR	NVP	27	32	27	22	108	28	32	28	25	113	18	0	0	18				
015	BS	CL	NVP	27	26	25	23	101	26	29	25	28	108	20	12	2	34				
016	GV	AS	VP	24	23	23	24	94	28	32	28	28	116	7	20	18	45	1	0	1	2
017	BS	FL	VP	22	25	16	22	85	28	31	26	25	110	30	24	15	69	5	0	0	5
018	GV	AS	NVP	23	32	25	25	105	28	32	28	22	110	25	0	0	25				
019	BS	AS	NVP	22	28	14	23	87	27	29	19	25	100	25	35	15	75				
020	GV	AS	NVP	23	32	20	24	99	27	32	27	27	113	330	95	0	425				
021	GV	AS	VP	20	29	14	11	74	23	31	23	23	100	42	60	15	117	0	0	0	0
022	GV	FL	NVP	25	31	21	20	97	28	32	28	26	114	40	0	20	60				
023	GV	CL	VP	28	31	25	22	106	28	32	28	28	116	25	73	25	123	1	2	1	4

024	BS	CL	NVP	19	32	19	22	92	28	32	28	28	116	55	85	75	215				
025	BS	CL	VP	27	32	16	22	97	28	32	28	28	116	35	30	0	65	1	1	0	2
027	BS	AS	NVP	23	28	20	26	97	27	29	27	27	110	0	0	0	0				
028	GV	FL	VP	26	28	19	22	95	28	32	28	26	114	19	35	5	59	0	1	0	1
029	GV	FL	NVP	23	29	14	22	88	28	32	26	27	113	33	15	10	58				
030	BS	AS	NVP	24	26	20	21	91	25	32	26	23	106	2	17	15	34				
031	GV	TR	VP	22	30	11	24	87	28	32	24	27	111	40	10	25	75	1	0	2	3
034	GV	TR	NVP	11	21	5	17	54	11	22	7	17	57	0	5	0	5				
035	GV	FL	NVP	26	30	20	27	103	28	32	28	27	115	27	30	0	57				
036	GV	CL	VP	27	30	19	17	93	28	31	27	19	105	25	25	20	70	0	3	3	6
037	GV	TR	NVP	20	26	23	22	91	17	29	26	23	95	10	5	12	27				
039	GV	AS	VP	26	29	13	22	90	28	31	17	22	98	10	14	0	24	2	0	0	2
040	GV	CL	NVP	26	32	22	26	106	27	31	27	28	113	90	120	45	255				
041	BS	TR	NVP	21	31	24	25	101	28	32	27	28	115	0	20	0	20				
042	BS	TR	VP	20	25	8	23	76	22	27	18	22	89	0	0	0	0	0	0	0	0
046	GV	CL	NVP	26	29	22	15	92	28	31	25	27	111	10	15	50	75				
047	GV	CL	NVP	27	31	23	26	107	28	32	25	27	112	0	0	0	0				
048	GV	FL	VP	23	26	24	21	94	28	32	27	23	110	90	75	80	245	3	2	4	9
049	GV	AS	NVP	26	29	14	22	91	26	30	22	14	92	27	0	40	67				
050	BS	TR	VP	28	32	27	26	113	28	32	28	28	116	18	12	13	43	1	2	0	3
052	GV	TR	VP	16	28	20	28	92	25	29	25	26	105	25	10	26	61	0	0	1	1
053	GV	AS	VP	26	30	23	22	101	28	32	28	26	114	60	20	25	105	2	0	1	3
054	BS	AS	VP	25	29	4	21	79	28	32	23	23	106	0	0	0	0	0	0	0	0

055	GV	TR	NVP	20	27	22	13	82	20	27	22	20	89	0	5	45	50				
056	GV	CL	VP	26	30	18	26	100	28	32	28	28	116	25	45	35	105	2	1	2	5
057	GV	FL	VP	13	28	16	19	76	28	32	28	28	116	30	10	0	40	1	0	0	1
058	BS	CL	VP	25	28	20	22	95	28	32	27	28	115	27	24	21	72	2	0	1	3
059	GV	CL	VP	26	29	19	21	95	28	32	26	28	114	15	40	35	90	0	1	0	1
060	GV	FL	NVP	26	31	22	22	101	28	32	27	24	111	15	17	23	55				
062	BS	CL	NVP	14	29	15	22	80	28	28	26	24	106	40	0	30	70				
063	BS	AS	VP	27	30	19	27	103	28	32	26	28	114	20	10	15	45	1	1	0	2
064	GV	TR	NVP	22	29	16	26	93	23	30	19	26	98	8	57	0	65				
065	GV	AS	VP	27	31	22	27	107	28	32	28	28	116	1	15	0	16	0	0	0	0
066	BS	CL	NVP	22	26	16	25	89	27	27	18	22	94	0	0	0	0				
067	GV	CL	VP	24	28	14	25	91	28	32	28	28	116	50	25	62	137	2	3	4	9
068	BS	AS	NVP	4	32	8	24	68	15	23	12	18	68	5	0	0	5				
069	GV	AS	VP	23	28	11	21	83	28	32	23	24	107	0	160	0	160	2	3	0	5
070	GV	FL	NVP	24	29	13	23	89	24	28	22	25	99	20	0	0	20				
071	BS	TR	VP	28	25	18	25	96	28	31	22	26	107	10	10	10	30	0	1	2	3
072	BS	TR	VP	23	27	20	22	92	28	32	26	28	114	15	15	25	55	2	2	2	6
073	GV	TR	NVP	22	28	14	23	87	28	31	23	27	109	31	38	15	84				
075	GV	CL	NVP	22	27	15	22	86	24	30	15	15	84	0	0	0	0				
076	GV	TR	NVP	25	26	20	22	93	25	27	23	25	100	0	0	0	0				
077	GV	TR	VP	20	28	9	24	81	26	30	13	25	94	0	20	0	20	0	1	0	1
078	GV	AS	VP	27	32	23	22	104	28	32	27	27	114	70	70	25	165	4	4	4	12
079	BS	CL	VP	26	28	18	22	94	28	24	24	23	99	0	0	0	0	0	0	0	0

080	GV	TR	NVP	11	30	8	21	70	11	30	9	23	73	0	3	0	3				
081	GV	AS	VP	25	31	17	22	95	28	32	27	27	114	0	0	30	30	0	0	0	0
082	BS	AS	VP	24	29	11	20	84	27	27	25	27	106	0	30	0	30	0	1	0	1
083	GV	TR	VP	19	30	15	27	91	28	32	27	28	115	12	14	16	42	1	1	1	3
085	GV	AS	NVP	28	29	24	15	96	28	32	28	16	104	0	50	0	50				
087	GV	AS	VP	7	14	2	9	32	24	29	4	22	79	0	5	45	50	0	0	0	0
088	GV	TR	NVP	22	24	20	28	94	28	30	26	27	111	0	33	0	33				
089	GV	FL	VP	20	28	16	23	87	27	32	23	23	105	0	24	0	24	0	4	0	4
090	BS	TR	VP	18	30	24	26	98	26	32	27	28	113	35	50	70	155	0	2	4	6
091	BS	AS	NVP	25	29	16	27	97	28	27	24	28	107	0	0	15	15				
092	BS	TR	NVP	20	30	21	26	97	28	32	21	27	108	0	25	5	30				
094	BS	FL	NVP	27	32	20	26	105	28	32	28	26	114	45	0	70	115				
095	GV	FL	VP	27	31	16	23	97	28	32	27	28	115	55	20	30	105	0	2	0	2
096	GV	FL	NVP	21	24	22	22	89	12	30	27	23	92	15	16	21	52				
097	GV	FL	VP	24	26	20	20	90	27	32	26	25	110	0	10	0	10	0	0	0	0
098	GV	CL	NVP	28	21	19	14	82	28	26	25	13	92	17	0	22	39				

APPENDIX O
Inter-Rater Reliability Raw Data

ID#	Pitch (JV)	Pitch (SS)	Rhythm (JV)	Rhythm (SS)	Fluency (JV)	Fluency (SS)	Artic (JV)	Artic (SS)
006post	26	26	32	32	26	22	28	28
012post	28	27	32	32	27	26	28	27
027post	28	27	31	29	28	27	27	27
030post	25	25	32	32	24	26	25	23
050post	28	28	32	32	28	28	28	28
059post	28	28	31	32	28	26	28	28
060post	28	28	32	32	28	27	24	24
069post	27	28	32	32	24	23	24	24
072post	27	28	32	32	28	26	28	28
076post	25	25	28	27	23	23	26	25
088post	25	28	32	30	27	26	26	27
097post	26	27	31	32	26	26	24	25
003post	28	28	32	32	28	28	28	28
005pre	28	28	32	32	27	26	28	28
018pre	26	23	32	32	27	25	25	25
023pre	28	28	32	31	28	25	26	22
040pre	26	26	32	32	26	22	27	26
047pre	26	27	32	31	24	23	25	26
053pre	25	26	30	30	23	23	25	22
067pre	22	24	29	28	18	14	26	25
078pre	26	27	31	32	25	23	22	22
085pre	28	28	29	29	25	24	15	15
090pre	21	18	30	30	24	24	25	26
094pre	27	27	32	32	23	20	25	26
003pre	25	25	32	32	26	22	28	27