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FROM FRANCES ELLIOTT CLARK TO TODAY'S HIGHER EDUCATION MUSIC
EDUCATORS: AN EXPLORATION OF THE PERCEPTIONS AND USAGE OF DIGITAL
AUDIO VIA ELECTRONIC RESERVES AND DIGITAL DATABASES

by

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ABSTRACT

Currently, there is a lack of research on the use of digital audio from the perspective of music educators in higher education. Researchers [for example: James Mason and Jared Wiercinski (2009), Jean E. Ferguson (2004), Richard Griscom (2003), Scott R. Phinney (2005) and Kathryn Sullivan, John J. Stafford, and Cindy Badilla-Melendez (2004)] have, however, studied streaming audio in relation to university students and libraries. Knowing the perceptions of instructors is important, because according to Oblinger & Oblinger (2005), they may not have the same perceptions as the students. Additionally, Moseley (2010) recommended further qualitative studies concerning the perceptions of faculty regarding technology utilization to allow more in-depth information to be discovered on the topic.

The purpose of this qualitative multiple case study was to analyze music educators' perceptions and usage of the use of digital audio (e-reserves and streamed databases) in higher education. This research explained how and why these educators utilize (or do not utilize) streaming audio via e-reserves and databases. The research questions used for this study were: (a) How is streaming audio – in the form of e-reserves and subscription-based databases (*Naxos* and *Classical Music Library* – being utilized by college/university level educators at the two studied institutions?; (b) What are the perceptions of the participating music department faculty members on the subject of streaming audio?; and (c) What factors, regarding the use of streaming audio, are considered by the participating instructors to be important? Results of this research revealed participant instructors did utilize digital audio recordings, but not all of the instructors utilized streaming audio. The results of this study also revealed possible reasons for the lack of use of available streaming audio resources.

To Mama and Daddy who gave me the love of music and education.

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CHAPTER ONE: INTRODUCTION

Background

There have been many changes in mediums and players since audio recordings began being utilized in music education. Digital technology is now prevalent, and streaming audio is available for use in higher education music classes in the form of electronic reserves (e-reserves) and digital music databases (Durman, 2009). Accessing digital audio via e-reserves and digital databases such as *Naxos* and *Classical Music Library* for music study is becoming increasingly prevalent. Durman (2009) noted college students can concurrently access music via streaming databases at any time they choose. According to McGlinn (2007), digital libraries allow for the usage of information without having to be at the location of the actual physical information (documents, recordings, etc.).

There are different forms of digital audio archiving and disseminating for libraries. According to Sullivan, Stafford and Badilla-Melendez (2004), there are two prominent methods of digitally disseminating audio files, which are *e-reserves* and a *VARIATIONS* style database. The first method, called e-reserve, only allows students to access streaming music via a password while they are enrolled in a class requiring the reserved audio files, and students are not required to be on campus to access the files. The *VARIATIONS* type database, the second method, is the access method developed by Indiana University, and it affords students streaming access to audio files in select locations on campus.

Statement of Problem

There is a lack of research on the use of digital audio from the perspective of music educators in higher education. Researchers [for example: James Mason and Jared Wiercinski

(2009), Jean E. Ferguson (2004), Richard Griscom (2003), Scott R. Phinney (2005) and Kathryn Sullivan et al. (2004)] have, however, studied streaming audio in relation to university students and libraries. These studies, however, did not specifically address the perspectives of music educators in higher education, and it is important to know this information to, among other things, be able to allocate funds for audio recordings if needed and be able to provide training if needed. It is important to know to what extent (if any) these digital recordings are used, because library resources may need to be adjusted accordingly. For example, librarians may need to procure more or less digital audio via database subscriptions depending on how unstructors perceive and, therefore, use these databases. Additionally, Moseley (2010) recommended further qualitative studies concerning the perceptions of faculty regarding technology utilization, because qualitative studies, as opposed to solely quantitative studies, will allow more in-depth information to be discovered on the topic. Finally, this study was based on information revealed during a pilot study conducted by the researcher, which involved the use of audio recordings in the classroom and digital archives, and this study illustrated the need for more research regarding instructors' use of digital audio (LoPresti, 2008).

Statement of Purpose

The purpose of this qualitative multiple case study was to analyze music educators' perceptions of and usage of digital audio in higher education. Specifically, higher education music educators' usage and perceptions of digital audio e-reserves and digital databases were investigated. This research explained how and why these educators utilize (or do not utilize) streaming audio via e-reserves and databases. This research study was intentionally created to be

broad in nature in order to obtain as many variant answers to questions as possible, because this study was meant to be the foundation upon which future studies can build.

Conceptual Framework

According to Maxwell (2013), in qualitative research the conceptual framework is the study's theory or theoretical framework. Maxwell noted a conceptual framework can be based on "everything from so-called grand theory, such as behaviorism, psychoanalysis, or rational choice theory, to specific, everyday explanations of a particular event or state" (p. 48). Additionally, Maxwell maintained this conceptual framework can come from "experiential knowledge," "other people's theories" (p. 48) and pilot studies. In the case of the current study, the conceptual framework resulted from a combination of: (a) the researcher's experience regarding the use of recordings in the classroom, (b) Frances Elliott Clark's beliefs regarding the benefits of recordings in the classroom and playback technology, and (c) the results of the researcher's pilot study (LoPresti, 2008) revealing issues related to the use of digital recordings in the classroom.

The foundation for this study was Frances Elliott Clark's belief in the benefits of using technology to play audio recordings in music education. Clark introduced great music works to students via her Victor talking machine, because she believed recordings could quickly illustrate more songs, composers, nationalities, and types of music than would normally be possible in a classroom with no recordings (Stoddard, 1968). Stoddard (1968) credited Frances E. Clark with founding the idea of utilizing music recordings in the classroom. The evolution of music education was tremendously impacted by Frances Elliott Clark's innovations involving the use of recordings (Greene, 2008; Stoddard). In the quest for access to music for her students, Frances E.

Clark believed in trying “any device or mechanical aid” (p. 24), which had promise (Cooke, Hollweck, Keith & Kinscella, 1960). Clark (1933) declared:

All things are being made over, adjusted to the new demands of life, new methods of living, new foods, new equipment for living the life that now is, new objectives, new books, new understandings, new policies and new standards. (p. 12)

Much of this can be said today when thinking of the impact the Internet has made on civilization.

Clark further stated:

Yes, the machine age is upon us _ *and it is a grand age*. We could not go back if we would. Education must indeed be “looking ahead” ... Music in Education as the livest subject in the whole curriculum must not only follow, but should lead the way. (p. 12)

Again, Clark could be speaking of the present, as today’s music instructors must adjust their methods to the demands of a technological age where the machines are computers and other digital tools.

This conceptual framework was the guide for the study. Researcher experience drove the development of the interview questions for the pilot study. Pilot study findings regarding the need for more research on streamed digital audio recordings and Frances Elliott Clark’s theory on the use of technology for playing recordings in the classroom were utilized when developing the research questions for the current study. The pilot study emphasized instructor perceptions and usage while Mrs. Clark, as noted earlier, emphasized the use of current technology to play recordings in the classroom to benefit students

Sample

Two university/college music department faculties in Florida were chosen as the locations from which to get the sample for this multiple case study. Four faculty members from this population (two from each school - representing both full-time and adjunct faculty members) participated in this study. As Padgett (2008) noted, in qualitative studies, depth should be the emphasis in sample sizes as opposed to breadth. Additionally, Padgett maintained small samples are often utilized in multiple case studies. The sample was a purposive sample, as the researcher chose to study the feelings of music educators (on the topic of streaming audio) at local institutions. Additionally, one institution is a large, public research university whereas the other is a small, private liberal arts college, and this afforded the researcher the opportunity to gather data from different types of institutions.

Purposeful sampling, specifically maximum variation sampling, was deemed appropriate for this study. The study sample reflects maximum variation, as there are different types of instructors at two vastly different institutions. Additionally, the sample represented faculty members teaching both regular/core and applied/performance music classes. This distinction is important, as regular/core music instructors often teach in a vastly different manner than applied/performance instructors. This study included four survey participants representing both full-time and adjunct faculty members - two from each school. Full-time and adjunct faculty members also should be considered separately, because part-time instructors may not always have all of the information full-time instructors possess. For example, they may not be present at faculty meetings discussing new technology, because adjunct instructors are often not required to attend faculty meetings.

Research Questions

The intention of this qualitative study was to gather information rather than compare information. Data was analyzed to determine which factors are prominent regarding the instructors' beliefs about the use of streaming audio. The research questions in this study are intentionally broad in order to obtain as much information as possible, as this study is meant to be the basis for future research, which can utilize the resulting information to create more focused questions. The research questions that will be answered in this study are:

1. How is streaming audio – in the form of e-reserves and subscription-based databases (*Naxos* and *Classical Music Library* – being utilized by college/university level educators at the two studied institutions?
2. What are the perceptions of the participating music department faculty members on the subject of streaming audio?
3. What factors, regarding the use of streaming audio, are considered by the participating instructors to be important?

To answer these research questions, faculty from the two Florida university/college music departments were surveyed. Additionally, an audio technology analysis was done in order to corroborate responses received from the survey. This audio technology analysis involved ascertaining the availability of audio recordings in digital format at each school, including any streaming audio that was available to faculty members, and any information advertising these available recordings or training available for the use of them was analyzed.

Significance of Study

Music instructors utilize music in the classroom continuously and need access to recordings and the tools to play these recordings (Maple & Henderson, 2000). Instructors assign students listening activities, and instructors should be informed on currently available audio technology for use in the classroom and understand the desires of their students. Streaming audio is one available audio technology available for use during listening activities. Knowing the beliefs about and present usage of streaming audio by music faculty members will help determine if job aids, etc. are needed to increase the use of streaming audio by faculty members.

Instructional designers will benefit from this study, as they will learn the preferences of instructors regarding streaming audio and will be able to use this knowledge for future course designs. For example, if streaming is audio is utilized by faculty members, instructional designers will be able to incorporate this technology, and they will be able to design the necessary training based on the responses from the survey. Additionally, the use of streaming audio allows instructors to have another method to disseminate information in their music classes, and it affords students another means with which to listen to their assignments. Results from this study will allow library staff to decide if they need to advertise these digital audio tools more, and they will also be able to decide if they need to subscribe to more databases or purchase more physical recordings. Finally, this study will allow future research in the area of streaming audio, for example, how do faculty perceptions compare with student perceptions, and how does this affect their use of (approval of the use of) streaming audio. Researchers can design studies based on the knowledge gained from this study.

Operational Definitions

This section includes a list of definitions for the purposes of this study.

E-reserves: access to digital audio recordings streamed for the purpose of student listening sessions; similar to using CDs for reserve assignments but streamed (Sullivan et al., 2004)

Listening: not simply hearing music; a session of listening to music recordings with the purpose of ascertaining certain qualities / aspects of a piece of music

Listenings: repeated listening sessions

Millenials (the Net Generation): students born between 1982 and 1991 (Oblinger & Oblinger, 2005)

Streamed audio database / digital audio database: database of music recordings streamed rather than downloaded to user's computer; can be subscription database or free

CHAPTER TWO: LITERATURE REVIEW

This chapter is a review of literature, which provides background information for this study. The chapter contains the following sections: a) History of Audio Technology, b) Frances Elliott Clark, and c) Audio Technology Since Clark's Time. This last section includes topics such as technology access, adoption, usage, and perceptions. The purpose of this review is to allow for a better understanding of information pertaining to the use of digital audio reserves and databases.

History of Audio Technology

Audio recordings have taken many shapes and have had many uses from analog gramophone discs in the 1880s to digital mp3s in the 1990s (Brandenburg, 1999; Kingsbury, 2006; Library of Congress, 2002). Digital and analog are the two types of audio recordings available (Griscom, 2006). Appendix A contains a list depicting the progression of audio technology throughout history.

Analog

Audio recordings have existed for over a century. Smith and Brylawski (2006) noted the genesis of audio recording dates to 1877. The Council on Library and Information Resources [CLIR] and the Library of Congress (2010a) stated, however, the oldest recording where the voice can be distinguished is Edouard-Leon Scott de Martinville's 1860 phonograph vocal recording of a portion of "Au Clair de la Lune" in 1860. Soon thereafter, in 1877, Thomas Edison invented the phonograph (cylinder) (Kingsbury, 2006; Webster, 2002). According to Kingsbury (2006), the creation of the phonograph marked the birth of the ability to record and

play sound. Additionally, Webster (2002) maintained music education was altered with Thomas Edison's phonograph invention.

The music of the world's cultures was the subject of much of the earliest audio recordings. Ethnographic audio recordings of cultures with aural modes of transmission were the earliest audio recordings in academic holdings (CLIR & the Library of Congress, 2010b). Starting with Hungarian Béla Vikár, Europeans began recording folk music via the phonograph in 1896, and Zoltán Kodály and Béla Bartók followed, making wax cylinder recordings (Licsár, Sirányi, Kovács & Pataki, 2009). The music and language wax cylinder recordings resulting from Jesse Walter Fewkes's 1890 study of the Passamaquoddy Native American tribe are the earliest recordings of this nature (CLIR & the Library of Congress, 2010b).

Recordings have also been heard via radio, and in 1907, music recordings were first transmitted via radio by Dr. Lee DeForest (Fisher, 1926). Shortly thereafter, he transmitted a live performance from the Metropolitan Opera of singer Enrico Caruso from New York to his Jersey City, New Jersey testing facility (Fisher, 1926). According to Howe (2003), in 1910, operas were broadcast via radio from the Metropolitan Opera, and, in 1921-22, all of the operas at the Chicago Opera that year were broadcast via radio.

Recorders and recording media continuously changed including increases in performance, decreases in size and changes in materials used. According to Dent (1947), the armed forces required mobile instantaneous recorders at the time of World War II (and before), and the development of various types of recorders occurred during this time. In the years following World War II, Dent noted the difficulty in the creation of instantaneous recorders (audio recording and playback devices) that were reasonably priced, mobile *and* produced good

quality audio, because a product with all three attributes could not be found. Dent discussed several kinds of instantaneous recorders, the initial model being the disc (record-like) type of instantaneous recorder. Instantaneous recorders were beneficial to music education, as they could be listened to nearly *instantaneously* after recording (Dent). Dent anticipated an eventual fundamental element in music teaching would be instantaneous recorders of some form. This change can be seen later in cassette tapes and digital music, which can be both recorded and played back immediately in most cases.

Technology has been advocated in music education since the beginning of the early 1900s (Howe, 2003). According to Stoddard (1968), Frances Elliott Clark believed musical recordings, followed by phonographs and the radio, to be the catalysts for new music teaching methods (Stoddard). Clark also utilized the radio, and the radio followed in the path of the phonograph as a means of teaching music appreciation (Stoddard). Frances E. Clark was one of the early trendsetters regarding the utilization of radio in the music classroom (Kinscella, 1956; Stoddard). Clark saw the great potential for students to be exposed to a great deal of variant music via the radio in schools (Stoddard). Additionally, F.E. Clark noted people with no access to music performances or records, due to location or financial circumstances, benefited from the broadcasting of music on the radio (Stoddard).

According to Lee & Chan (2007), higher education utilized radio from its inception. Stoddard (1968) reported that the first educational music radio program aired in 1925. Howe (2003) maintained Walter Damrosch also realized the possibilities of utilizing radio for music appreciation and performance broadcasting purposes, and Damrosch's first music appreciation radio programs began in 1928 and incorporated sessions for students in 3rd grade thru college.

Additionally, according to Gordon (1931), the radio show *Michigan University of the Air* was broadcasted weekly for a short period in 1931 and afforded students in 4th grade thru high school with lessons on how to play different instruments.

Digital

Digital recordings, including those used via computer, proceeded analog recordings, and computers have had a monumental impact on the types and uses of audio and audio recordings. According to Beckstead (2001), students can use synthesizers (i.e. electronic keyboards) interfaced with uncomplicated music sequencers on a computer to make MIDI recordings of their compositions. These MIDI files can be used for, among other things, accompaniment purposes (Kersten, 2004). Additionally, the origin of the development of music education software was at universities and colleges (Webster, 2002).

Audio can now be played via computers, and this playback is often an easier process than via other playback mediums. Wong (2005) noted utilizing a computer for class listening is very similar to using analog playback equipment such as cassette players, as the function buttons (pause, play, stop, etc.) on the computer are even visually comparable to those on analog playback equipment. In fact, digital audio use has begun to eclipse that of other forms. For example, in a 2006 study at a U.S. university, Millennial students favored mp3s over terrestrial AM/FM radio as a means to hear music (Albarran et al., 2007). Additionally, in another 2006 study of Millennial, U.S. college students, responses illustrated students owning mp3 players listened to the radio less than those who did not have an mp3 player, which could indicate portable mp3 players are taking the place of radio (Ferguson, Greer & Reardon, 2007).

Streaming audio via computer was also a revolution in audio playback. According to Griscom (2003), streaming exists because computers are now faster and technology (such as mp3 technology) allows for compression of audio files. The compression of audio files (often to mp3 format) allows the amount of data in a digital music library to be less voluminous (Margounakis & Politis, 2009). Due to their small size, digital audio files can easily be sent to different researchers or archives (Lyons, 2008).

Streamed recordings can be heard while the file is buffering, and this distinguishes them from files, which must be downloaded first (Cox & Pratt, 2002; Durman, 2009). Streaming is beneficial when listening to lengthy recordings, as listeners can begin to hear the recording as it is downloading (Klein, 2001). According to Anderies (2005), libraries at colleges and universities were at the forefront of affording online digital access to audio recordings. For example, streaming audio has been utilized at Northwestern University since the 1990s making it one of the frontrunners in educational streaming (Stewart & Cervone, 2003).

Streamed audio has continued its presence in higher education. College instructors can utilize subscription streaming music databases such as *Naxos*, *Classical Music Library* and Smithsonian Global Sound in much the same way as reserving physical recordings in the library by constructing playlists for listening exercises (Durman, 2009). According to Dunn, Byrd, Notess, Riley and Scherle (2006), Indiana University's music library was an early pioneer of online music databases/libraries with their *Variations* database. Anderies (2005) noted subscription-based audio databases, school-created audio databases or a combination of the two are a few of the methods college and university libraries are utilizing to provide access to audio recordings. McPherson and Bainbridge (2001) noted the proliferation of digital music databases

(libraries). According to Anderies, *Classical Music Library*, started in 1999, was the earliest subscription-based streaming music service intended for libraries. Additionally, in a 2007 study of U.S., higher education music librarians and other library specialists familiar with the music holdings, streaming subscription music databases were taking the place of some new audio recording purchases at one institution (Imre & Cox, 2009).

Mp3 players have also been used academically. Galuszka (2005) labeled the utilization of iPods and other mobile technologies as a developing trend in higher education. Any player capable of playing mp3s, including computers and mobile technology such as Zunes or iPods, can be utilized to listen to mp3 files, which includes podcasts (Cooper, Dale, & Spencer, 2009; Gordon-Murnane, 2005; Lamb & Johnson, 2007; Murray, 2010; Robinson & Ritzko, 2009; Schmit, 2007). According to Cooper et al. (2009), iPods can hold a great deal of musical files. In addition, mp3 players are light and easily transported (Microsoft, 2008). Mp3 players have revolutionized the way and magnified the quantity of time (second only to TV) U.S. youths listen to music (Rideout, Foehr, & Roberts, 2010). According to McMillan (2008), Georgia College & State University (in 2002) was the first to make educational use of iPods, but Duke University's commencement of iPod usage in 2004 was the catalyst for a movement to utilize iPods in educational settings. Additionally, according to Massis (2010), mp3 players (iPods, etc.) are often accessible at college and university libraries.

Digital audio is also available from other sources on the Internet including, among others, Internet radio, social media and *YouTube*. For example, oral histories can be heard via Internet radio (Barnett, 2009). According to Chen (2009), among the favored methods for making videos accessible is via *YouTube*. Many virtual communities for networking with other musicians

(online communities including those on social networking services such as *Facebook*, *Twitter* and *MySpace*) exist on the Internet and allow users to share their music (compositions in digital format and preferences) with others (Salavuo, 2008a). Additionally, according to Getscherin (2009), there are many choices legal (e.g. iTunes) and illegal (e.g. peer-to-peer (P2P) file sharing networks) through which digital music can be procured by listeners.

Frances Elliott Clark

Frances Elliot Clark's first foray into using technology in music education was with the phonograph (sometimes referred to as the *talking machine*, *singing machine*, or *the gramophone*) (Stoddard, 1968). Speaking of the phonograph, Stoddard (1968) noted a thought from the January 25th 1936 Camden, New Jersey *Currier-Post*: "Covering as it did every phase of music from folk dance to symphony and from folk song to opera and oratorio, and built up as it was with special care as to its use for school purposes, it is impossible to measure the influence of this recorded music upon the children of America" (1968, p. 174). Frances Elliott Clark advocated the incorporation of recorded music in education (Howe, 2009). Specifically, Clark advocated the utilization of phonographs in schools (Greene, 2008). Clark introduced great music works to students via her Victor talking machine, because she believed recordings could quickly illustrate more songs, composers, nationalities, and types of music than would normally be possible in a classroom with no recordings (Stoddard).

Frances E. Clark stumbled upon the idea for using records in schools in 1909 (Stoddard, 1968). Mrs. Clark was purchasing some Red Seal records for her mother when she encountered a salesman playing a record of "All Through the Night" (a song her students sang) sung by a professional singer, and she realized records such as this would be great singing models for her

students (Kinscella, 1956; Stoddard, 1968). She began using records the next day in her classes for listening sessions with overwhelming success (Kinscella, 1956).

Two principals allowed Frances Elliott Clark to play records (including examples of songs the children were singing) in their classrooms to observe how the students would receive them, and the response from the students was very positive (Stoddard, 1968). Soon after, similarly successful trials were done with more students at different locations, which resulted in these principals buying Victrolas for their schools (Stoddard, 1968). A delegation from the Victor Talking Machine Company (makers of Victrolas) was present at some of these sessions, and this led to Frances Elliott Clark being offered a job in charge of a newly developed education department at the Victor Talking Machine Company, which she accepted in 1910 (Greene, 2008; Stoddard, 1968). This new Victor education department was the direct result of Clark endeavoring to use recordings in the music classroom (Cooke, et al., 1960).

At the Victor Company, Frances Elliott Clark directed the recording of music to be used in the classroom, and this music was recorded specifically for different age/grade levels (Stoddard, 1968). Frances Elliott Clark oversaw the production of recordings (for modeling, accompaniment and music appreciation) of many different genres of music including, among others, medieval music and folk music, and much of this music (and the instruments on the recordings) had not been heard before by students (particularly rural students) (Stoddard, 1968). During her reign at Victor, the number of recordings created - under her direction - for the classroom numbered over 500 (Cooke et al., 1960). Subsequently, use of the phonograph grew due to Frances Elliott Clark's hard work and determination (Cooke et al., 1960).

Frances Elliott Clark considered the accessibility of music (for listening purposes) for all children to be very important (Stoddard, 1968). Clark headed the 1907 assemblage of Music Supervisors, which eventually evolved into what is now known as the National Association for Music Education (Howe, 2009). She is considered one of the architects of the Music Supervisors National Conference (Cooke et al., 1960, p. 24; Kinscella, 1956, p. 28). Frances Elliott Clark considered “More beautiful music, well sung and well played, by and for the children!” (p. 24) to be the foremost goal of music education and its advocate - the Music Educators National Conference (Cooke et al., 1960, p. 24; Kinscella, 1956, p. 28).

The phonograph allowed this accessibility. Frances Elliott Clark observed the phonograph allowed those without the means to experience live music to still hear it (Stoddard, 1968). Recordings also afforded listeners the opportunity to hear pieces not often performed live (Katz, 1988). In addition, recordings made such music available for study in college classrooms with, for example, Mount Holyoke (in 1913) leading the way with the University of Wisconsin following (Katz, 1988).

People of variant locations, socio-economic status, ethnicities and backgrounds were now afforded access, via the phonograph, to music, which they may have never had occasion to hear before (Katz, 1988). This was especially true in the case of: (a) African Americans who were not allowed in some places holding music concerts, and (b) residents of (and students in) rural America where no such events took place nearby (Katz, 1988). Frances Elliott Clark was lauded for contributing to the accessibility of music in rural schools through the promotion and use of the phonograph (Greene, 2008).

The listening periods in Mrs. Clark's classes were the inception of music appreciation, and others followed suit (Cooke et al., 1960; Kinscella, 1956). Frances Elliott Clark (1933) stated:

Music Appreciation involves not only the passive listening which brought the music memory phase of the development, but in addition the rich experience of purposeful listening, which brings the cultivating choice, love for, and taste in beautiful music, the definite acquaintance with the moods, thought content, rhythmic and melodic patterns, the harmonic and form structures which spell "Music Understanding." (p. 12)

One must listen to different types of music in order to be able to choose that which they like best (Clark). Though seemingly a basic aspect of music appreciation, this 'choice' can become all encompassing. For example, some music instructors require their students to listen to a certain musical piece performed, conducted or arranged by a particular person or group, and they are often adamant about their choice.

Listening

Frances Elliott Clark stated: "Education through the ear instead of through the eye – learning to listen, listening to learn – had been well established, settled, and accepted through and by the use of records" (as cited by Stoddard, 1968, p. 139). Many agree that one of the central aspects of music education is the act of *listening* to music. This is because, as the music education philosopher Bennett Reimer (1997) stated: "The fundamental way all people experience music [is] by listening to it" (p. 34). Lancaster (2006) noted students learn about music both "artistically" and "theoretically" via listening (p. 32). The process of understanding musical tones, which make up music, requires listening (Hartshorn, 1963). Listening to music

allows teachers to aurally exemplify musical elements the students are learning (McAnally, 2007). Additionally, aural elements of music such as dynamic contrast and timbre/color can be better understood by listening to audio recordings (Campbell, 2005).

The importance of listening in music education has been described in various manners. Listening to music, according to Frances Elliott Clark, is an integral part of music appreciation and music comprehension, and it is of importance before anything else for instrumental and vocal musicians (Stoddard, 1968). Listening is a critical, fundamental aspect of music education (Campbell, 2005; Lancaster, 2006; McAnally, 2007). A good ear, which includes being capable of perceiving (*hearing*) sounds/music in one's mind rather than ear, is a critical asset for musicians, and this is learned through listening to recordings (Hiatt & Cross, 2006). Caverner and Gould (2003) stated:

Music listening is not only an important part of music education, it is fundamental to all forms of musical expression. In addition, it is a crucial part of performance and improvisation, composition and arranging, and participating with or responding to music. Music listening is not just a subskill to teach separately, it is an integral part of how we express ourselves musically. (p. 19)

Finally, according to Baldrige (1984), all aspects of music education are infused with listening.

Listening used as a teaching method is evident in schools. For example, in a study of listening in music education in elementary school, Baldrige (1984) found recordings were utilized in music appreciation, and vocalists' and instrumentalists' listening exercises. In a study of teaching methods, Morris (2010) found listening to be pronounced in the music education methods of both the United States and the United Kingdom. Morris noted listening was named as

an integral part of music in various education standards including the National Curriculum in the United Kingdom, the 1967 Tanglewood Symposium guidelines and the 1994 National Standards for the Arts Education in the United States.

Repetitious Listening

Frances Elliott Clark believed repeated hearings to be important regarding students listening to music, and this repetitious listening could be achieved through the utilization of the phonograph (Katz, 1988; Stoddard, 1968). Reimer (1997) stated: “Few challenges to the mind can equal the demands made by musical listening” (p 35). Repetitious listening can help students overcome these challenges. Barrett, Lacey, Sekara, Linden, and Gracely (2004) maintained repetitive listenings are vital for learning auditory information. Additionally, students are able to hear and comprehend more musical components when they are able to repetitively listen to the music (Campbell, 2005, Hartshorn, 1963).

Various studies exemplify the benefits of repetitious listenings. In a study of U.S. 5th-6th grade music students, Thornton (2008) found students accurately determined whether sections were played correctly in songs to which they had listened many times. In a study of U.S. elementary students, DeStefanis (2004) discovered repetitively listening to models via CDs resulted in heightened musical achievement. Additionally, in a study of elementary students, Frewen (2010) found students performed a keyboard piece more precisely after utilizing a recorded model for repetitive listenings of the piece.

Modeling

Aural models are by their very nature apropos to the study of the aural art of music. Mrs. Clark believed imitation (through modeling) was the most advantageous method to teach singing

(Stoddard, 1968). Educators utilized the phonograph for modeling purposes in the early 1900s (Katz, 1988). According to Stoddard (1968), vocal educators found Victor's records helpful for modeling. Haston (2007) also noted imitation of what is done by a model is how students ordinarily gain skills and knowledge. Oral illustrations of musical aspects cannot replace aural models of music (Kerstetter, 2009). Haston maintained Shinichi Suzuki and Edwin Gordon (1931) deemed modeling to be beneficial in music education. In addition, according to Frewen (2010), Albert Bandura believed students acquire information via models.

The quality of recorded models, however, can be good or bad. Students, according to Haston (2007), need high caliber models, because students copy models, irrespective of their value. In a study of traits choir educators in U.S. middle schools felt characterized effective middle school choir instructors, Barresi (2000) found the ability to model vocal techniques for students to be a quality prominently mentioned. Vocal models allow students to discern good vocal qualities (Barefield, 2006). Student singers learn better when exposed to a model singing in their vocal range, and not all teachers are able to sing in the proper range, especially for young singers.

Katz (1988) stated: "With the phonograph, the type of music and level of performance heard in the classroom were not limited by the talents of teachers, students, or available musicians" (p. 458). Responding to an inquiry by the gentleman in charge of Iowa State Teachers College's department of music (Charles A. Fullerton) in 1914, Frances Elliott Clark undertook the task of having children's music recorded by professional singers for teachers who could not be singing models for their students (Stoddard, 1968). C. Fullerton used the resulting

recordings for college students and to instruct teachers in his county on how to use the record for modeling singing, and this led to self-assurance on the part of the teachers (Stoddard, 1968).

Modeling has been utilized and found to be advantageous in other areas of music education as well. Audio recordings can also be used for self-evaluation, for heightening listening skills and for encouraging students to aspire to attain the musical level of the recorded artist (Kostka, 2004). Listening to jazz recordings allows students to learn from what others have done regarding improvisation (Morrison, Montemayor & Wiltshire, 2004). In a study of Canadian and Hong Kong music instructors, participants maintained listening to models assists improvisation students (Niermeier, 2010). Additionally, in a study of U.S. middle school instrumental students utilizing digital recordings from a methods book as models, Davison (2006) discovered results illustrating enhanced self-confidence with regards to improvisation among students.

Modeling can be utilized for learning musicality and accuracy. Expressiveness in musical performances can be identified and modeled via audio recordings (Elliott, 2005). Ebie (2004) found, in a study of U.S. middle school choral students, students learning via a recorded model were better able to display emotions while singing than those learning via other teaching methods were. The utilization of audio recordings allows students to listen to how a song on which they are working is meant to sound (Morrison et al., 2004). Henley (2001) discovered utilization of CD model recordings by U.S. high school instrumentalists for practice purposes resulted in the playing of more accurate rhythms than those not utilizing a model. In addition, in a study of high school wind students, Ricketts (2008) revealed affording access to digitally

recorded models of performance pieces for practice purposes led to more successful Solo and Ensemble contestants.

Another manner in which models are beneficials is teaching self-evaluation, and self-evaluation can be practiced by musicians via recorded models. According to Frewen (2010) and Haston (2007), students can gain assessment skills via modeling. In a five week study of U.S. middle and high school students, students utilizing models exhibited heightened self-assessment skills (Morrison et al., 2004). Additionally, singers hear themselves differently than those listening to them, and, thus, must rely on models (including recorded models) for vocal self-assessment by comparing their vocalizations to those of the models (Barefield, 2006).

Models can also be utilized to illustrate cultural aspects. According to Frances Elliott Clark, “Music has preserved for all time the history of all races through their scales, rhythms and instruments” (1928, p. 18). Authentic recorded models of world vocal music allow students to hear correct pronunciation (Goetze, 2000). Music of those cultures that do not utilize notation can be learned via audio recordings (Campbell, 2005). Goetze furthered this by maintaining, if the music of a culture is normally disseminated aurally (rather than also being notated), then students should learn in this manner.

Audio Technology Since Clark’s Time

Access

There are similarities between the audio technology in Frances Elliott Clark’s time and the audio technology of today. Katz (1988) maintained the phonograph contributed to the musical literacy of Americans and the growth of music in the US because of its attributes, as it: (a) was inexpensive, (b) had the ability to afford repetitious listening, and (c) was mobile to an

extent. This can be said about some media since then, for example, cassettes and CDs (and other digital audio media). Frances Elliott Clark noted the radio changed society by bringing music from all over the world to the masses, and, therefore, bringing about an obligation to incorporate it in education (Greene, 2008). This can be said about the Internet today, and the literature revealed digital technology has made a huge impact on music/audio listening in the present. According to Harrower (2005), “the Internet is revolutionising [*sic*] how people access music” (p. 483). Music listeners are now able to choose the music to which they listen rather than someone else choosing, and more people are engaged in music than before (Carlisle, 2007).

Available

Instructors and students habitually utilize the Internet for many activities from buying digital music to social networking, and music access via the Internet affords them the access they demand (Mason & Wiercinski, 2009). The Internet allows for effortless accessibility of digital audio recordings (Kingsbury, 2006). Additionally, digital music is limitlessly (and quickly) accessible on the Internet (Haltmeier, 2009; Harrower, 2005). Online digital music, according to participants in a 2004 study, allows listeners to access a greater amount of good music (Ho, 2007b).

As of 2009, online music sites afforded listeners over 11 million songs from which to select (International Federation of the Phonographic Industry [IFPI], 2010). According to IFPI, there are hundreds of legal digital music sites on the Internet, including *Deezer*, *Napster*, *Spotify*, *We7*, *YouTube*, *Rhapsody*, *eMusic*, *MySpace Music*, *iTunes* and more. In addition, there has been a proliferation in the legal purchase of music online (Gerlich, Turner, & Gopalan, 2007;

Getscherin, 2009). Currently, digital music (purchased online) is the preferred format of those purchasing music (Burkart, 2008; Margounakis & Politis, 2010).

Choice

Another important advantage of digital audio on the Internet is choice. Online music listening affords students the ability to select their music rather than rely on the selections and limited choices of non-Internet radio stations and physical music retailers (Carnevale, 2003). According to Johnson (2000), the Internet gives shoppers more (and easily obtained) options in their music purchase selections, and music educators (and music lovers) benefit, as there is now much more classical music available. Digital music accessible via the Internet gives listeners choices of music, whereas before, listeners had to search to, hopefully, even locate the music desired (Brandenburg et al., 2009). The Internet has also made it possible to access digitally re-released, out-of-print audio recordings (Harrower, 2005).

More People / More Places

Digital audio can be reached by many listeners via the Internet. Music artifacts from various cultures have been made accessible to more listeners through the creation of digital copies of music holdings (Lyons, 2008; Thomas, Middleton & Warren, 2007). Music originating from virtually any country is accessible on the Internet, whereas before, music production and accessibility was often country-specific (Harrower, 2005). For example, Stinson and Chrisfield (2001) maintained academics and researchers from all over the world utilize the La Trobe University Medieval Music Database online. The Internet also allows students to distribute music worldwide and listen to the world's musics via social media such as *YouTube* (Hebert, 2008).

More Listening

There is often a need for more students to be able to listen to audio recordings simultaneously. Improved access to listening reserves is important prior to testing, as many students try to access the recordings at the same time, and this can be achieved via the use of streaming audio (Griscom, 2003; 2006; Klein, 2001). For example, music students at Indiana University often needed music recordings for listening at the same time as others, and this was accomplished with *VARIATIONS* (Dunn & Mayer, 1999). Streaming audio reserves allow multiple students to concurrently utilize course reserve recordings for an unlimited amount of time, while limited access is afforded students with the old, standard method of using physical recordings from the library for music listening reserves (Mason & Wiercinski, 2009). Providing music reserves on iPods can also provide access to material to multiple students at once, and this is beneficial, as there is often only one physical copy of music reserves (McMillan, 2008). Table 1 includes some mediums and methods in which access to music reserves for multiple students has been provided.

Table 1

Mediums/Methods to Accommodate Multiple Users

1970s – 80s	Cassette tapes; reel-to-reel; sometimes able to be broadcast to more than one listening station at a time	Griscom (2006)
1990s	CD-Rs; streaming (mid 1990s)	Griscom (2006)
2000s	Streaming (including subscription-based); iPods	Griscom (2006)

Time and Place

A review of literature revealed physical presence in the library is often neither required nor chosen. Music students many times finish their day's activities after library hours, because they frequently have rehearsals in addition to their classes (Anderies, 2005). Access to digital music files allows music students to concurrently listen to music files at a time and place of their choosing, rather than being in the library until someone returns a copy (Cox, 2005; Griscom, 2006; Maple & Henderson, 2000). Digital databases afford users the benefit of not having to visit the library in order to utilize (listen to) the files (Dickson, 2008; Imre & Cox, 2009; McGlenn, 2007). In addition, mobile technology (mp3 players, etc.) also affords students the ability to utilize technology in the places and times of their choosing, while stationary technology, such as desktops, does not allow this (Ferguson et al., 2007; Murray, 2010; Traxler, 2010). Music reserves on iPods allowed music students at McGill University to do required listening assignments at times and places of their choosing, which did not often involve the library (McMillan, 2008).

Database / Library

A 2007 study of Swiss National Library patrons revealed increased digital accessibility of library holdings was desired (Clavel-Merrin, 2010). Accessibility (mainly via the Internet) is the reason for the development of digital music libraries (Margounakis & Politis, 2009; Pardo, 2006). For example, the *VARIATIONS* digital music database at Indiana University began as a means to access music utilized at the music school, and *VARIATIONS* was utilized like a copy of audio recordings had been utilized in the past (Dunn & Mayer, 1999). Additionally, streaming

databases provide libraries with supplemental music holdings (Anderies, 2005; Durman, 2009).

See Appendices B and C for more examples of digital databases.

There are also collaborative digital recording endeavors occurring, and this can be seen in academic as well as non-academic entities. Like-minded archives can collaborate and share digitized recordings, which will increase access to audio recordings (Lyons, 2008). For example, Thomas et al. (2007) named the Collaborative Digitization Project in Colorado and the Maine Music Box as two collaborative digitizing undertakings. Libraries (academic and non-academic) throughout Maine [including the Bagaduce Music Lending Library, the University of Maine's Fogler Library and the Bangor Public Library (the Bangor Symphony Orchestra's music library)] participated in the collaborative process that produced the Maine Music Box (Lutz, 2004; Lutz & Gallucci, 2005). Additionally, MusicAustralia was created via a collaboration between different entities in Australia including higher education institutes (e.g. Griffith University's Queensland Conservatorium), archives (e.g. the National Film and Sound Archive) and libraries (e.g. the National Library of Australia) (Thomas et al.).

Streaming music databases are utilized in academia, and the following examples will illustrate this usage. Many music instructors give students required listening assignments (Maple & Henderson, 2000). Course listening reserves are utilized more than any other audio recordings in higher education libraries, and these listening reserves are distributed most often via streaming audio (Griscom, 2006). Most respondents (93%) in a 2002 study of members of the Music Library Association from libraries in higher education reported access to course reserves for listening assignments was afforded via streaming audio (Griscom, 2003). According to Mason

and Wiercinski (2009), digital reserves for course listening assignments are more relevant today than the antiquated practice of utilizing physical audio recordings for course music reserves.

There are other examples of streaming media at higher education institutions including the University of North Carolina and Haverford College. In the late 1990s, the music library at Haverford College created digital files of existing physical audio recordings and began streaming audio reserves accessible via computer (Anderies, 2005). In 2005, the music library at the University of North Carolina School of the Arts began streaming audio for music course listening assignments (Thomason & Kamtman, 2007). Concordia University also initiated streaming audio reserves to enable more students to access their music reserves (Mason & Wiercinski, 2009). According to Mason and Wiercinski (2009), Concordia University utilized streaming audio reserves to supplement subscription-based music databases with music not available through these entities but required by instructors. Maple and Henderson (2000) noted streaming audio was utilized at Penn State for students' listening reserves via university-developed digital audio files. Some examples of non-subscription (school-based) streaming utilized in higher education are provided in Table 2.

Table 2

Examples of Streaming in Higher Education

	Streaming	Source
Concordia University	Digitized music course reserves - Streaming	Mason & Wiercinski (2009)
University of Toronto Music Library	Digitally archived (digital copies) music department performances from old recordings (cassettes, CDs, etc.) / Streaming	Mason & Wiercinski (2009)
<i>Variations</i> - Indiana University – William and Gayle Cook Music Library	Over 10,000 recordings - bulk of recordings classical; also popular and jazz recordings / Streaming	Dunn et al. (2006); Dunn & Mayer (1999); Notess (2004)

The literature also revealed instructors must know there are digital sources in existence and available for their use, or they will obviously not be able to utilize these sources. In a 2004 study of U.S. middle and high school teachers in the field of social studies, interviewees noted teachers need to be aware that digital libraries exist (McGlenn, 2007). In a study at a UK university, Adams and Blandford (2002) discovered instructors do not always know of the existence of digital libraries. Teachers, in a 2004 study, advised the interviewer that DocSouth

developers should alter it so teachers can locate information easier in order to utilize it (McGlenn, 2007).

After reviewing the literature, having digitized audio recordings available to patrons appears to be advantageous in libraries. Audio recordings have the potential of being utilized more with streaming audio, because they can be accessed with less difficulty than physical copies (Mason & Wiercinski, 2009). According to Smith, Allen and Allen (2004), after libraries' audio recordings are accessible online via digital audio files, they are often utilized to a greater extent than they were before. The literature revealed streaming audio files helps keep music listening legal. The temporary nature of streamed audio files helps assure copyright compliance (Durman, 2009; Thomason & Kamtman, 2007). Streamed files are received in limited portions, heard, then eliminated so more portions can be received, and this makes it more complicated to illegally obtain, as the file is not permanently downloaded (Cox, 2005; Griscom, 2003; 2006). Streamed audio files are never totally downloaded onto the listener's computer (Durman, 2009; Margounakis & Politis, 2010).

These digital audio files utilized in academia can be accessed in variant ways, and literature on such institutions as Northwestern University, the University of Nevada and Haverford College exemplified this utilization. Instructors can make streaming audio/video accessible to students via course management systems (e.g. Moodle, Blackboard) or websites for the course (Boyer, 2009). For example, the music library at Haverford College streamed audio reserves accessible via computer with password authentication on Blackboard (Anderies, 2005). Northwestern University students can also access material via Blackboard (Stewart & Cervone, 2003). The University of Nevada, Las Vegas's Music Library utilizes streaming audio for course

listening reserves, accessible through ERes (electronic reserves management system) (Brown, Fabbi & Taranto, 2005). Additionally, participants at the Music Library Association's [MLA] 2006 conference noted Stanford University utilized streaming e-reserves by way of iTunes U, which are accessible from their web-delivery system CourseWork (McBride, 2006).

Websites are also an avenue for digital audio accessibility for instructors and students, and this includes social media websites. Digital music files placed on a website allow others to hear students' music (Sichivitsa, 2007). MIDI files can be utilized by students for rehearsing outside of class time if they are uploaded to websites by instructors (Kersten, 2004). Choir directors can supply students with access to digital recordings via a website for choir members for practice purposes and to assist students in learning diction in a foreign language via authentic and/or valid sources (Whiteley, 2010). Regarding social media, music is being placed on the Internet by its creators in order to allow others in their social network to hear it (Salavuo, 2008b). According to Whiteley (2010), students can be exposed to variant musics via *YouTube*. iTunes is yet another avenue of digital audio accessibility, and Connolly and Golderman (2008) illustrated this in their literature on Union College. According to Connolly and Golderman, digital music was purchased through iTunes by librarians at the Schaffer Library at Union College to enhance their music holdings for classes, and music files were then either copied on CDs or placed on iPods for reserve listening.

Mobile Technologies

Mobile technology is another mode of audio accessibility for students and instructors. Students can obtain academic material via mobile technology (Traxler, 2010). For example, Georgia College & State University began utilizing iPods for student access to music in 2002

(Galuszka, 2005). McGill University's Marvin Duchow Music Library has utilized iPods for course listening reserves since 2006 (McMillan, 2008). According to McBride (2006), music reserves for courses can be listened to on iPods at Baylor University and at the University of Montana. Thomason and Kamtman (2007) noted iPods were being utilized for music course listening assignments at the music library at the University of North Carolina School of the Arts. Students can even download their personal music performances to their iPod (Cooper et al., 2009). According to Banister (2010), besides listening to music, learners can listen to music on *YouTube* via an iPod Touch. Digital music is now also accessible via cellular phones (Banister, 2010; Harrower, 2005; Kroski, 2008). According to Kroski (2008), mobile service providers afford users access to both the streaming and the downloading of music. Finally, *Naxos* can even be utilized by Harvard students and faculty via Apple and Android products' apps (applications) (Masteller, 2010).

This review of literature also revealed the ability to multitask while utilizing digital media via mobile technologies is advantageous. For example, those surveyed in a U.S. study of university students indicated they utilized iPods concurrently with exercising or participating in sporting activities, traveling and relaxing (Danahauer et al., 2009). Cooper et al. (2009) noted UK undergraduate music students listened to podcasts in various situations such as on a train and on a treadmill. Additionally, in a study of Millennial students' perceptions and usage of mp3 players at a U.S. university, Hoover and Krishnamurti (2010) discovered one manner in which students utilized mp3 players was when they traveled (by bus, car or walking).

Culture & Preservation

Cultural

Literature on audio technology since Clark's time also involved audio cultural artifacts. Audio cultural artifacts have been the objects of many accessibility and preservation issues. Music recordings are often the only type of artifact available to represent cultures, especially local/indigenous cultures (Shepard, 2000). Sound recordings have acted as cultural archives for more than a century (Billington, 2006). For example, Chinese traditional music is being digitized to foster the advancement and preservation of this genre (Ho, 2007b). Additionally, recordings that cannot be replaced (one-of-a-kind and historical recordings specific to a university, such as those recorded at a university or by university faculty/students) and are usually inaccessible have recently become the concentration of much of the digitization occurring in libraries, and this allows for preservation *and* access (Griscom, 2006). For example, live university performances are part of a university music department's history and should be preserved (Mason & Wiercinski, 2009).

Fragile

Many audio recordings are sometimes a challenge to play, as they are either deteriorating or on archaic media. Copious amounts of audio recordings are now useless, as the media has ceased to be in a playable condition (CLIR & the Library of Congress, 2010a). For example, cracking/ shattering has caused the destruction of many recordings cut on glass discs, and these recordings now no longer exist (CLIR & the Library of Congress, 2010b). According to responses in a 2003 CLIR study of the Oberlin Group consortium of libraries and ARL, some

audio recordings could not be utilized, because they were too fragile for playback (Smith et al., 2004).

Archaic media is the other issue facing libraries and listeners. Libraries rarely have the equipment to play audio recordings on archaic/out-of-date media (CLIR & the Library of Congress, 2010a). Not only do libraries have to contend with the fragile and deteriorating nature of recordings on older media, but they must also contend with outmoded or obsolete playback devices requiring access to someone with the skills to utilize them and, if necessary, restore them to working order, which is a rare asset (Mason & Wiercinski, 2009). For example, in a 2003 CLIR study of the Oberlin Group consortium of libraries and ARL, participants noted some audio recordings could not be utilized, because the equipment necessary to play them was not possessed by the institution (Smith et al., 2004).

Some of these playability and accessibility issues have been (or can be) solved by digitization. In a 2002 study of members of the Music Library Association from libraries in higher education, participants revealed they created digital files to allow for less difficult accessibility of recordings whose physical forms are not easily played (Griscom, 2003). Libraries have been moving recordings (often with enforced limited use due to preservation concerns) to new formats for accessibility and preservation for many years (Griscom, 2003). Additionally, fragile items (e.g. recordings) can be preserved through digitization, as users no longer need to utilize (play), and further damage, the originals (primary recordings) (Dickson, 2008; Griscom, 2003; 2006).

Not Catalogued

A lack of complete cataloging is another source of problems related to the accessibility of audio recordings. Libraries are often not aware of the contents of their audio recordings acquisitions (CLIR & the Library of Congress, 2010a). Many participants in a 2003 study revealed their libraries' collections contained audio recordings that were unknown to patrons, as not all holdings were catalogued (Smith et al., 2004). A 2006 study of those affected by the issue of audio preservation (librarians, academics, etc.) also revealed academics often could not (or could not easily) locate and access audio recordings, because complete contents of libraries were often unknown by the library and uncatalogued (CLIR & the Library of Congress, 2010b). Participants at the MLA 2006 conference noted only a minority of higher education libraries have complete catalogs of school or community related audio recordings (McBride, 2006). Additionally, many LPs were found to be uncatalogued in over a third of the libraries in a 2007 study of U.S., higher education music librarians and other library specialists familiar with the music holdings (Imre & Cox, 2009). If library patrons are unaware of the existence of certain audio recordings, they will obviously not request access to them (Smith et al., 2004). Additionally, according to findings of a 2006 study, if material cannot be located and accessed, library audio collections often go unutilized, and this lack of use leads to a lack of funding for the administration and preservation of these audio holdings (CLIR & the Library of Congress, 2010b).

The literature revealed instructors and students are likely already looking to other resources for their audio needs. According to Mason and Wiercinski (2009), students often resort to the Internet to search for music for listening assignments, often not discovering the exact

performance the instructor requires, because they have limited access to physical reserve copies in their library. In a recent survey of Marywood University Millennial, undergraduate students, Ismail (2010) found the library's resources (including online resources) were not often all being utilized and inferred that, rather than the library being their method of finding academic information, students were probably turning to other means such as the Web. Findings of a 2006 study of those affected by the issue of audio preservation revealed the Internet is often the solution for academics who wish to have less complicated access to audio recordings (CLIR & the Library of Congress, 2010b).

Preservation and Access

Often, listeners are not able to utilize original recordings for reasons of preservation. Access limitations have often been the answer to preservation issues for audio recordings (Maple & Henderson, 2000). According to Dunn and Mayer (1999), music students at Indiana University utilized a great deal of audio recordings held in restricted areas for listening exercises. Before *VARIATIONS* was introduced, Indiana University incorporated the use of copies of physical recordings and the broadcasting of recordings to listening stations for the purpose of keeping the original recordings from being damaged and to afford accessibility to more students (Dunn & Mayer). Digitization for preservation allows for access, and digitization for access allows for preservation (Griscom, 2003; Lyons, 2008; Maple & Henderson, 2000). Digital audio archives also allow distribution to many listeners all over the world without the need to utilize (and further deteriorate) physical recordings (Lyons, 2008).

Libraries turned to digitization to alleviate the problems of access and preservation. Digitizing physical copies of library music holdings is a trend in libraries, which has been

catalyzed by the need for preservation and accessibility of holdings (Thomas et al., 2007). Preservation digitization was seen in libraries in the 1980s, and the 1990s saw streaming developed with audio streaming utilization for course listening reserves evident in libraries in academia in 1996 (Griscom, 2003; 2006). In a 2003-4 study of U.S. libraries, Liu (2004) discovered preservation of frail/deteriorating and historical holdings and heightened accessibility of holdings are the reasons for digitization activities in libraries. Mason and Wiercinski (2009) named accessibility and preservation as the foremost reasons for the digitization of audio recordings at music libraries in higher education institutions. Some surveyed in a 2002 study of members of the Music Library Association from libraries in higher education indicated preservation was the reason they digitized audio recordings (Griscom, 2003). Preservation and accessibility were also two of the purposes of The Maine Music Box (Lutz & Gallucci, 2005).

Reformatting

Many elements affect choices for the digitization process. Digitization occurs at institutions according to what each organization deems important (Kyriazis, 2005). Similarly, universities' and colleges' academic goals normally drive the acquisition of audio recordings (CLIR & the Library of Congress, 2010b). Walker (2003) noted selections for library music holdings are often driven by the academic and performance requirements of the college or university, which is mainly classical music with some jazz and world music. Petitions to utilize collection holdings and course reserve needs drove Variation's digitization process (Notess, 2004). Much of the audio recordings utilized at Indiana University were for reserve purposes, so these drove the selections for digitization (Dunn & Mayer, 1999). Similarly, Penn State chose only to create digital copies of music course reserves (Maple & Henderson, 2000).

The caliber of sound varies between analog and digital audio recordings, and this is an important aspect – especially with regards to music. Analog copies of original recordings are not often of the highest caliber (regarding the sound), and these copies degrade with use (Dunn & Mayer, 1999). Kingsbury (2006) noted digital copies mirror the original version regarding sound quality, whereas analog copies lose sound quality each time a copy is made from a copied version. Analog recordings can now be duplicated digitally with an almost identical sound resulting (Haltmeier, 2009). Additionally, sound imperfections from excess usage can be eliminated from audio recordings via computer technology during reformatting (Griscom, 2003).

According to the literature regarding access to recordings, the LP is one medium that creates accessibility issues for libraries. Results, in a 2007 study of U.S., higher education music librarians and other library specialists familiar with their music holdings, revealed the bulk of the LP recordings in higher education are inaccessible or limitedly accessible (Imre & Cox, 2009). Some of the LP recordings in higher education libraries have only been published on analog LPs and are not obtainable on digital media, but reformatting LPs is a costly venture (Imre & Cox, 2009). Only about one-third of the participants who were surveyed, in a 2007 study of U.S., higher education music librarians and other library specialists familiar with their music holdings, indicated they reformatted LPs to digital media (Imre & Cox, 2009). Participants' discussions at the Music Library Association's 2006 conference surrounded the utilization of the iPod at Harvard University to make available recordings from LPs of world (non-Western) music that have become frail (McBride, 2006).

Technology Adoption

Besides access, adoption of technology was also addressed in the literature. Many issues are involved in the adoption of technology including lack of use. According to Wong (2005), instructors in Hong Kong do not always take advantage of tools such as digital audio resources accessible via the Internet. In a 2002 study of instructors and students in Hong Kong, only a little more than one-third of the music instructors responded favorably regarding the use of technology in music classes (Ho, 2004). Wong noted faculty in higher education have not accepted the benefits of digital technology (including via computer) integration and therefore make little use of it in listening classes. Instructors of younger students look to higher education for pedagogical examples, and, in the case of listening classes, they are probably not witnessing examples of digital audio integration (including via the Internet) (Wong). Wong attributed instructors' lack of digital audio utilization (via the Internet) for listening to their lack of technical confidence. Additionally, in a 2006-7 study, an Australian music instructor identified fear as the reason for instructors' lack of technology adoption (Crawford, 2009).

Further reasons for a lack of use on the part of instructors were illustrated in the literature. Educators who do not recognize the value of technology integration may not wish to utilize technology, because it forces them to incorporate different teaching methods than those with which they are comfortable (Bauer, Reese & McAllister, 2003). Dent (1947) felt teachers would not be apt to adopt one of the new (in the 1940s) forms of music recording and playback, because they were comfortable with and confident in the utilization of phonographs. Wong (2005) echoed this when commenting that teachers often utilize outmoded playback equipment simply because they are accustomed to using it. Durman (2009) maintained, without proof that

they are advantageous and/or better than the method they are currently employing for listening exercises, college instructors will not automatically start using subscription databases. In order for technology to be integrated in any class, instructors must have a desire to do so, and they must often take the initiative to do it on their own (Keengwe, Pearson, & Smart, 2009). Additionally, faculty members integrate technology, which they feel is beneficial (Moseley, 2010).

Other reasons apparent for instructors' technology usage include the desire to cater to their students' desires and assumed requirements. Some faculty in a 2009 study of U.S. community college students and faculty felt they should utilize technology, because students utilize and enjoy technology (Moseley, 2010). Similarly, in a 2004 study of U.S. middle and high school teachers, some interviewees maintained the integration of technology, due to its cultural prevalence, is an obligation (McGlenn, 2007). In addition, in a study concerning the technology literacy of music instructors, Haltmeier (2009) maintained competency and inclination to integrate technology in music courses could be favorably affected by one's use of and encounters with technology for personal interests pertaining to music. According to Vogt, Schaffner and Chavez (2010), technologies are adopted slowly from one adopter to the next, with more apt to adopt technologies when the number of adopters grows. In addition, Durman (2009) noted music faculty members would likely adopt subscription-based music databases if they understood how convenient they would be for them in terms of finding the music they need/want (and that students can access) for listening exercises at any time or place.

Finally, if instructors are going to adopt technology, they may benefit from training. Future teachers should have instruction on current technologies available to them (Marks, 2009).

In a study of U.S. university, education students, Marks (2009) found these students discovered available technological resources (of which they were not previously aware) during the course. A study of K-12 music instructors in the U.S. revealed instructors usage of and facility in technology in music instruction was enhanced due to attendance at a seven-day class on the subject (Bauer et al., 2003). In a study of U.S. middle and high school teachers in the field of social studies, McGlenn (2007) found, however, even after gaining skills in technology usage, teachers still may not be able to incorporate certain technology due to limitations of resources, curriculum and time.

Technology Usage

The literature also illustrated how technology is used by students and instructors. Millennials were a group of students addressed in the literature regarding technology usage. Millennials constitute much of today's traditional college and university student populations (Robinson & Ritzko, 2009). Instantaneous results, answers, access, etc. are desired by Millennials, and multitasking is commonplace for Millennials (Gosper et al., 2007; Oblinger & Oblinger, 2005). The Internet has always been present in the lives of Millennials (Robinson & Ritzko, 2009). Additionally, an essential element of Millennial students in college is technology utilization (Pearson, Carmon, Tobola & Fowler, 2009/2010). Most Millennials utilize technology for access rather than for technology's sake (Oblinger & Oblinger, 2005). Webster (2002) noted students see technology usage as commonplace. Echoing this sentiment, Ho (2007b) contended the majority of students in China find the utilization of digital technologies the norm.

Presumptions

It is evident from the literature that presumptions regarding student and instructor technology usage are often prevalent. According to Kennedy et al. (2006), there are beliefs present in higher education, due to Prensky's ideas of digital natives and immigrants, that are largely based on common thought rather than research such as: (a) higher education faculty members are incompetent regarding technology while their students are all competent in this area; and (b) students desire their non-academic technology utilization to cross over to their academic lives. McNaught, Lam and Ho (2009) also noted that, according to popular thought, faculty members tend to be digital immigrants and, as such, not as technologically inclined or savvy as their digital native students. Selwyn (2008) maintained, however, past studies on the use of technology by students have not revealed an all-encompassing student desire for academic technological integration, and, additionally, the premise of the need for technology integration at universities may have been based on the false idea that all of these students *were* desiring academic technological integration.

Some have accepted the assumption of student superiority in technological literacy. Regarding students, Lancaster (2006) maintained they have more technology intelligence. Faculty, in a 2009 study of U.S. community college students and faculty, felt their Millennial students were more technologically literate (and skilled) than they were, even though the faculty members saw themselves as skilled in technology utilization, and some of their students were actually not very technologically literate beyond fundamental skills (Moseley, 2010). Additionally, Moseley (2010) discovered a portion of student and faculty participants felt older instructors prefer their traditional methods to newer pedagogical (i.e. technology) methods.

According to Moseley, though some community college students and faculty gave credence to the popular notion concerning the contrast between Digital Immigrants and Natives regarding technology, the fact they accepted this does not make it true.

Presumptions should not drive academic technological decisions, as not all students or instructors are the same when it comes to technology; and these instructors and students do not always fall within the accepted presumptions. Oblinger and Oblinger (2005) maintained it is important to actually know, rather than presume to know, how students are inclined to learn, and this is particularly important with regards to technology. Kennedy et al. (2006) noted serious inquiry should occur before any new technologies are accepted based on assumptions rather than actual technological necessities.

The presumed age affect was also addressed in the literature. According to Corrin, Bennett, and Lockyer (2010), when identifying someone as a digital native or digital immigrant, a person's age is no longer always the predominant or deciding factor. Age is not the only factor affecting technological ability, as non-Millennials who have utilized technology a great deal are likely to have technological abilities corresponding to those of the Millennials (Oblinger & Oblinger, 2005). Additionally, non-Millennial students comprise a good deal of the students in higher education (Oblinger & Oblinger, 2005).

Studies revealed results contrary to popular thought regarding technological literacy. In a 2009 study of U.S. community college students and faculty, non-Millennial students indicated they were introduced to technology when computers became accessible to them, while most Millennial students felt technology had always had a part in their lives; however, some of the younger (Millennial) students did not utilize computer technology before college, which

contradicts Prensky's notions regarding computer use for Millennials / Digital Natives (Moseley, 2010). Additionally, Moseley (2010) theorized the reasons the results of this 2009 study did not parallel popular ideas regarding the technological skills and beliefs of Millennial students versus instructors were that either: (a) the variation in generational technological skills and beliefs becomes less prominent as Millennial students get older; or (b) their Digital Immigrant instructors gained technological skills and beliefs closer to those of their Millennial students. According to McNaught et al. (2009), in a study of faculty and Millennial undergraduates at a Chinese university, some students were not technologically skilled, and technology skills and usage reported by students did not always surpass those of faculty members. Additionally, both instructors and students, in 2009 study of a U.S. community, valued technology integration in academia, but this is contrary to the popular notion that these two groups should feel differently about technology integration (Moseley).

The literature revealed faculty technology skills contrary to presumptions about them. A good portion of the faculty, in a 2009 study of U.S. community college students and faculty, indicated they taught themselves technology skills rather than college administered training, and Moseley (2010) felt the fact that they taught themselves was in contrast to the generally accepted literature (Prensky being specifically cited) that credits only those born as Millennials or Digital Natives with this tendency to learn to use technology autonomously. Additionally, Australian middle/high school instructors in a 2006-7 study of music classes noted self-teaching as the method utilized to gain most of their technological abilities (Crawford, 2009).

Students

Another issue addressed in the literature was that not all students display technological literacy and access. According to Reinhart (2008), there are still students who are not skilled in technology, because they are of low socioeconomic status. Non-native English speaking students were reported by interviewees, in a 2004 study of U.S. middle and high school teachers, as potentially needing assistance with technology at times (McGlenn, 2007). Additionally, in a study of U.S. students, Rideout et al. (2010) discovered lower parental education levels adversely affected the ability of students to access the Internet from their home.

Other studies exemplify this disparity. In a 2006 study of Millennial students at a U.S. university, students felt they were highly skilled at basic technology applications, but in contrast to common thought regarding Millennial's technological abilities, they did not feel their skills were high on more advanced technological applications (Shannon, 2008). In a 2008 study of Australian, Millennial undergraduates, Corrin et al. (2010) discovered students' self-proclaimed technology skills ranged from beginner to advanced rather than all being advanced, which the authors noted is contrary to the common belief regarding the technological skills of Millennials.

Researchers revealed students often utilized basic technologies. In a 2007 study of U.S. university students, participants revealed music downloading and Internet searches were the Internet applications they frequently used (Fritz, 2007). Additionally, frequent academic technology utilization by students in a 2008 study of Australian, Millennial undergraduates, according to Corrin et al. (2010), was overall insignificant; however, some technology applications were utilized frequently (e.g. searching for facts online and utilizing school eLearning systems).

Non-academic to Academic

Some of the literature maintained students preferred academic technological utilization that mirrored their non-academic usage. According to Durman (2009), college students will likely express a desire to be able to access their listening reserves via the Internet since they already utilize online resources for music in their everyday lives. According to Golderman and Connolly (2007), Millennial college students want their academic life to incorporate Internet technology. According to Wong (2005), Millennial students will likely demand the integration of digital technology in their education, as they have been habituated to using it all through school. Additionally, in a study of U.S., Millennial undergraduates, Kumar (2009) found students valued digital audio recordings for academic purposes, and this was a result of the fact they often listened to digital audio recordings via the Internet or mp3 devices in their non-academic lives.

Music

Students' music listening habits were also addressed in the literature. According to the International Federation of the Phonographic Industry [IFPI] (2010), 40% of U.S. and 27% of world music purchases were digital music. Even when students purchase physical CDs, they often immediately reformat them to mp3s (Carnevale, 2003). Cell phones and iPods/mp3 players are commonplace among almost all students in all social classes (Haltmeier, 2009; Traxler, 2010). Salmon & Nie (2008) also revealed mp3 players are a part of everyday student life at colleges and universities.

Some chose to listen to audio files via mp3 players, while others did not. Almost all (95.4%) of the participants in a recent study indicated music was the purpose for listening to their iPods (Danahauer et al., 2009). In a study of subjects involved in both technology and music

(including students from high school through college, instructors and college graduates), Horikiri (2009) discovered a little more than a third engaged in listening to music on their mobile handhelds. Additionally, UK university students in the 2006 Informal Mobile Podcasting and Learning Adaptation (IMPALA) study revealed most participants rarely utilized mp3 players for academic listening or anything else other than music listening (Salmon & Nie, 2008).

Streaming was another aspect addressed in the literature, and streaming was also found to be utilized by students to access audio recordings. In a 2006 study of Millennial students at a U.S. university, participants revealed over half of them had utilized streaming media (53%) (Albarran et al., 2007). Additionally, Rideout et al. (2010) discovered U.S. students between eight and eighteen listened to music/audio via computer in the form of streaming audio, and *YouTube* captivated their attention (Rideout et al.).

Faculty

Faculty members utilize different forms of technology in varying degrees. Most Australian middle/high school music instructors in a 2006-7 study maintained they were able/qualified to integrate technology in their classroom (Crawford, 2009). According to Moseley (2010), in a 2009 study of U.S. community college students and faculty, 12% of faculty members specified they utilized audio for their courses, and 72% of faculty members specified they utilized video (including online, e.g. *YouTube*).

Teaching Methods

According to the literature, different elements affect faculty members' technology integration. Durman (2009) contended instructors approach the utilization of audio recording in different manners, as some continue to utilize the customary (and proven) procedure of directing

students to utilize physical recordings for their listening requirements, while others cater to students' technology desires such as through utilizing digital audio recordings including e-reserves and subscription databases online, and still others utilize some combination of the two. According to Marks (2009), the teaching approach instructors experienced in school is generally that on which they model their teaching practices, and these practices will generally deviate from the manner in which Millennials are inclined to learn. In a 2009 study of U.S. community college students and faculty, Moseley (2010) discovered some faculty members utilized technologies, because they satisfied the objectives for their curriculum and were readily accessible from either curriculum material publishers or the Internet. Additionally, Moseley found, though students felt most of their teachers wanted to integrate technology, they felt their Digital Immigrant teachers did not integrate technology, because either they had not experienced technology integration in school (and thought that was also fine for their students) or had not experienced technology when younger.

Teachers vs. Students

Studies also revealed a disparity in technology utilization between students and their instructors. Students in a study of students at a U.S. university felt the faculty was less skilled than they were in the usage of virtually every technological application (Kyei-Blankson, Keengwe, & Blankson, 2009). Additionally, a majority of students in this same study considered themselves to be competent in computer applications such as word processors, multimedia presentations, social media and spreadsheets, while noting a lower percentage of skill for their instructors (Kyei-Blankson et al., 2009). Durman (2009) maintained most college instructors

have not been utilizing downloading as a means to procure music for as long as (or since as young an age as) their Millennial students.

Technology Ownership

Studies illuminated the actualities of technology ownership among students and instructors. The majority, if not all, students, in a 2009 study of U.S. community college students and faculty, disclosed they possessed cell phones, computers and mp3 players (e.g. iPods) (Moseley, 2010). The following sections address student and faculty ownership of mobile technology based on the literature.

Mobile Technology

Studies revealed students possessed cellular phones, which can play audio. Almost thirty percent of surveyed undergraduates, in a study of psychology students at a Canadian university, indicated they had a cell phone with music playing capabilities (Ahmed et al., 2007). In a study at a Chinese university, more Millennial undergraduate students (88.3%) than faculty members (55.8%) indicated they possessed a cellular phone with the ability to play audio (including mp3s), (McNaught et al., 2009). Additionally, in a study of subjects involved in both technology and music (including students (from high school through college), instructors and college graduates), Horikiri (2009) discovered over 75% possessed a mobile handheld tool such as an advanced mobile phone (e.g. iPhone).

Finally, student ownership of mp3 players was also revealed in the literature. Several studies revealed a majority of students owned a portable mp3 player of some variety (Albarran et al., 2007; Ferguson et al., 2007; Frydenberg, 2006; McNaught et al., 2009; Salmon & Nie, 2008; Walls et al., 2010). In a study of U.S. college students, sixty-six percent of participants revealed

they possessed an iPod, while 15.2% indicated they owned another type of mp3 player (Danhauer et al., 2009). Additionally, most students (86%) in a 2008 study of Australian, Millennial undergraduates had unlimited access to mp3 players/iPods (Corrin et al., 2010).

Academic Advantages / Disadvantages

Streaming Audio and Online Music Databases

Along with technology usage, academic advantages and disadvantages were discussed in the literature. Researchers noted negative and positive aspects of streaming audio and online music databases. Mason and Wiercinski (2009) learned, in a study of music librarians in Canada, most were not utilizing in-house (non-commercial) music streaming because of matters of copyright, funding and time. Colvin (2010) noted some academic libraries do not have the funds for subscription-based music databases. One issue college instructors may have with subscription databases is the databases may not have certain recordings, which they normally use or prefer to use (Durman, 2009). Additionally, *Naxos* offers music performed by musicians with whom listeners may not be as familiar (Durman, 2009).

Subscription databases used in libraries in academia (*Naxos*, *Classical Music Library*, etc.) afford students the ability to access music recordings online as they prefer. A greater number of students utilize digital rather than physical reserves no matter where they have to access them (Griscom, 2003). For example, music history students, in a 2006 study at a U.S. university, indicated they were motivated to do more music listening when utilizing iPods for reserves rather than physical library copies (McMillan, 2008). Students' use of the *VARIATIONS* music database greatly exceeded the amount that they had ever utilized the standard reserve

system and physical copies (Dunn & Mayer, 1999). Some examples of available subscription-based databases utilized in higher education are provided in Table 3.

Table 3

Examples of Subscription-Based Databases in Higher Education

Classical Music Library	Subscription-based – mainly classical; subscription can include African American song & Global Sound (world music)	Anderies (2005); Durman (2009)
Naxos Music Library	Subscription-based – mainly classical; also folk, jazz & world	Anderies (2005); Durman (2009)
DRAM (Database of Recorded American Music)	Subscription-based – American; Preservation/ access of underutilized/ undervalued music – Music of America on New World Records label (jazz, opera, musicals, Native American, folk, etc.)	Anderies (2005); DRAM (2010)

Social Media

Social media was found to be beneficial to students for self-marketing, networking and the sharing of music. The Internet affords musicians who are not yet professionals the opportunity to self-market their music by placing it online (Haltmeier, 2009). Musicians can almost effortlessly convert their music to mp3s and upload them to the Internet for others to hear without the necessity of a record label or marketer (Harrower, 2005). Part of being a musician involves networking with like-minded musicians to learn and share, and the Internet affords this

networking (Salavuo, 2008a). For example, the social networking service, *MySpace*, affords musicians the ability of self-advocacy through the sharing of their music to a large audience (Margounakis & Politis, 2010). Additionally, a social networking site, *Funkdammen* - for Finnish musicians who spoke Swedish, also allowed members to share their musical compositions (Salavuo, 2008a).

Music Technologies

This review of literature revealed advantages related to music technologies including motivation. In a 2002 study of instructors and students (2nd thru 12th grade) in Hong Kong, the utilization of music technologies inspired enthusiasm in student participants towards their music studies (Ho, 2004). Additionally, Zhou, Percival, Wang, Wang, and Zhao (2010) revealed, in a study of Singaporean elementary students, the use of the MOGCLASS (Musical mObile Group for Classroom Learning And Study in Schools) MIDI based music learning application with iPod Touch devices stimulated students' desire to study music.

Audio recordings are advantageous, as they can be utilized to ascertain commonalities and differences between variant renditions of the same composition. McAnally (2007) agreed that it is often helpful to take one composition and contrast different recordings of it. A common listening exercise is contrasting one interpretation of a song with a different interpretation (different performer, conductor, etc.), and this can be accomplished by utilizing online databases (Anderies, 2005). For example, graduate music students, in a 2006 study of a Chinese university, utilized multimedia (digital audio/visual) to listen for similarities and differences between various musicians performing identical works (Ho, 2007a).

Other advantages were also illuminated in the literature. Brittin (2002) maintained audio recordings furnished with method books are beneficial for students, as the tempo and pitch remain constant throughout. The computer program Audacity, according to Sichivitsa (2007), can be utilized for rehearsing at a pace of the students' choosing, and students have the ability to save mp3 audio files of their rehearsals. The key signature and tempo of MIDI files can be altered via computer with music sequencers for rehearsal purposes (Kersten, 2004). Smartmusic software allows mp3 listeners to alter the tempo of pieces of music while utilizing it (Niermeier, 2010). Audio recordings can be utilized to allow visually impaired students to learn music by memory, as a large number are not proficient in reading Braille music (Siligo, 2005). Students' musical performances and warm-up exercises can also be recorded via computer (Niermeier, 2010). Finally, in a 2006 study of students in a music history class at a U.S. university, music course reserves on iPods were already together in one place (McMillan, 2008).

Non-advantageous elements related to music technologies exist as well. Haltmeier (2009) felt learning to utilize some music notation programs (e.g. Finale) was more trouble than it was worth because of the time it takes to learn to use them. Some negative aspects of utilizing school iPods for music listening were addressed by music history students, in a 2006 study at a U.S. university, such as apathy regarding setting aside time for listening caused by the effortless, continual access to their music listening pieces (McMillan, 2008). Additionally, the quality of digital audio is not always valued. Haltmeier felt some music software (e.g. Band-in-a-Box) utilized inauthentic sounding audio. Participants, in a 2006 study of graduate music students, did not value the sound quality of MIDI (Ho, 2007a). MIDI recordings do not display the human aspects of music such as expressiveness and musicality (Kersten, 2004; Niermeier, 2010).

Researchers illustrated the advantageous qualities of academic audio usage in the area of evaluations and assessments both by and of students. It is imperative that musicians are able to listen for precision while they are playing a piece (Thornton, 2008). In a study by Hewitt (2005), CDs were utilized to evaluate student performances. The recording of vocal rehearsals via Audacity affords instructors the ability of student evaluation (Sichivitsa, 2007).

Computer technologies also afford students the ability to practice or perform without fear of ridicule. Rehearsing improvisation with recordings via Computer Assisted Instruction (CAI) could eliminate angst related to performing improvisation for others (Niermeier, 2010). Additionally, rehearsing with computer programs such as Audacity provides students with an avenue for private vocal rehearsal in contrast to rehearsing before classmates with the potential of classmate critique (Sichivitsa, 2007).

Technology Difficulties

Technical obstacles may affect academic technological utilization. In a study of students at a U.S. university, participants noted faculty members had difficulties utilizing technology, which led to a diminished amount of time to use on class content and student dissatisfaction (Kyei-Blankson et al., 2009). Millennial, Australian middle/high school students in a 2006-7 study indicated technology usage was hampered in their music classrooms due to technology tools that were not always functional or accessible (Crawford, 2009). Faculty and students, in a 2009 study of U.S. community college students and faculty, noted a lack of skills and problems with equipment as elements impeding faculty member utilization of technology (Moseley, 2010). Problems can arise when aspects of the school's technologies are altered - affecting access to files (Connolly & Golderman, 2008). Additionally, according to Maddux and Johnson (2010),

technology utilization by university faculty members can be impeded by not being aware of alterations made to school software and/or hardware until they try to utilize the technology.

Cost and Effort

The costs and efforts required for utilization of various audio technology mediums was discussed in the literature. Durman (2009) noted colleges and universities can save funds meant for new copies of audio recordings that are no longer viable by utilizing subscription-based music databases that have these recordings. Streaming audio via iTunes is relatively effortless and inexpensive to use as a means for streaming audio in higher education (Thomason & Kamtman, 2007). The literature specifically addressed iTunes. According to Connolly (2005), digital music can be purchased via iTunes to take the place of physical copies that are no longer playable or to purchase music that is no longer in print.

The literature revealed other aspects of cost and effort relating to audio technology. The financial and skill requirements for making and copying digital audio files are rather minimal (Frydenberg, 2006). Inexpensive (or moderately priced) home recording equipment can now be utilized to create expert grade recordings, which in the past would have only been afforded by professionals with advanced recording tools (Haltmeier, 2009). Harrower (2005) noted software for home music production is now cost-efficient. Some costs related to digital audio access are not seen as inexpensive however. Libraries must allocate a large amount of funds for the initial startup needs (software, hardware, etc.) of streaming capabilities (Cox, 2005). Additionally, in a 2005 survey of Iowa higher education libraries, participants maintained they did not have the: (a) personnel, (b) assistance of the school information technology staff, (c) time, or (d) technological tools to stream audio recordings (Cox, 2005).

Inequitable Ownership

Finally, another disadvantage discussed in the literature was the fact computer access was also not universal. In a 2002 study of instructors and students in Hong Kong, results indicated music instructors had inadequate access to music technologies (including computers) (Ho, 2004). In a 2006-7 study of Australian middle/high schools, Crawford (2009) found music instructors experienced adverse perceptions (regarding music education and technology) from others and disparate and inferior access to technology (with computers in a mere 5% of the music classes studied) as compared to other instructors.

Perceptions

Another aspect of audio recordings usage found in the literature was perception. High usability was considered to be an asset in both computer applications and digital databases. According to Margounakis and Politis (2010) it is imperative that digital music libraries afford manageable utilization. Adams and Blandford (2002) revealed, in a study at a UK university, digital libraries' utilization is often inhibited (and decreased), because they are not always user-friendly. Additionally, subjects in a study of digital databases at a U.S. university indicated databases need to be found, accessed and negotiated by users with little effort (Dickson, 2008).

According to the literature, students and instructors felt there were other academic advantages related to the utilization of digital audio. Graduate music students, in a 2006 study of a Chinese university, believed listening via multimedia (digital audio/visual) allowed for better comprehension of musical concepts (including musical eras and styles) and music education subjects (such as composition, music analysis, music appreciation and music history) (Ho, 2007a). Most music instructors, in a 2002 study of instructors and students in Hong Kong

indicated students could benefit academically from the utilization of music technologies (Ho, 2004). Additionally, a 2006 study of students in a music history class at a U.S. university revealed students found the utilization of iPods for course listening assignments to be academically advantageous (McMillan, 2008).

Perceptions regarding other elements relating to digital audio technologies were also addressed in the literature. In a 2004 study of Millennial, Chinese middle school students, participants revealed the utilization of technology for music listening followed by singing, composition and music history were the most applicable roles for technology regarding their music education (Ho, 2007b). Instructors and students at two Canadian universities responded favorably to the heightened availability of digital music at their universities (Mason & Wiercinski, 2009). Finally, participants in a 2005 study of Iowa higher education libraries indicated instructors and students enjoyed the ability to access streaming audio, but instructors valued streaming audio only when there were no technical problems (Cox, 2005).

CHAPTER THREE: RESEARCH METHODOLOGY

Introduction

Chapter Three contains a description of the research methodology that was used in this study. This description includes the conceptual design, study design, purpose, research questions, design, population, researcher information, validity / verification, instrument information, data collection and analysis procedures, and limitations pertaining to this study.

Conceptual Framework

According to Maxwell (2013), in qualitative research the conceptual framework is the study's theory or theoretical framework. Maxwell noted a conceptual framework can be based on "everything from so-called grand theory, such as behaviorism, psychoanalysis, or rational choice theory, to specific, everyday explanations of a particular event or state" (p. 48). Additionally, Maxwell maintained this conceptual framework can come from "experiential knowledge," "other people's theories" (p. 48) and pilot studies. In the case of the current study, the conceptual framework resulted from a combination of: (a) the researcher's experience regarding the use of recordings in the classroom, (b) Frances Elliott Clark's beliefs regarding the benefits of recordings in the classroom and playback technology, and (c) the results of the researcher's pilot study (LoPresti, 2008) revealing issues related to the use of digital recordings in the classroom.

The foundation for this study was Frances Elliott Clark's belief in the benefits of using technology to play audio recordings in music education. Clark introduced great music works to students via her Victor talking machine, because she believed recordings could quickly illustrate more songs, composers, nationalities, and types of music than would normally be possible in a classroom with no recordings (Stoddard, 1968). Stoddard (1968) credited Frances E. Clark with

founding the idea of utilizing music recordings in the classroom. The evolution of music education was tremendously impacted by Frances Elliott Clark's innovations involving the use of recordings (Greene, 2008; Stoddard). In the quest for access to music for her students, Frances E. Clark believed in trying "any device or mechanical aid" (p. 24), which had promise (Cooke et al., 1960). Clark (1933) declared:

All things are being made over, adjusted to the new demands of life, new methods of living, new foods, new equipment for living the life that now is, new objectives, new books, new understandings, new policies and new standards. (p. 12)

Much of this can be said today when thinking of the impact the Internet has made on civilization.

Clark further stated:

Yes, the machine age is upon us _ *and it is a grand age*. We could not go back if we would. Education must indeed be "looking ahead" ... Music in Education as the livest subject in the whole curriculum must not only follow, but should lead the way. (p. 12)

Again, Clark could be speaking of the present, as today's music instructors must adjust their methods to the demands of a technological age where the machines are computers and other digital tools.

This conceptual framework was also the guide for analysis of the findings of the study. Researcher experience drove the development of the interview questions for the pilot study. Findings from the LoPresti (2008) pilot study regarding the need for more research on streamed digital audio recordings and Frances Elliott Clark's theory on the use of technology for playing

recordings in the classroom were utilized when developing the research questions for the current study. The pilot study emphasized instructor perceptions and usage while Mrs. Clark, as noted earlier, emphasized the use of current technology to play recordings in the classroom to benefit students

Purpose

The purpose of this qualitative multiple case study was to analyze music educators' perceptions of and usage of digital audio in higher education. Specifically, higher education music educators' usage and perceptions of digital audio e-reserves and digital databases were investigated. This research explained how and why these educators utilize (or do not utilize) streaming audio via e-reserves and databases. This research study was intentionally created to be broad in nature in order to obtain as many variant answers to questions as possible, because this study was meant to be the foundation upon which future studies can build.

Design of the Study

This study was based on information revealed during a pilot study conducted by the researcher, which involved the use of audio recordings and digital archives by music department faculty members (LoPresti, 2008). Results of this pilot study indicated there was a need for research pertaining to music department faculty perceptions of and usage of streaming audio. The research questions in this study are intentionally broad in order to obtain as much information as possible, as this study is meant to be the basis for future research, which can utilize the resulting information to create more focused questions.

Research Questions

Many options for obtaining and utilizing audio recordings are available to music educators. The selection of these options by music educators is often affected by their perceptions of these choices. Based on the options available and the importance of music educator perceptions, research questions were formulated. The research questions in this study are intentionally wide-ranging in order to obtain as much detailed information as possible, as this study is meant to be the basis for future research, which can utilize the resulting information to create more focused innate questions. The research questions that were analyzed in this study are:

1. How is streaming audio – in the form of e-reserves and subscription-based databases (*Naxos* and *Classical Music Library*) being utilized by college/university level educators at the two studied institutions?
2. What are the perceptions of the participating music department faculty members on the subject of streaming audio?
3. What factors, regarding the use of streaming audio, are considered by the participating instructors to be important?

Setting

The study utilized faculty members from the music departments of two Florida higher education institutions. Though the educational settings are both in Florida, they are vastly different. One institution is a large, public research university (Site 1) with over 50,000 students whereas the other is a small, private liberal arts college (Site 2) with less than 5,000 students, and

this diversity affords the researcher the opportunity to gather data from different types of institutions. Table 4 provides setting demographics for these two sites.

Table 4

Setting Demographics

	Total Enrollment Fall 2013	Music Students Percentage of Total Enrollment
Site 1	59,770 (Institutional Research/Institutional Knowledge Management, 2014, p. 1)	0.55% (Institutional Knowledge Management, 2013)
Site 2	3,153 (Office of Institutional Research, 2013)	4.76% (Office of Institutional Research, 2013)

According to the Carnegie Foundation for the Advancement of Teaching classifications (2014), Site 1 and Site 2 have similarities and differences in other areas as well. The Carnegie Foundation for the Advancement of Teaching classified both Site 1 and Site 2 as *high undergraduate* schools. While Site 1 is considered a *large*, public institution with the majority of students not living on campus, Site 2 is considered a *small*, non-profit private college with the majority of students living on campus (Carnegie Foundation for the Advancement of Teaching). Additionally, the Carnegie Foundation for the Advancement of Teaching classified Site 2, in regards to undergraduates, as being primarily an Arts & Sciences school, but Site 1 is primarily a

professions school. Finally, Site 1 has many doctoral students whereas Site 2 has only one doctoral program (Carnegie Foundation for the Advancement of Teaching).

Population

Two university/college music departments in Florida were chosen as the locations from which to get the sample for this research. The faculty at Site 1 consists of 40 total faculty members including 26 full-time faculty members and 14 part-time faculty members. Site 2 is much smaller but has 36 total faculty members (almost the same as Site 1); however, only seven of these are full-time while 29 are part-time faculty members.

Sample

Four faculty members from this population (two from each school - representing both full-time and adjunct faculty members) participated in this study. As Padgett (2008) noted, in qualitative studies, depth should be the emphasis in sample sizes as opposed to breadth. Additionally, Padgett maintained small samples are often utilized in multiple case studies. The sample was a purposive sample, as the researcher chose to study the feelings of music educators (on the topic of streaming audio) at local institutions. Additionally, one institution is a large, public research university whereas the other is a small, private liberal arts college, and this afforded the researcher the opportunity to gather data from different types of institutions.

Purposeful sampling, specifically maximum variation sampling, was deemed appropriate for this study. The study sample reflects maximum variation, as there are different types of instructors at two vastly different institutions. Additionally, the sample represented faculty members teaching both regular/core and applied/performance music classes. This distinction is important, as regular/core music instructors often teach in a vastly different manner than applied/

performance instructors. This study included four survey participants representing both full-time and adjunct faculty members - two from each school. Full-time and adjunct faculty members also should be considered separately, because part-time instructors may not always have all of the information full-time instructors possess. For example, they may not be present at faculty meetings discussing new technology, because adjunct instructors are often not required to attend faculty meetings.

Faculty members from both schools' music departments were recruited for this study via email, and emails were sent utilizing email addresses listed on the department websites and from any additional faculty lists provided by the departments. Participants were selected from those faculty members responding to the email and completing the survey. For this study, pseudonyms for the respondents will be utilized for purposes of clarity for the reader. The pseudonyms that will be used to refer to the participants from Site 1 are Andrew and Kevin. Andrew is an applied/performance instructor and is an adjunct (part-time) faculty member. Kevin is both a regular/core classroom teacher and an applied/performance instructor, and this participant is a full-time faculty member. Additionally, the pseudonyms that will be used to refer to the participants from Site 2 are Oliver and Samuel. Oliver is a part-time (adjunct) faculty member, and he teaches applied lessons. Samuel teaches both applied lessons and regular/core classroom courses, and this participant is a full-time professor.

Researcher

According to Glesne (2006), "in qualitative inquiry, the nature of relationships depends on at least two factors: the quality of your interactions to support your research – or rapport – and the quality of your self-awareness of the potential effects of self on your research – or

subjectivity” (p. 109). The following will include factors involving rapport, subjectivity (and the possible influences), subjective lenses and means for accounting for this researcher’s subjectivity.

Rapport

Glesne (2006) maintained, “You manage your appearance and behavior as a way to fit in” (p. 110). As a musician and music educator this researcher is already a part of (and *fits in*) the music education community in Florida, which was studied. Rapport was already established to a degree between the prospective study participants and this researcher. According to Glesne, “generally, people will talk more willingly about personal or sensitive issues once they know you” (p. 113). This researcher knows many of the music department faculty members at both of the studied institutions as teaching colleagues or from shared performance activities and/or past research. This researcher believes, therefore, that there is *sufficient trust*, which Glesne deems the goal of rapport.

Subjectivity

Glesne (2006) noted the importance of being aware of one’s subjective lenses, which are how one views or perceives situations. This researcher would call these subjective lenses, through which to view this topic, the researcher’s *music lens* and *technology lens*. The current researcher’s *music lens* includes personal views as both a music educator and a musician. There are certain ways in which this researcher is accustomed to accessing and utilizing music for both teaching and performance purposes. These may not be the same as other music educators. As for the current researcher’s *technology lens*, this researcher often uses technology for teaching and for personal rehearsals. This researcher utilizes technology for everything from editing scores

and audio recordings for students to locating music. The current researcher often goes straight to the Internet to search for new or obscure pieces of music, and this researcher expects students to become familiar with this method of searching for music, as well as being able to find physical copies of their music in places such as the library. The current researcher is aware that all music educators may not utilize technology to this degree.

Validity and Verification

Creswell (2003) stated the “researcher is [the] key instrument. The qualitative researchers collect data themselves through examining documents, observing behavior, or interviewing participants” (p. 175). Subjectivity reflection will help alleviate any bias, which may arise in the present study due to this fact. According to Glesne (2006), one’s subjectivity can be reflected on and monitored, and this is a method of verification to help validate findings. Throughout the data collection process, the researcher constantly monitored subjectivity via Glesne’s suggestion of a research journal. Not all of the researcher’s prospective participants were students of instructional technology, and it was possible they may not have utilized technology in their classroom. The researcher believes it is important to utilize technology to afford accessibility to many different kinds of music for students. This researcher also feels certain types of technology usage are beneficial for the music educator. The goal of this researcher, however, was to investigate the perceptions and usage of others without voicing personal beliefs and imposing personal perceptions and opinions on the data received. This researcher intended to ascertain the views of other music educators on this subject.

Data triangulation was utilized for purposes of validity, and Guion (2002) provided the following description of this type of triangulation: “Data triangulation involves the use of

different sources of data/information. A key strategy is to categorize each group or type of stakeholder for the program that you are evaluating” (p. 1). The stakeholders in this study are the different types of instructors. Additionally, Glesne (2006) maintained triangulation adds to the validity of the study. Glesne noted triangulation is both “the use of multiple data-collection methods” and “the incorporation of multiple kinds of data sources” (p. 36). This study included both an audio technology analysis and a survey, and both full-time and part-time as well as both classroom and studio faculty members were participants. Additionally, the audio technology analysis served to corroborate the participants’ survey responses.

Survey Instrument

The survey used for this study is located in Appendix D, and it contains 17 open-ended questions. The purpose of this survey was to determine faculty members’ perceptions of and usage of streaming audio and important factors noted by faculty members regarding streaming audio. The survey was developed for this study based on the researcher’s experience, and it was utilized in a pilot study (LoPresti, 2008). The survey questions were validated using pretesting according to Dillman’s (2007) four stages of pretesting: (a) “Stage 1: Review by Knowledgeable Colleagues and Analysts” (p. 140); (b) “Stage 2: Interviews to Evaluate Cognitive and Motivational Qualities” (p. 141); (c) “Stage 3: A Small Pilot Study” (p. 146); and (d) “Stage 4: A Final Check” (p. 147). Stage 1 resulted in the deletion of some questions and the addition of others. After Stage 2, a few words were changed for clarification. Stage 3 resulted in one question being added to the survey, and following Stage 4, no alterations were made.

Pilot Study

Stage 3 involved a pilot study (LoPresti, 2008), which had approval from the University of Central Florida's Institutional Review Board [IRB]. The participants in this study were faculty members in the music department at one of the schools to be studied in this dissertation, and, as Williams (2003) noted, it is advisable for participants in pilot studies to have characteristics corresponding to those participants in the actual study. The participants in the pilot study exemplified members of the two departments studied at present (LoPresti, 2008). One important difference is the music department, which was used in both studies, was housed in an old building during the pilot study, but the music department has since been provided with a new facility.

The results of this study revealed most of the eleven participants at this one school utilized streaming audio recordings in their classrooms / studios, and they found them very beneficial. The participants did mention, however, older and non-tech savvy faculty members may not want to utilize streaming audio, or they may need training to be able to use it. The participants also noted technical problems with playback equipment. Participants, when asked if they would have asked any other questions, made suggestions for survey questions in this pilot study. One question was added, as it was commonly suggested, and participants in the pilot study freely offered what their responses would have been had that question been asked.

Open-ended Questions Rationale

This study utilized open-ended questions. When studying specific topics lacking research findings, open-ended questions allow for many different answers (specific to the participants) and are, therefore, advantageous (Williams, 2003). Similarly, Dillman (2007) noted open-ended

questions are appropriate if the answer choices cannot be listed, because they are unknown to the researcher. Additionally, according to Patton (2002):

The truly open-ended question allows the person being interviewed to select from among that person's full repertoire of possible responses those that are most salient. Indeed, in qualitative inquiry one of the things the inquiry is trying to determine is what dimensions, themes, and images/ words people use among themselves to describe their feelings, thoughts, and experiences. (p. 354)

In the case of this study, this applies to the person taking the survey rather than being interviewed.

Survey Design

For the survey portion of this study, Dillman's (2007) Tailored Design, which affords instruction for the design, development and implementation of the survey instrument, was utilized. According to Dillman:

Tailored Design is the development of survey procedures that create respondent trust and perceptions of increased rewards and reduced costs for being a respondent, which take into account features of the survey situation and have as their goal the overall reduction of survey error. (p. 27)

Trust

For the *trust* element, Dillman (2007) listed "sponsorship by legitimate authority" and "make the task appear important" as two of the elements that can produce *trust* (p. 27). This study utilized the University of Central Florida as the *legitimate authority* as the researcher is enrolled at this university. Emails to participants who had not completed their survey and easy to

comprehend questions were utilized in this study, as these elements show import according to Dillman.

Rewards

Regarding the *rewards* element, Dillman (2007) listed several elements, which can be used including: (a) “show positive regard;” (b) “say thank you;” and (c) “make the questionnaire interesting” (p. 27). Surveys were addressed to the actual survey participants, as this served to *show positive regard* (Dillman). *Thank you’s* were sent to survey participants per Dillman’s recommendations. The schema of the survey included beginning questions, to gain the attention of those surveyed, and Dillman noted this as a method of having an *interesting* survey.

Reduced Costs

Finally, in relation to the *costs (social costs)* element, Dillman (2007) listed factors, which researchers can employ to lessen the *costs* such as: (a) “avoid embarrassment;” and (b) “avoid inconvenience” (p. 27). As per Dillman’s suggestions, asking questions, which are easy to comprehend, will eliminate *embarrassment*, and *inconvenience* will be lessened with email surveys, as they are easy to use.

This survey was developed using Dillman’s (2007) Tailored Design in anticipation of collecting good data. Dillman stated: “Tailored Design is a set of procedures for conducting successful self-administered surveys that produce both high quality information and high response rates” (p. 29). The aspects of Dillman’s “Principles for Writing Survey Questions” (p. 50) were utilized.

Data Collection

This study involved data collected via surveys and an audio technology analysis. Data was gathered during the Summer 2014 term, because this was the term when the researcher was available to conduct the study. There are normally fewer classes taught in both music departments, but the researcher addressed this by conducting an electronic survey, which could reach instructors whether or not they were on campus. Survey responses were received electronically via Qualtrics. Additionally, the audio technology analysis resulted in field notes that were used for analysis.

Survey

The survey was administered via Qualtrics (using email) to reach more potential participants, and this was also convenient for the participants. This was important, as musicians often travel and are not always at the university/college during the summer. One participant even noted that he was not in the country, and many potential members were known to be out of the country. According to Owens (2002) and Dillman (2007), surveys distributed online can allow researchers to contact participants worldwide. Additionally, Poole and Loomis (2010) noted surveys distributed via the Internet are becoming popular.

Surveys were distributed via email using Qualtrics to the four volunteer faculty members, both full-time and adjunct, selected from both institutions' music departments. Instructions, a deadline for completion and a copy of the consent form were included with the surveys. This completion deadline was necessary, as there was a limited amount of time to complete this study.

The survey participants (two faculty members from each schools' music department) were emailed on more than one occasion. Four of Dillman's (2007) five possible contact

instances were utilized (via email) in this study with two of the five combined: (a) advance notice of the survey; (b) the actual survey invite with cover letter; and (c) notes of thanks or a reminder to complete the survey *and* an additional survey link in the event the first was deleted. Contacting the survey participants was not an issue, as Dillman noted most higher education faculty members have email addresses and can access the Internet, and this is true of the participants for this study.

Survey responses were received electronically via Qualtrics. During analysis, names were changed to codes in order to insure anonymity. Coded responses were stored electronically, and the computer on which they were stored is password protected. After initial survey responses were received, five additional survey questions were sent to participants in the form of a follow-up survey. This was similar to what would occur if participants had been interviewed and follow-up questions were asked during the interview. These five follow-up questions were:

1. How are faculty members informed of the availability of streaming audio databases (*Naxos, Classical Music Library, etc.*) at your school?
2. What training have you received (or is available to you) regarding the use of these databases?
3. How would you describe the technology (audio players, computers, etc.) available to you for playing digital recordings (CD, streaming, etc.) in your classroom/studio? (ex. Ease of use, reliability, etc.)
4. If you utilize cellphones / smartphones (ex. iPhones, Androids) in your classroom/studio for audio recordings, in what capacity do you use them? (ex. Recording, playing saved recordings, *YouTube, etc.*)

5. What opinions (if any) have you heard from your students regarding the use of CDs or other digital audio recordings in your classroom/studio?

Audio Technology Analysis

An audio technology analysis was done in order to corroborate responses received from the survey. This audio technology analysis involved ascertaining the availability of audio recordings in digital format at each school, including any streaming audio that was available to faculty members, and any information advertising these available recordings or training available for the use of them was analyzed. Information relating to digital audio databases was collected from each school. This information was electronic in the form of documents, Webpages, Weblogs, etc. These documents were used as another method to verify findings from the surveys. Additionally, according to Glesne (2006), “documents corroborate your observations and interviews and thus make your findings more trustworthy” (p. 65). In this case, they were used to corroborate open-ended survey findings.

Data Analysis

Survey responses and audio technology analysis field notes were analyzed in this study. All field notes were transcribed in order to have them in electronic form for analysis. Surveys were coded using pseudonyms and participants were anonymous. Qualitative data from the survey questions was coded for emerging themes.

Data analysis consisted of thematic analysis via coding. According to Glesne (2006), “Within the sociological tradition, the most widely used means of data analysis is *thematic analysis*, a process that involves coding and then segregating the data by codes into data clumps for further analysis and description” (p. 147). During this analysis process, like ideas receive the

same code. This coding process occurred as data was received rather than just at the end of the study after all data has been collected. According to Creswell (2003), analysis of data in qualitative research “is an ongoing process involving continual reflection about the data, asking analytic questions, and writing memos throughout the study” (p. 184). Glesne maintained codes grouped together create themes, and as the thematic analysis progresses, frequency counts (based on the coding) will help reveal major themes.

All responses collected via Qualtrics were downloaded and converted to pdf files for organization purposes. All files containing survey responses and audio technology field notes were saved in the same computer folder. As responses were received, the researcher read and began preliminary coding as suggested by Glesne (2006). After all data was received, the researcher read all of the responses and field notes several times to gain an understanding of the results as a whole. The researcher then began the process of analyzing the data for patterns, and relating the responses and audio technology analysis findings to the research questions.

Thematic analysis for this study was completed to reveal major themes within the collected data, which corresponded to the research questions. Responses from all survey participants were coded based on how these responses related to the research questions, and similar or related responses received the same codes. Using Glesne’s (2006) process, similar codes were then grouped together to construct preliminary themes. Finally, a frequency count of the preliminary themes, which emerged from this grouping revealed the major themes from the survey data. The codes assigned during analysis and the resulting major themes are revealed in Table 5.

Table 5

Thematic Analysis Codes and Themes

	Requirements	Availability	Usage	Perceptions
	Theme	Theme	Theme	Theme
Codes	<ul style="list-style-type: none"> • Genres • Technology • Preference • Ease of use • Quality of recording 	<ul style="list-style-type: none"> • Digital audio - site library • Digital audio - department • Information about availability • Training 	<ul style="list-style-type: none"> • Digital audio media type • How audio • Why audio • Streaming audio usage 	<ul style="list-style-type: none"> • Perceptions on current use of streamed audio in education • Perceptions of future use of streamed audio in education / benefits

Limitations

According to Creswell (2003), “limitations identify potential weaknesses of a study” (p. 150). Creswell noted several types of limitations pertaining to documents. In regards to documents, Creswell listed “requires transcribing or optically scanning for computer entry” (p. 187), “materials may be incomplete,” and “the documents may not be authentic or accurate” as potential limitations. Transcribing and/or scanning documents was not seen as a problem, as the researcher had often transcribed and scanned documents. As far as the completeness, authenticity and accuracy of documents, the researcher analyzed documents with this in mind, as the researcher had no way of knowing if all documents were totally complete, authentic and

accurate. In an effort to account for this, information from self-reports (via the survey) were compared with the information in the documents for additional validation of the documents.

Glesne (2006) noted: “Part of demonstrating the trustworthiness of your data is to realize the limitations of your study. Your responsibility is to do the best that you can under certain circumstances. Discuss what documents, people, or places were unavailable to you” (p. 169). One possible limitation of this study was that the study was conducted during the summer when not all instructors teach a full load of classes, and instructors who are also performers often travel during the summer for overseas engagements (both performing and teaching). This did not affect this study, as faculty members representing both full-time and part-time (and core and studio) instructors volunteered to participate.

Summary

This qualitative study was designed to ascertain the usage and perceptions of streamed audio reserves and digital audio databases by higher education music educators. The participants were members of the music department faculties of two Florida higher education institutions. Data collected from the survey and audio technology analysis were analyzed to answer the study research questions. This chapter provided a description of this study’s research methodology. The conceptual review, purpose, research questions, design, population, researcher information, validity, procedures and limitations in relation to this study have been revealed. The remaining chapters will discuss the findings of this study.

CHAPTER FOUR: RESEARCH FINDINGS

The purpose of this qualitative multiple case study was to illuminate and analyze music educators' perceptions of and usage of digital audio in higher education. Specifically, higher education music educators' usage and perceptions of streaming digital audio e-reserves and digital databases were investigated. This research explained how and why these educators utilize (or do not utilize) digital audio in this manner. This study was based on information revealed during a pilot study conducted by the researcher, which involved the use of audio recordings and digital archives by music department faculty members (LoPresti, 2008). Results of this pilot study indicated there was a need for research pertaining to music department faculty perceptions of and usage of streaming audio. The research questions in this study are intentionally broad in order to obtain as much information as possible, as this study is meant to be the basis for future research, which can utilize the resulting information to create more focused questions.

To obtain this information, two Florida university/college music departments were used as the population for this study. A sample selected from the faculty of these two Florida university/college music departments (two participants from each school) was surveyed and an audio technology analysis was done. This chapter contains the findings from this qualitative research. These findings were the result of qualitative analysis on research based on these three research questions:

1. How is streaming audio – in the form of e-reserves and subscription-based databases (*Naxos* and *Classical Music Library*) being utilized by college/university level educators at the two studied institutions?

2. What are the perceptions of the participating music department faculty members on the subject of streaming audio?
3. What factors, regarding the use of streaming audio, are considered by the participating instructors to be important?

As this was a multiple case study, findings will be described for each case and cross-case findings will be described. Four themes emerged in both cases, and these themes were: (a) requirements, (b) availability, (c) usage, and (d) perceptions. Each of these themes will be discussed along with the manner in which they address the research questions.

Conceptual Framework Review

The foundation for this study was Frances Elliott Clark's belief in the benefits of using technology to play audio recordings in music education. Clark introduced great music works to students via her Victor talking machine, because she believed recordings could quickly illustrate more songs, composers, nationalities, and types of music than would normally be possible in a classroom with no recordings (Stoddard, 1968). Stoddard (1968) also credited Frances E. Clark with founding the idea of utilizing music recordings in the classroom. In the quest for access to music for her students, Frances E. Clark believed in trying "any device or mechanical aid" (p. 24), which had promise (Cooke et al., 1960).

Study Participants

Two university/college music departments in Florida were chosen as the locations from which to get the sample for this research. The faculty at Site 1 consists of 40 total faculty members including 26 full-time faculty members and 14 part-time faculty members. Site 2 is

much smaller but has 36 total faculty members (almost the same as Site 1); however, only seven of these are full-time while 29 are part-time faculty members.

Purposeful sampling, specifically maximum variation sampling, was deemed appropriate for this study. The study sample reflects maximum variation, as there are different types of instructors at two vastly different institutions. Additionally, the sample represented faculty members teaching both regular/core and applied/performance music classes. As Padgett (2008) noted, in qualitative studies, depth should be the emphasis in sample sizes as opposed to breadth. Additionally, Padgett maintained small samples are often utilized in multiple case studies. Patton (2002) went further, stating: “qualitative inquiry typically focuses in depth on relatively small samples, even single cases ($N=1$), selected *purposefully*” (p. 230).

This study included four participants representing both full-time and adjunct faculty members - two from each school. Faculty members from both schools’ music departments were recruited for this study via email. Emails were sent utilizing email addresses listed on the department websites and from any additional faculty lists provided by the departments. Participants were selected from those faculty members responding to the email and completing the survey.

Site 1 Aspects

Site 1 is a large, public research university with 59,770 students (Institutional Research/Institutional Knowledge Management, 2014, p. 1). During the Fall 2013 semester, women made up 54.92% of the population of Site 1 while men accounted for 45% of the total (Institutional Research/Institutional Knowledge Management, 2014, p. 1). The Carnegie Foundation for the Advancement of Teaching (2014) classified Site 1 as a *high undergraduate*

school and considered it a *large*, public institution with the majority of students not living on campus. Additionally, the Carnegie Foundation for the Advancement of Teaching classified Site 1, in regards to undergraduates, as being a *professions* school with many doctoral students.

Site 1 Population

The actual population for Site 1 was the faculty of the music department. Site 1's music students only made up 0.55% of the student body as of 2013 (Institutional Knowledge Management, 2013). The department of music faculty at Site 1 consists of 40 total faculty members including 26 full-time faculty members and 14 part-time faculty members.

Site 1 Sample

Emails were sent to all faculty members in the music department requesting participation, and those that participated were included in the study. The sample represented faculty members teaching both regular/core and applied/performance music classes. This study included two survey participants representing both full-time and part-time (adjunct) faculty members from Site 1.

Case 1a Characteristics

Survey Question 1 addressed the characteristics of the cases. Case 1a was a participating faculty member from Site 1 with over 20 years of teaching and performance experience. Case 1a will be referred to by the pseudonym Andrew for the purpose of a clearer narrative in this study. Andrew is an applied/performance instructor who teaches brass students. Andrew is also a part-time, adjunct faculty member at Site 1, and this participant falls into the 45-64 age bracket.

Case 1b Characteristics

Case 1b was also a faculty member with over 20 years of teaching and performance experience from Site 1, and this participant falls into the 45-65 age bracket. Kevin will be the pseudonym for Case 1b for the purpose of this study. Kevin is both a regular/core classroom teacher and an applied/performance instructor. In addition, Kevin is a full-time faculty member, and this participant teaches woodwind students and technique classes.

Site 2 Aspects

For the purposes of this study, a small, private liberal arts college was selected as Site 2. As of Fall 2013, the total undergraduate and graduate student enrollment at Site 2 was 3,153 (Office of Institutional Research, 2013). Similar to Site 1, there were more females (59%) than males (41%) at Site 2 during the Fall 2013 semester (Office of Institutional Research, 2013). The Carnegie Foundation for the Advancement of Teaching (2014) considered Site 2 to be a *high undergraduate* school and a *small*, non-profit private college with the majority of students living on campus. Additionally, the Carnegie Foundation for the Advancement of Teaching classified Site 2, in regards to undergraduates, as being primarily an Arts & Sciences school, and it had only one doctoral program.

Site 2 Population

The population for Site 2 was made up of the faculty in the school's music department. According to Fall 2013 school statistics, Site 2's music students accounted for 4.76% of the total enrollment (Office of Institutional Research, 2013). Additionally, though School B is much smaller than Site 1, it has 36 total faculty members (almost the same as Site 1); however, only seven of these are full-time while 29 are part-time faculty members.

Site 2 Sample

Emails were also sent to all faculty members in the music department at Site 2 requesting participation, and those that participated were included in the study. The sample consisted of two faculty members and represented those teaching (a) regular/core classes, (b) applied/performance music classes and (c) full-time and part-time (adjunct) faculty members.

Case 2a Characteristics

Case 2a was a faculty member in the music department with over 20 years of experience teaching and performing. For the purposes of this study, Oliver will be the pseudonym for Case 2a. Oliver is a part-time (adjunct) faculty member and teaches applied voice lessons. Oliver falls into the 65-Older age bracket.

Case 2b Characteristics

As in the three other cases, this department of music faculty member also had at least 20 years of teaching and performance experience. The pseudonym that will be used to refer to Case 2b for the purpose of this study is Samuel, and he falls into the 45-64 age bracket. Samuel teaches applied/performance vocal classes. Samuel is a full-time professor who also teaches various core subjects including music literature.

Survey Results

Themes, which emerged from the survey results are presented in this section, and the four themes are: (a) Requirements, (b) Availability, (c) Usage, and (d) Perceptions. These themes are revealed within the context of the research questions and background information. Some themes address more than one research question. Additionally, the survey questions pertaining to each section are noted. Question 16 and Question 17 of the survey received no comments. The order

in which this information will be addressed will be as follows: (a) Background information, (b) Question 1, (c) Question 2, and (d) Question 3. Table 6 illustrates the order of analysis presentation, and the table also identifies which themes address which research questions.

Table 6

Analysis Presentation Order

	Theme(s)
Background	Requirements Availability Usage
Research Question 1 How is streaming audio – in the form of e-reserves and subscription-based databases (<i>Naxos</i> and <i>Classical Music Library</i>) being utilized by college/university level educators at the two studied institutions?	Usage
Research Question 2 What are the perceptions of the participating music department faculty members on the subject of streaming audio?	Perceptions
Research Question 3 What factors, regarding the use of streaming audio, are considered by the participating instructors to be important?	Requirements

Background Information

The information in this section resulted from survey questions, which asked basic information such as genre requirements. This information is important as it may reveal why participants do or do not utilize streaming audio. The survey questions corresponding to these results are questions two through nine. Additionally, questions one through four from the follow-up survey are included in these results.

The first theme that emerged regarding background information was faculty member *requirements* regarding audio recordings for their studios/classrooms. This theme addressed Question 4 of the survey [What types/genres of music do you use in your classroom/studio? (ex. Classical, folk, tribal/ethnic, etc.)]. Andrew noted recordings of specific genres of music that were required to teach his applied, brass students including: (a) classical, (b) jazz, (c) funk, (d) swing, (e) bebop, and (f) Latin. The above list also indicates the order in which Andrew listed his required genres of music. Kevin did not provide a response to Question 4 of the survey, but he did note elsewhere that he required classical music in his studio and classroom. Both respondents from Site 2 noted that they required access to classical music recordings for their studios/classrooms.

Technology requirements were revealed and fell within this *requirements* theme. Andrew stated he utilized his own equipment: (a) MacBook Pro, (b) iPod, and (c) other personal playback devices. Conversely, Kevin appeared to utilize the school's equipment, which worked properly with the exception of "when you want to use multiple technologies, such as playing a recording while projecting the score." Additionally, Samuel made an observation about available technology at Site 2 stating there was "adequate equipment" and it was "fairly reliable." Oliver

did not supply a response to the question regarding available playback technology. These responses addressed Question 3 of the follow-up survey [How would you describe the technology (audio players, computers, etc.) available to you for playing digital recordings (CDs, streaming, etc.) in your classroom/studio? (ex. Ease of use, reliability, etc.)].

The second theme evident in this background information was the *availability* of the audio recordings needed for the participants' music studios/classrooms. Question 6 [To your knowledge, what types of digital audio recordings are available at your university?] and Question 7 [To your knowledge, what types of digital audio recordings are available in your department?] of the survey yielded responses for this section. Andrew maintained he had no need to utilize the digital audio recordings at his school, whether in the department or from the library, and, therefore, he was not aware of what recordings were available. Kevin, however, was aware of Site 1 having recordings in the library on CD and via an online database (*Classical Music Library*) that included genres such as classical and jazz. Kevin also stated Site 1 did not have a department music (audio recordings) library. Additionally, Kevin noted streaming was not done at the department level, while Andrew was unsure of the availability of streaming audio at the department level. Question 8 and Question 9 of the survey addressed streaming audio availability [To your knowledge, what types of streaming digital audio recordings are available at your university? / To your knowledge, what types of streaming digital audio recordings are available in your department?].

Information for streaming audio databases *available* via Site 1's library was an apparent factor within Theme 2, and this helped provide the background information regarding how information on these databases was disseminated and what training (if any) was received for the

use of these databases. Data about information dissemination was received from responses to Question 1 of the follow-up survey [How are faculty members informed of the availability of streaming audio databases (*Naxos*, *Classical Music Library*, etc.) at your school?]. Kevin illustrated how faculty members were informed of the availability of streaming audio databases when stating: “This is announced in a library bulletin, but not everyone sees it.” Andrew was unsure of how faculty members were informed, as he had never been informed of their availability. Neither participant had received training on the usage of streaming audio databases available at their school, nor did they know if any training was available. Kevin, however, did note: “They are not hard to use.” Information regarding training was received via responses to Question 2 of the follow-up survey [What training have you received (or is available to you) regarding the use of these databases?].

The audio technology analysis addressed participant exposure to available streaming audio and training for the use of this streaming audio. Site 1’s library notifies patrons on its blog when *Classical Music Library* updates its database (School A, January 24, 2014). Site 1 also lists various updates regarding *Classical Music Library* offerings on *Database News* within the library’s website and on their *Facebook* page (School A, June 6, 2013; November 20, 2013). No information regarding training on the use of this database was found.

Availability emerged as a theme prominent in the participants’ responses from Site 2 as well. Oliver was unsure of what types of digital audio recordings (streaming or otherwise) were available at Site 2, but he did mention their “recital hall is set up to record digitally all concert events.” Samuel stated Site 2’s library has a “large CD library” and “also subscribe[s] to *Naxos*, *Classical Music Library* and numerous opera and jazz sites.” Samuel did note, however, that no

training on the use of subscribed streaming audio databases was received or available (to his knowledge) from Site 2. Regarding the digital audio recordings available in the music department of Site 2, Samuel stated, “We have a large variety of recordings. We also offer classical, jazz, rock and world music classes and we have the appropriate materials (recordings) to support the curriculum.” The availability of streaming audio recordings at the department level was also mentioned, and Samuel listed “Websites, databases, mp3s, *YouTube*, and other sources” as streaming music recordings available at the department level.

The audio technology analysis in this study revealed background information pertaining to available streaming audio, and this was a part of the *availability* theme. Site 1’s music department website has a few streamed audio clips available for listening (School A, nd). Site 1 also subscribes to a streamed digital audio database. Site 1’s library website lists *Classical Music Library* as an electronic database containing audio recordings (School A, 2014). This database is subscription-based, and users must be on campus or logged in via password for off-campus access. When logged in, users can access 709,146 different music tracks (Alexander Street Press, 2014a). Additionally, listed on *Classical Music Library’s* search page are many genres including, among others, classical, folk, jazz and world music (Alexander Street Press, 2014b).

The audio technology analysis also revealed the presence of streaming audio at Site 2. Site 2’s music department website has a link to their library’s music resources page (School B, 2013). Site 2’s music database offerings are listed on its library’s website and include: (a) *Classical Music Library* (Alexander Street Press), (b) *Music Online* (Alexander Street Press), (c) *Naxos Music Library*, and (d) *Opera in Video* (School B, nd). The *Welcome* page for *Classical Music Library*, accessed via Site 2’s proxy login, states the database includes 252,928 different

pieces of music (Alexander Street Press, 2014d), and when accessing *Music Online*, another database by Alexander Street Press, users see 5,930,239 song tracks are available (Alexander Street Press, 2014c). The *Naxos Music Library* (2014) home page indicates users have access to 1,438,407 music tracks.

Music Online is actually a compilation of several databases to which Site 2 subscribes including: (a) *American Song*, (b) *Classical Music Library*, (c) *Opera in Video*, (d) *Jazz Music Library*, (e) *Popular Music Library*, (f) *Contemporary World Music*, and (g). *Smithsonian Global Sound for Libraries* (Alexander Street Press, 2014c). The *Naxos Music Library* (2014) genre selections to which Site 2 subscribes include, but are not limited to, classical, jazz, folk, blues, world, pop/rock, and Chinese.

It is stated on Site 2's library database Webpage that only five patrons can listen to music on *Naxos Music Library* at the same time, and only three patrons can utilize *Opera in Video* at one time (School B, nd). All music databases at Site 2 can be freely accessed on-campus, but they require proxy login for off-campus access. No training / help information for these databases was found on the library's website.

Usage of audio recordings also emerged as a prominent theme, and this theme involved background information. This information was received via responses from Question 3 of the survey [In what capacity do you utilize audio recordings in your classroom/studio?]. Both participants from Site 1 noted they used audio recordings in their studios/classrooms. Andrew noted his usage was "applicable to what's being taught." Kevin uses "*play-along* recordings" for some classes, while for others he uses recordings "to demonstrate a particular performer,

interpretation of a particular piece, etc.” Both participants at Site 1 maintained they use audio recordings on CD.

This *usage* theme was also evident in the responses from Site 2. Regarding the use of audio recordings in the music studio Oliver stated, “I urge every student to record and study his lessons, primarily for the purpose of listening to differences in the sound when different techniques are applied. I also urge students to use pre-recorded tracks as opposed to listening to *YouTube* or other recordings.” Samuel also had a strong opinion about using audio recordings in the classroom: “As musicians, we should always remember that we [are] predominantly an aural art form so using audio examples in class is very important.” Samuel noted he utilized audio recordings to expose students to a particular piece of music for “either the sake of a performance example or knowledge of the work.” These responses were replies to Question 2 of the survey [What are your thoughts about using audio recordings in your class?]

Media emerged as the next important aspect within the theme of *usage*, and both respondents from Site 2 utilized CDs. Question 5 of the survey addressed media usage [What types of audio recordings do you utilize in your classroom/studio? (ex. LP, CD, cassette, other digital)]. Oliver maintained he utilized smartphone recordings, and stated that smartphone recordings “seem to be universally available.” Samuel, however, does not utilize iPhones, because he “[doesn’t] like the compressed sound it creates.” This information about smartphones addressed Question 4 of the follow-up survey [If you utilize cellphones / smartphones (ex. iPhones, Androids) in your classroom/studio for audio recordings, in what capacity do you use them? (ex. Recording, playing saved recordings, *YouTube*, etc.)]. Cases 1a and 1b also indicated they did not utilize smartphones.

Research Question 1

Research Question 1 was: How is streaming audio – in the form of e-reserves and subscription-based databases (*Naxos* and *Classical Music Library*) being utilized by college/university level educators at the two studied institutions? Research Question 1 was addressed by Question 12 of the survey [If applicable, what types of streamed digital audio recordings do you use? (e-reserves, specific databases, etc.)].

Usage emerged as a prominent theme, and it addressed Research Question 1. Andrew stated he did not utilize any streamed audio recordings. Kevin, however, noted he has used this method of playback “for certain demonstrations in class and also as a recording resource for student homework assignments.” Samuel mentioned he utilized audio recordings found on the Internet as well. Additionally, while Oliver stated he did not use digital audio via either e-reserves or online databases, Samuel maintained he uses “anything that is available.”

Research Question 2

Research Question 2 was: What are the perceptions of the participating music department faculty members on the subject of streaming audio? Survey questions addressing Research Question 2 were Questions 10, 11, and 15. [Question 10 - What are your thoughts on utilizing streamed digital audio recordings for education purposes? / Question 11 - What are your thoughts on utilizing streamed digital audio recordings via e-reserves and/or subscription-based databases (ex. *Naxos*, *Classical Music Library*) for education purposes? / Question 15 - How do you think the use of digital audio reserves and digital audio databases will or will not affect music education?]

The participants' *perceptions* emerged as a major theme, and this addressed Research Question 2. Both Andrew and Kevin saw utilizing streamed digital audio recordings for education purposes, and specifically streamed recordings via subscriptions-based databases, as useful. Regarding how digital audio databases will affect music education, Kevin stated:

Streaming audio databases will serve to make more music available at the touch of a button. It will allow teachers to use a wider range of pieces, performers, etc. for their classes. It will allow teachers to be more spontaneous in class, because a recording can be called up through the streaming service immediately without depending on a physical CD prepared ahead of time.

Perceptions also emerged as a theme from Site 2. Oliver was “unaware as to the value” of utilizing streamed digital audio recordings for education purposes. Samuel, however, noted it was important to use streaming audio when *appropriate*. Oliver stated, “Students are encouraged to use such aids, but little information is given,” when asked his thoughts on utilizing streamed digital audio recordings via e-reserves and/or subscription-based databases such as *Naxos* and *Classical Music Library* for education purposes. Samuel labeled these same streamed digital audio recordings as “a great resource”.

Participants also had opinions regarding whether or not digital audio reserves and digital audio databases will or will not affect music education. Oliver stated they “most certainly will, but it is too soon to say how.” Samuel volunteered: “They [teachers] will continue to rely on recordings to facilitate our student’s education.” He also noted his students “think of CDs as antiques.”

Research Question 3

Research Question 3 was: What factors, regarding the use of streaming audio, are considered by the participating instructors to be important? Survey questions, which addressed Research Question 3 were Survey Question 13 [What factors are important to you when deciding whether or not to utilize digital audio?] and Survey Question 14 [What factors are important to you when deciding whether or not to utilize streamed digital audio?].

The *requirements* theme also emerged when participants addressed factors important when choosing to use digital audio, and this addressed the fourth research question. Kevin listed the factors he felt were important when deciding whether or not to use streaming and other digital audio. These factors were (exactly as he notated them): “1. availability of required technology 2. piece availability 3. preferred artist 4. ease of use.” Andrew, however, was unsure of what factors were important.

The participants from Site 2 also mentioned factors that they consider important when deciding whether or not to utilize digital audio, and these factors addressed Research Question 3. Oliver listed the “quality and accuracy of classical performances” and the “authenticity of Music Theater versions” as important factors to him. Samuel stated piece availability and “preferred performance” were most important to him. While Oliver was not sure what factors were important concerning streamed digital music use, Samuel revealed piece availability and “preferred performance” were also important to him when considering the use of streamed recordings.

Conclusion

The purpose of this study was to illuminate and analyze music educators' perceptions of and usage of streaming digital audio e-reserves and digital databases in higher education. This study utilized faculty members of two Florida university/college music departments as the sample. The participants were surveyed and audio technology was reviewed. This chapter presented the results of this study via a thematic analysis narrative revealing the participants' responses. Four themes were identified as having emerged from this research, and they were presented along with the research questions. Chapter 5 presents an interpretation of these results and recommendations for future studies.

CHAPTER FIVE: INTERPRETATIONS AND RECOMMENDATIONS

Chapter 4 contained the findings from this research study presented within the context of the research questions. Chapter Five reveals interpretations and recommendations for future studies based on the findings of this research. In this chapter, interpretations are presented based on the themes found during the analysis phase of this study. Findings are related to the study research questions and conceptual framework. This is followed by recommendations for future studies.

This research study was intentionally created to be broad in nature in order to obtain as many variant answers to questions as possible, because this study was meant to be the foundation upon which future studies can build. This foundation study utilized broad, open-ended questions, because when studying perceptions, it is beneficial to use open-ended questions in initial studies (Schuman & Presser, 1996). The findings from the thematic analysis of the current study will allow for the creation of more focused questions for future studies.

The purpose of this qualitative multiple case study was to illuminate and analyze music educators' perceptions and usage of digital audio in higher education. Specifically, higher education music educators' usage and perceptions of digital audio e-reserves and digital databases were investigated. This research explained how and why these educators utilize (or do not utilize) streaming audio via e-reserves and databases. The following three questions were used to guide this study:

1. How is streaming audio – in the form of e-reserves and subscription-based databases (*Naxos* and *Classical Music Library*) being utilized by college/university level educators at the two studied institutions?

2. What are the perceptions of the participating music department faculty members on the subject of streaming audio?
3. What factors, regarding the use of streaming audio, are considered by the participating instructors to be important?

Interpretation of Thematic Analysis

This section is an in-depth interpretation of the thematic analysis of this study in relation to the research questions and Frances Elliott Clark's concept of the usage of audio recordings in the music classroom. The order in which the analysis will be presented is: (a) Background, (b) Question 1 (streaming use), (c) Question 2 (perceptions) and (d) Question 3 (factors). Presenting the background issues first makes it easier to understand the findings related to the actual use and perceptions of streaming audio.

Before presenting the interpretations, however, findings related to age, studio / core and full-time / part-time regarding the faculty member participants should be addressed. Age did not appear to be a factor affecting whether or not these faculty members utilized streaming audio recordings. All of the participants were older than 45 years of age, but their usage varied. Regarding whether they taught applied / studio lessons or core classes, any possible differences cannot be determined, because the full-time faculty members did not differentiate between how audio is utilized in their classrooms as opposed to their studios. Additionally, full-time faculty member participants appeared to know more about the audio recording holdings at their schools. This could be because they are on campus more often than part-time faculty members and may be provided more information about available resources, but this is only speculation. Finally, for

the most part, the full-time faculty members provided more thorough responses than the part-time participants.

Background

This section reveals information crucial to the understanding of the respondents' use of audio. The first important theme included in the background information involved the *availability* of audio recordings needed for use in the respondents' classrooms / studios. Two out of the four respondents (one from each site) did not know what digital audio recordings were available at their school. One of these two respondents did not know what digital audio recordings were available in his department either, but this respondent (from Site 1) did note that he utilized his own music library and had no reason to look for music at his school. The remaining two respondents stated their school libraries both had substantial audio CD collections including jazz and classical music. One of these respondents specified *opera* as a genre included in the classical holdings at his university's library. Essentially, half of the respondents did not even know what resources were available to them. This lack of knowledge suggests the need for more information to be provided to faculty members on what music resources are available at their school.

Regarding digital audio holdings within their departments, only one respondent indicated his department (Site 2) had digital audio recordings, and these digital recordings included genres such as jazz, classical, world, and rock. The audio technology analysis verified these holdings. The researcher found Site 2 has a fairly large audio CD collection in the music department with most of these recordings being classical, but many other genres are also represented. One of Site 1's respondents indicated their department had no digital audio recordings. Additionally, one

respondent from Site 2 did not know of any available department recordings, but he did note their recital hall has digital recording capabilities for musical events. Respondents listed various mediums regarding their audio recordings, but all of the respondents revealed they utilized CD audio recordings when teaching. Availability appears to be an issue, as one respondent from Site 2 has access to department recordings but did not know this, and the two respondents from Site 1 have no access to department recordings.

Information regarding availability is important, because if instructors do not have access to music recordings, or know they have this access, then they cannot use said recordings. There could be many reasons for Site 1's lack of audio recordings at the department level such as: (a) the department could have no space for physical recordings and relies on the library for audio recordings; (b) the department may not have the funds for department holdings since their student population is a small percent of the school population; or (c) the department assumes faculty members have their own audio libraries. In this researcher's experience, faculty members are often expected to have their own personal audio library just as faculty members and students are expected to purchase their personal sheet music for their library. Additionally, all of the respondents noted they utilized CDs so it is possible (as one of the respondents mentioned) these instructors are not even looking for other options such as streamed recordings. If they have a personal audio recording library, they have no reason to look for recordings unless they need a piece they have never used before. In this case, this researcher's experience is faculty members often first ask colleagues if they have a copy of the piece they can borrow, or they often just purchase a copy if they normally use CDs in their classrooms and know they will need the piece again in the future.

The next important theme relating to background information was *usage* of audio recordings in the classroom / studio. The use of audio in general needs to be addressed, because it reveals the importance of having access to audio recordings. One hundred percent of the respondents stated they utilized audio recordings in their classrooms / studios to some degree. One respondent from Site 2 stated, “I urge every student to record and study his lessons, primarily for the purpose of listening to differences in the sound when different techniques are applied. I also urge students to use pre-recorded tracks as opposed to listening to *YouTube* or other recordings.” The other Site 2 respondent also illustrated the importance of audio recordings in the classroom / studio stating, “As musicians, we should always remember that we [are] predominantly an aural art form so using audio examples in class is very important.”

Respondents listed various usages for these audio recordings in their classrooms / studios. One respondent from Site 1 utilizes audio when it is “applicable to what’s being taught,” and the other respondent uses “play-along recordings.” One of the respondents from Site 2 stated he utilized audio recordings to give an example with a particular performance of a piece or to provide students with “knowledge of the work.” In this researcher’s experience, there are rarely days when audio recordings are not utilized in music classes. As an educator, the researcher is aware there are many aspects of music education, for example, musicality or tone quality, which cannot be properly taught or understood any other way.

Streaming digital audio holdings were discussed as well. Half of the respondents (one from each school) stated their schools subscribed to *Classical Music Library*, and the respondent from Site 2 also noted his school subscribed to *Naxos Music Library* as well as other jazz and opera databases. Both of the remaining respondents were unaware of any streaming audio

available at their school library or in their department. This lack of knowledge of the available streaming audio is a problem, because if the instructors do not know if streaming audio is available at their school, then they will obviously not be able to utilize these audio recordings. Instructors essentially do not have this streaming audio resource, because they are unaware of it. Once again, this lack of awareness shows the need for more promotion of available music resources by either the music departments or the libraries. Training in technology integration can also lead to awareness of resources, and this was revealed in a study of the utilization of an instructional model called the TIME model (Mitchell & Gunter, 2004). Additionally, in a study of U.S. university, education students, future educators discovered available technological resources (of which they were not previously aware) during training (Marks, 2009).

The audio technology analysis revealed the presence of the above-mentioned databases as well as others, and this illustrates instructors actually *do* have access to streamed audio at their schools. It was confirmed that both schools subscribe to *Classical Music Library*, which can be accessed either on-campus or via password login off-campus (School A, 2014; School B, nd). During analysis, Site 2 was found to subscribe to both *Music Online* and *Naxos Music Library* (School B, nd). *Music Online* is a compilation of several databases including: (a) *American Song*, (b) *Classical Music Library*, (c) *Opera in Video*, (d) *Jazz Music Library*, (e) *Popular Music Library*, (f) *Contemporary World Music*, and (g) *Smithsonian Global Sound for Libraries* (Alexander Street Press, 2014c).

According to the websites of these subscribed databases, each school's subscription allows access to a vast amount of digital audio music. According to the main website page seen when users from Site 1 log in to *Classical Music Library*, they are able to access 709,146

different music tracks (Alexander Street Press, 2014a). When users from Site 2 access *Music Online*, they are able to listen to any of the 5,930,239 song tracks available (Alexander Street Press, 2014c). Site 2 listeners have access to an additional 1,438,407 music tracks via the school's *Naxos Music Library* (2014) subscription.

At Site 2, however, the library's database webpage states that only five patrons can listen to music on *Naxos Music Library* at the same time, and only three patrons can utilize *Opera in Video* at one time (School B, nd). The above information reveals instructors at the two studied schools do have access, but access limitations such as those mentioned for *Naxos* and *Opera in Video* may deter instructors from using these resources. Site 2, which has the stated limitations, has small class sizes, however, so this limitation may not be an issue. Millions of songs are available from these databases. This resource is being wasted if it is unknown. These streaming tools afford free access, and this would definitely save instructors and their students money that would have been spent on recordings.

Access was also addressed at the department level. Regarding streaming audio available in their department, one of Site 1's respondents maintained his department had no such recordings. The respondent from Site 2 mentioned mp3s, *YouTube* recordings, and "other sources" as examples of available recordings. A comparison of the audio technology analysis and the respondents' reports revealed some conflicting information. The audio technology analysis revealed Site 1's music department website *does* have digital audio recordings, which can be streamed by listeners (School A, nd).

Again, even though these digital audio recordings are available, if instructors (for example, the instructor from Site 1) do not know this, then they are unable to use these

recordings. It is possible the faculty members do not know these resources are available, because information is compartmentalized. In this researcher's experience, each department within a music department is often a separate entity, and information is disseminated within departments. Departments are even listed separately on the department website. For example, brass professors communicate with brass professors, and voice professors communicate with voice professors. This results in departments not being aware of what other departments are doing. The string professors, for example, may not know what audio files the band instructors are uploading to the department website.

Announcements could be made regarding the availability of streaming audio resources at each school in a manner that would reach the entire faculty, for example, in emails or at staff meetings. Email is an important means of communication, because faculty meetings where the total faculty is present are not often held in these schools' music departments. As an example, Site 2 only has part-time faculty members meet once per year, and this meeting is not mandatory. This leads to the possibility of information not being disseminated to those faculty members not attending the meeting.

Information about available streaming audio databases and training on these databases was an important factor within the *availability* theme. Only three of the respondents (two from Site 1 and one from Site 2) responded to questions concerning these two factors. Regarding how faculty members were informed of the availability of streaming audio databases, only one respondent (from Site 1) identified how they were informed. He noted his school's library gave information on the availability of *Classical Music Library*, but he also stated, "Not everyone sees

it.” Findings from the audio technology analysis appear to confirm this statement, as users would need to search the library’s website in order to discover the information.

The audio technology analysis did reveal Site 1’s library provided patrons with information on *Classical Music Library*, and this was done via: (a) the library’s blog, (b) the library’s *Facebook* page, and (c) the *Database News* page on the library website (School A, June 6, 2013; November 20, 2013; January 24, 2014). Both school’s libraries have listings for the music databases to which they subscribe. The electronic database listing for Site 1’s library includes *Classical Music Library* (School A, 2014). The library’s list of music databases available at Site 2 includes both *Classical Music Library* (via *Music Online*) and *Naxos Music Library* (School B, nd). In addition, Site 2’s music department website has a link to their library’s music resources page, which lists available databases (School B, 2013).

The problem is these methods of communication are obviously not adequate for faculty members, because if they were, faculty members would all know about available audio resources on their campuses. Even with this information available, some instructors were still not aware of the available resources. This lack of awareness also illustrates the need for more information to be provided to instructors. Additionally, the faculty participants in this study did not appear to use the resources at their libraries often, therefore, they would likely not notice any information on their libraries’ blogs, etc.

Faculty training on library resources (in addition to the email and faculty meeting notices mentioned above) could be an avenue of dissemination for information on library streaming audio resources. Information on available resources needs to be distributed within the music department through different avenues, or the information will likely not be seen. It has been this

researcher's experience that music educators have little time to search for new resources. Music educators often have rehearsals with students, personal performance jobs and personal rehearsal times in addition to their teaching obligations. This means music professors usually look for music in ways that have worked for them in the past or that are suggested by colleagues. This researcher believes if databases are suggested by faculty members, other faculty members will then utilize (or at least try) these resources.

Regarding training on these databases, participants' responses mirrored the findings from the audio technology analysis. None of the respondents received any training (or knew of any available training) on the use of the databases, however, one respondent (from Site 1) maintained, "They are not hard to use." During document analysis, no training information was found on either school's department or library website, which confirmed the respondents' responses. The databases may not actually require training to use them, but based on the results of this study, instructors may benefit from the increased awareness that training sessions would provide. In this researcher's opinion, there should actually be a training session on technology integration. This could be in conjunction with faculty meetings, and this would limit the time away from already busy schedules. The best time for this would be before the Fall term (and band camp if applicable) starts, because summer obligations would likely be over, and classes and rehearsals would not yet be started for the new school year. Additionally, music educators would be familiar with how to integrate these streaming databases before they make instructional plans for the entire term.

The way in which these respondents became aware of digital audio databases available at their schools and what training they received is important information to know. Adams and

Blandford (2002) revealed, in a study at a UK university, digital libraries' utilization is often inhibited (and decreased), because they are not always user-friendly. Additionally, subjects in a study of digital databases at a U.S. university indicated databases need to be found, accessed and negotiated by users with little effort (Dickson, 2008). The fact no training was apparent was cause for concern that was only somewhat alleviated by one of the current study's respondent's statement that the databases are "not hard to use." Additionally, only one respondent in the current study indicated how they learned of the available digital audio databases, but the audio technology analysis revealed sources showing the availability of such databases at both schools.

Interestingly, Site 2 - the smaller institution, actually has more streaming music resources (and appears to have more total music recording resources) than the much larger Site 1. At first glance, this may seem unusual; however, this may not be the case here. As was mentioned earlier, Site 2 is predominantly an Arts & Sciences school while Site 1 is predominantly a Research school (Carnegie Foundation for the Advancement of Teaching, 2014). Additionally, according to enrollment counts at both institutions, Site 2's music students account for a larger portion of the total student population than do those of Site 1 (Institutional Knowledge Management, 2013; Office of Institutional Research, 2013). With this in mind, the fact Site 2 has more streaming audio resources (and seems to have more total audio recording resources) for their music department than Site 1 does not appear to be out of the ordinary.

Streaming Audio Utilization – Research Question 1

This section addresses the information revealed during thematic analysis regarding Research Question 1 - How is streaming audio – in the form of e-reserves and subscription-based databases (*Naxos* and *Classical Music Library*) being utilized by college/university level

educators at the two studied institutions? One respondent from each school indicated they utilized streamed music recordings in their classrooms / studios. Streaming audio was utilized for course listening assignments and classroom examples / models. Fifty percent of the respondents (one from each school) maintained they did not utilize streamed audio in their studios / classrooms. One respondent from Site 1 indicated he utilized digital recordings (streaming and otherwise) to “demonstrate a particular performer, interpretation of a particular piece, etc.” One of the respondents from Site 2 stated he utilized audio recordings to give an example with a particular performance of a piece or to provide students with “knowledge of the work.” Additionally, one respondent from Site 2 also indicated the use of “smartphone recordings,” but the other Site 2 respondent insisted he did not utilize iPhones stating: “I don’t like the compressed sound [they] create.”

Again, half of the respondents (one from each school) maintained they did not utilize streaming audio in their classrooms / studios, and according to the literature, this is not uncommon among instructors. Wong (2005) found instructors in Hong Kong did not always take advantage of tools such as digital audio resources accessible via the Internet. According to Wong, faculty members in higher education have not accepted the benefits of digital technology (including via computer) integration and therefore make little use of it in listening classes. Instructors’ lack of digital audio utilization (via the Internet) for listening was also attributed to their lack of technical confidence (Wong). Echoing this finding, in a 2006-7 study, an Australian music instructor identified fear as the reason for instructors’ lack of technology adoption (Crawford, 2009).

Based on the results of this study, fear or a lack of confidence do not appear to be factors in these instructors' lack of utilization of streaming audio, as none of them mentioned either issue. The more likely reason seems to be either they do not know they have the option to use this type of audio recording at their school, or they simply prefer to utilize recordings as they have in the past. As was stated before, some of the participants in this study did not even realize they had access to streaming audio at their schools. As far as preferring their present forms of audio recordings, this was inferred in the respondents' responses, for example, when Andrew (one of Site 1's respondents) noted he already had the recordings he required and, therefore, did not need to look to the library or other school resources for additional music recordings. Additionally, Gunter & Gunter (2015) named a "basic resistance to change by many educators" (p. 217) as one of the main barriers regarding the integration of technology in education.

It is possible, however, the respondents could have poor technical skills or a lack of confidence, but they did not want to mention this in their responses during this study. According to Tourangaeu and Bradburn (2010), some study participants provide responses that are different from what they actually believe "presumably because they don't want to embarrass themselves" (pg. 339). The current study's method of data collection via computer should have eliminated much of the potential for this, because one of the "most practical methods for reducing editing of the answers [is] self-administration of the questions (including both paper self-administration and administration of the questions directly to the respondents via computer)" (Tourangaeu & Bradburn, p. 339). Additionally, this researcher's experience has revealed music professors give forthright answers when asked questions about issues that affect the quality of their music and/or

their teaching, and questions regarding their use of audio recordings would definitely be seen as asking about issues that affect their music and/or teaching.

Perceptions – Research Question 2

Perceptions were the elements forming the theme from this research that addressed Research Question 2 - What are the perceptions of the participating music department faculty members on the subject of streaming audio? Seventy-five percent of the respondents felt the utilization of streamed digital audio recordings (via e-reserves, subscription databases or other sources) for educational purposes was useful. The remaining respondent (from Site 2) was “unaware as to the value of this.” One respondent did mention, however, that it was imperative educators utilized these tools when *appropriate*. All of the respondents believed the use of streamed digital audio in the form of e-reserves and databases *will* have a positive effect on music education. This result indicates there is a possibility that if respondents had actually utilized streaming audio they may have found it valuable for current use. The lone respondent not finding streamed audio recordings useful at present had confusing responses. This respondent did not know the value of utilizing streamed audio; however, he believed it would be valuable in the future. It is possible that he did not know the value of streamed audio, because he did not use streamed audio – because he did not know it was an available option for him.

Respondents finding this form of audio recordings useful labeled streamed digital audio with such descriptors as “a great resource” and “a valuable resource.” One respondent from Site 1 stated:

Streaming audio databases will serve to make more music available at the touch of a button. It will allow teachers to use a wider range of pieces, performers, etc. for their

classes. It will allow teachers to be more spontaneous in class, because a recording can be called up through the streaming service immediately without depending on a physical CD prepared ahead of time.

Additionally, regarding streamed digital audio, a respondent from Site 2 stated, “[teachers] will continue to rely on recordings to facilitate our student’s education.” This leads one to believe these participants are more apt to use streamed digital audio, because they believe it is useful. As a music educator, this researcher believes any resource that allows convenient access to more quality music is very beneficial. This access saves time, and it allows for the introduction of more music examples for students. This exposure is critical, especially for beginning music students who may have had limited previous exposure to different composers, conductors, types of music, etc.

The literature revealed studies in which others perceived streamed digital audio in a positive manner. Instructors and students at two Canadian universities responded favorably to the heightened availability of digital music at their universities via streaming (Mason & Wiercinski, 2009). Additionally, participants in a 2005 study of Iowa higher education libraries indicated instructors and students enjoyed the ability to access streaming audio (Cox, 2005).

Perception is an important aspect when deciphering technology adoption. As noted above, one respondent did not see the value of using streamed audio even though he felt it *would* positively impact music education. The literature revealed *value* as being relevant to adoption, and adoption of new technology in music education has been a topic for many years. Dent (1947) felt teachers would not be apt to adopt one of the new (in the 1940s) forms of music recording and playback, because they were comfortable with and confident in the utilization of

phonographs. Wong (2005) echoed this when commenting that teachers often utilize outmoded playback equipment simply because they are accustomed to using it. Additionally, educators who do not recognize the value of technology integration may not wish to utilize technology, because it forces them to incorporate different teaching methods than those with which they are comfortable (Bauer, Reese & McAllister, 2003). Finally, Moseley (2010) noted, faculty members integrate technology, which they feel is beneficial. This emphasizes the above notion that the participants in this study are more apt to utilize streamed audio if they believe it is useful.

Another reason for a lack of use of technology related to *perception* was illustrated in the literature. Durman (2009) named “underutilization by faculty” (p. 114) as an issue surrounding subscription databases and maintained, without proof that they are advantageous and/or better than the method they are currently employing for listening exercises, college instructors will not automatically start using subscription databases. Additionally, in order for technology to be integrated in any class, instructors must have a desire to do so, and they must often take the initiative to do it on their own (Keengwe et al., 2009). Finally, Durman noted music faculty members would likely adopt subscription-based music databases if they understood how convenient they would be for them in terms of finding the music they need/want (and that students can access) for listening exercises at any time or place. This applies to participants in this study, because the results of this study suggest the participants may be motivated to use streaming audio if they: (a) knew it was available and (b) knew of its benefits. The respondents lack the needed proof that streaming audio resources are useful. The participants in this study may also not want to utilize it, because (as their responses indicated) they already have the

necessary audio resources. Additionally, they need a reason to desire to use streaming audio resources, and this reason could be the convenience of such resources.

One respondent from Site 2 noted his students believe CDs are “antiques.” This revelation is important, as all respondents noted they utilized CDs in their classrooms / studios. Millennials expect teachers to utilize technology (Haltmeier, 2009). According to Mason and Wiercinski (2009), digital reserves for course listening assignments are more relevant today than the antiquated practice of utilizing physical audio recordings for course music reserves. Additionally, a greater number of students utilize digital rather than physical reserves no matter where they have to access them (Griscom, 2003). For example, students’ use of the *VARIATIONS* music database greatly exceeded the amount that they had ever utilized the standard reserve system and physical copies (Dunn & Mayer, 1999). The results of the present study suggest the participants are not utilizing the most relevant and preferred means of accessing audio recordings. This researcher believes this can lead to not only a lack of music available to the professors, but also, to a lack of enthusiasm or engagement on the part of their students. Students often have little patience when it comes to waiting for a certain part of a CD to be found for listening, and if they lose interest, the instructor has lost a teaching moment.

Factors Important to Instructors – Research Question 3

This study’s thematic analysis revealed answers to Research Question 3, which was: What factors, regarding the use of streaming audio, are considered by the participating instructors to be important? This section presents results including factors for audio usage in general along with factors regarding the use of streaming audio. This is important, because some factors were named by participants as factors important for all audio recordings in general.

Requirements was a theme that emerged in all four cases, and these included genre requirements. Though genre was not specifically mentioned by faculty members as a factor affecting usage, it was noted specific pieces were required to be available, and these selections may not be available if the required genre is not offered in the available databases. Respondents named several music genres of which they required recordings when teaching in their classrooms / studios. These genres were: (a) classical, (b) jazz, (c) funk, (d) swing, (e) bebop, (f) Latin, and (g) musical theatre. *Classical* was listed as a required genre by all of those listing a genre (three of the four respondents). This illustrates the demand for audio recordings reflecting varying music genres in the classrooms / studios at these two music departments. This demand for genres is important, because it reveals to which types of genres the participants need access. Thus, one can infer professors will only use resources that offer their required genres, and this has been the experience of this researcher. If music educators are not positive the genre they need is located in a particular resource, they will not waste time looking there – even if this means missing other quality pieces available from that resource.

Besides having access to many song tracks, instructors also have access to various genres via these electronic databases. Users from Site 1 have access to many genres of music via *Classical Music Library* including, among others, classical, folk, jazz and world music (Alexander Street Press, 2014b). Site 2 affords access to many genres via these music database subscriptions as well. Site 2 offers its users access to genres such as classical, jazz, folk, blues, world, pop/rock, and Chinese via their subscription to *Naxos Music Library* (2014). Upon accessing the *Music Online* database, listeners from Site 2 can access such genres as classical (including opera), pop, world and jazz music (Alexander Street Press, 2014c). Additionally, all

of the *required* genres mentioned by respondents at both schools are represented within these databases. This available access could be utilized by professors, particularly if the music they required was available on these databases, and access limitations did not deter the use of these resources. This researcher has found these databases invaluable when teaching. Music pieces can be easily accessed to provide students with examples, and lesson time is barely interrupted to do so. This is really important, especially when instructors have limited time with students each week, but they still have to cover a great deal of information.

The respondents noted they also required equipment for playing this music, and the findings revealed respondents utilized the school's equipment and/or their own equipment. Examples of personal equipment being used were a MacBook Pro, an iPod and a smartphone. According to responses, the equipment available at these schools was sufficient but not always perfect. Respondents noted playback equipment at times did not function properly when combined with other technology. Available technology was also described with such adjectives as *adequate* and *fairly reliable*. Instructors must have reliable methods of playback in order to teach their music classes. If instructors cannot rely on or do not have access to the playback equipment required for a particular music recording format, the instructors will likely look for other formats that can be played via equipment they know will function properly. Reliable playback equipment is crucial to music educators, because playing audio recordings for students is needed in almost every aspect of music education. Students need to hear music to understand and eventually create it.

There did not seem to be a great deal of confidence in the playback technology among respondents at either school in this study, and, according to the literature, this could affect

whether or not faculty members will utilize the technology available at their schools. In a study of students at a U.S. university, participants noted faculty members had difficulties utilizing technology, which led to a diminished amount of time to use on class content and student dissatisfaction (Kyei-Blankson et al., 2009). Additionally, faculty and students, in a 2009 study of U.S. community college students and faculty, noted problems with equipment as elements impeding faculty members' utilization of technology (Moseley, 2010). Additionally, in a recent study, participants selected a lack of support on technology issues as one of the biggest reasons for not integrating technology (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). Therefore, if this study's participants cannot rely on the available technology then they are not likely to utilize it.

According to the findings, three out of four respondents chose to use digital audio (streamed or not) based on several required factors including *availability* and *preference*. One respondent, however, was unsure of what factors he would consider important when deciding whether or not to use digital audio (streamed or not) while another respondent was just unsure of what factors he would deem important regarding streamed digital audio. *Availability* factors mentioned by respondents included the specific pieces (musical recordings) and the playback technology required. When considering using digital audio recordings, respondents also considered whether their *preferences* (including preferred artist and preferred performance) were accessible. This information on preferences reveals respondents are not only going to not utilize audio recordings that require playback devices to which they have no access, but they will also not likely utilize databases that do not afford them the choice of preferred artists and / or performances. One issue college instructors may have with subscription databases is the

databases may not have certain recordings, which they normally use or prefer to use (Durman, 2009).

In this researcher's experience, almost every music educator has preferred pieces, conductors and/or performers, which they utilize as examples for their students. This is because the instructors know their preferred performance illustrates the quality of music to which they want to expose their students. Instructors are not likely to use performances with which they are not familiar, because they may not be of the quality desired. For example, many different choirs have recorded the *Hallelujah Chorus*, but music educators want to expose their students to quality performances by well-known choirs such as the Mormon Tabernacle Choir rather than a random high school choir that has a recording on *YouTube*. Instructors may also prefer a certain way a performer interprets a piece so their students can understand different ways of interpreting, or a certain recording may display beautiful musicality while another recording of the same piece may sound robotic. In addition, the sound quality itself is very important, as music educators do not want to use examples of pieces, which have poor sound quality for their students. Just as there is a difference between the sound of a new CD and the sound of a cassette tape that has been played numerous times, there is also a discernable difference between compressed audio (such as that played through smartphone speakers) and studio quality sound played using quality speakers. Sound quality is also vastly different between a piece, which is recorded in a studio and one recorded, for example, at an outside concert. Additionally, instructors may already have their preferred music recordings in their personal libraries, and they may have no need to look to databases for recordings.

One respondent also mentioned *ease of use*, while another listed the *quality, accuracy, and authenticity* of the performance recorded as being important *requirements*. The quality of models can be good or bad, and this relates to the *quality, accuracy, and authenticity* of performance *requirement* regarding digital recordings. Students, according to Haston (2007), need high caliber models, because models, irrespective of their level of adequacy and value, are copied by students. Authentic recorded models of world vocal music allow students to hear correct pronunciation, and these recordings can be utilized repetitively (Goetze, 2000). Additionally, the *Naxos* music database (utilized at Site 2) offers music performed by musicians with whom listeners may not be as familiar (Durman, 2009). This leads to the conclusion that, if databases do not provide the preferred *quality, accuracy, and authenticity* of performance *requirements* regarding digital recordings, the instructors will not likely utilize these resources. These resources will then likely go unused, and administrators may decide it is not worth paying for them. Additionally, if instructors do not find what they need on the first attempt when using a new resource, they may not use the resource a second time.

Alignment of Findings to Conceptual Framework

Respondents indicated they utilized audio recordings in their classrooms / studios to, among other things: (a) *demonstrate* aspects, pieces and performers; (b) provide *examples*; (c) allow students to *listen* to music; and (d) *expose* students to musical pieces. This follows Frances Elliott Clark's concept of music education regarding how music recordings are utilized in music education. According to Stoddard (1968), Frances Elliott Clark considered the accessibility of music (for listening purposes) for all students to be very important. Frances Elliott Clark considered "More beautiful music, well sung and well played, by and for the children!" to be the

foremost goal of music education and its advocate - the Music Educators National Conference (Cooke et al., 1960, p. 24; Kinscella, 1956, p. 28). The phonograph allowed this accessibility.

Frances Elliott Clark stated “Education through the ear instead of through the eye – learning to listen, listening to learn – had been well established, settled, and accepted through and by the use of records” (Stoddard, 1968, p. 139). Listening to music, according to Frances Elliott Clark, is an integral part of music appreciation and music comprehension, and it is of importance before anything else to instrumental and vocal musicians (Stoddard, 1968).

Additionally, Frances Elliott Clark felt repeated hearings were important regarding students listening to music, and this could be achieved through the utilization of the phonograph (Katz, 1988; Stoddard, 1968).

Respondents in the current study also used audio recordings for examples and demonstrations and as models to provide examples for students and demonstrate musical aspects. Aural models are by their very nature apropos to the study of the aural art of music. According to Stoddard (1968), Mrs. Clark believed imitation was the most advantageous method to teach singing, and she found records to be useful for modeling singing aspects such as diction, tone and phrasing (Stoddard).

Although the usage of audio recordings by the respondents in this current study mirrored the ideas of Frances Elliott Clark, the respondents’ usage of technology was not totally in alignment with Clark’s theories regarding technology usage in music education, because streaming audio databases were not utilized by all respondents in the current study. As stated above, Frances E. Clark believed in trying “any device or mechanical aid” (Stoddard, 1968, p. 24), which had promise (Cooke et al., 1960). Streaming audio databases have been shown to

have *promise*. The literature revealed studies mirroring the respondents' perceptions of the usefulness of streamed digital audio. Instructors and students at two Canadian universities responded favorably to the heightened availability of digital music at their universities via streaming (Mason & Wiercinski, 2009). Participants in a 2005 study of Iowa higher education libraries indicated instructors and students enjoyed the ability to access streaming audio (Cox, 2005). Additionally, students' use of the *VARIATIONS* music database greatly exceeded the amount that they had ever utilized the standard reserve system and physical copies (Dunn & Mayer, 1999). The problem revealed by the current study's results is the participants all believed the use of streaming audio in the music classroom / studio had *promise*, but not all of them actually utilized it.

Frances Elliott Clark believed musical recordings, followed by phonographs and the radio, to be the catalysts for new music teaching methods (Stoddard, 1968). Clark also saw the great potential for students to be exposed to and listen to a great deal of variant music via the radio in schools (Stoddard, 1968). Mrs. Clark saw music could be accessed indiscriminately by almost anyone via radio. (Stoddard, 1968). Frances Elliott Clark also noted the potential of other mediums, which utilized audio, and even before movies had sound, Frances Elliott Clark foresaw the eventuality of operas being filmed with sound added and the usage of television in music education (Stoddard, 1968).

As can be seen from the above uses of the phonograph and radio, many of the uses and advantages of the technology Frances Elliott Clark utilized can be seen in streaming audio databases. For example, college instructors can utilize subscription streaming music databases such as *Naxos*, *Classical Music Library* and *Smithsonian Global Sound* in much the same way as

reserving physical recordings in the library by constructing playlists for listening exercises (Durman, 2009). Essentially, databases can be used in many of the same ways as technology in Frances Elliot Clark's time – from accessing to listening to modeling.

Though the participants in this study utilized audio recordings in the manner put forth by Clark (including modeling, listening, demonstrating and exemplifying), these instructors are not all making an attempt to utilize “any device or mechanical aid” (p. 24), which has promise (Cooke et al., 1960). In this case, the device / mechanical aid with promise is streaming audio in the form of digital music databases and e-reserves. The reasons for this lack of use could be numerous; however, this study revealed some possible reasons. First and foremost is the fact not all of the respondents even knew they had the option to utilize streaming audio at their schools. Secondly, it is possible that these music faculty members already have audio recordings of the music they need to teach their students. Thirdly, the participants in this study may simply not know the potential benefits of utilizing these digital tools. Finally, and probably the least likely explanation, these faculty members could lack the skills or confidence to utilize streaming audio.

Significance of the Study

This study concentrated on faculty members in higher education music departments, and the results revealed, though not all of the participants utilized streaming audio, they believed this method of accessing music recordings would be beneficial – in the future. The review of literature revealed students and instructors are *already* enjoying the benefits of using streamed audio recordings. There were no other studies found, which concentrated on the perceptions of and usage of digital audio e-reserves and digital databases by higher education music instructors.

There have been studies addressing university students and libraries and the use of streamed audio.

Knowing the beliefs about and present usage of streaming audio by music faculty members will help determine if job aids, training, etc. are needed to increase the use of streaming audio by faculty members. Additionally, instructional designers will benefit from this study, as they will learn the preferences of instructors regarding streaming audio and will be able to use this knowledge for future course designs. Based on the results of this research, instructors would utilize streaming audio technology if they were aware of its availability and they knew the benefits of using this mode of access.

As a music educator, this researcher understands the importance of having access to the music pieces required to provide an understanding of music for students. Many professors who have been teaching for quite a while will likely already have their own personal music recording libraries. New educators and those looking for new music will save a great deal of money if music recordings are available through streaming databases for free. This researcher realizes that instructors will want personal copies of some music recordings, but others they will only use once or twice and really do not need to spend money on these if they are available otherwise. Streaming databases also have the ability to expose music educators to pieces they have never heard. This researcher also appreciates the benefit of having access to streaming databases that allow instructors to quickly access a recording to play for their students, which is great for unexpected teaching moments. Additionally, streaming databases allow instructors many choices to use for examples of particular genres or types of music.

Recommendations for Future Studies

The following are recommendations for further research based on the findings of this current study. These studies would focus on the use of streamed audio recordings.

1. Further research should be conducted on the perceptions of and usage of streamed digital music (regarding audio recording requirements, availability of resources, usage of audio recordings, and perceptions of streaming audio) by music students in higher education via a qualitative study. This (along with the current study) would allow researchers to have information on both instructors and students.
2. Further research should be conducted on the perceptions of and usage of streamed digital music by music students and faculty in a higher education setting with the purpose of comparing the two groups of participants.
3. Further research should be conducted on the usage of streamed digital music by higher education music faculty members via a quantitative study with the purpose of determining which of the factors found in the current study are most prominent (lack of awareness, lack of need, lack of skills, etc.).
4. Further research should be conducted on higher education music faculty members via a quantitative study with the purposes of comparing multiple educational settings (Arts & Sciences vs Research; small vs large; public vs private; etc).
5. Further research should be conducted on higher education music faculty members and students with the purpose of comparing the level of achievement with the use of streaming audio vs non-use of streaming audio. this study can also compare different educational settings

Conclusion

The purpose of this qualitative multiple case study was to analyze music educators' perceptions and usage of digital audio in higher education. Specifically, higher education music educators' usage and perceptions of digital audio e-reserves and digital databases was investigated. This research explained how and why these educators utilize (or do not utilize) streaming audio via e-reserves and databases.

Results of this research revealed participant instructors did utilize digital audio recordings, but not all of the instructors utilized streaming audio. The instructors who did utilize streaming audio used digital audio databases. None of the participants had used e-reserves, and e-reserves were not addressed further by the respondents. All of the participants did believe the use of streaming audio *would* be beneficial, however, the literature seems to indicate streaming audio is beneficial now. Additionally, the results indicated faculty members did not utilize streaming audio available at their schools, in part, because they did not know of its availability. The reviewed literature also indicates lack of knowledge as a reason for technology not being utilized, because instructors cannot use what they do not know is available. There was, however, plenty of indication at their schools that this streaming audio was available, but the participants still did not know these streaming databases were available. This lack of awareness indicates the schools need to make more of an effort to advertise the existence of tools available to instructors.

APPENDIX A: HISTORY OF AUDIO RECORDING

1800s	
1877 – Thomas Edison invented phonograph (cylinder)	Kingsbury (2006); Webster (2002)
1800s (mid) – 1930s (early)	
Wax cylinders (fragile)	The Council on Library and Information Resources & the Library of Congress (2010b)
1887 – Emile Berliner invented disc gramophone (originals - zinc, wax; copies - celluloid, rubber, shellac); 78 rpm ; shellac = fragile	Kingsbury (2006); Library of Congress (2002)
1930s	
Disc cutters – aluminum (portable) – LoFi (stable)	The Council on Library and Information Resources & the Library of Congress (2010b)
1930s - late	
Disc cutters – aluminum w/lacquer coating (portable) – higher fidelity (fragile)	The Council on Library and Information Resources & the Library of Congress (2010b)
1940s	
Magnetic tape (for recording)	Kingsbury (2006)
1940s – early-mid – (World War II aluminum ration)	The Council on Library and Information Resources & the Library of Congress (2010b)
Disc cutters – glass (fragile)	The Council on Library and Information Resources & the Library of Congress (2010b)
1948-49 – 33 ^{1/3} rpm LP and 45 rpm records (vinyl) arrive	Kingsbury (2006)

1950s (mid) – 1970s (late)	
Music synthesizer created (Robert Moog / Donald Buchla)	Webster (2002)
1960s	
8-track tape	Kingsbury (2006)
Cassette tape (small compared to other forms of recorded/recording media)	Kingsbury (2006)
Ned Deihl – investigated use of computer for ear training (1969)	Webster (2002)
Use of PLATO (CAI) in music education classes and projects (e.g. GUIDO music curriculum – authored by Fred Hofstetter – 1975)	Webster (2002)
1970s (late) – 1980s (mid)	
Micro Music software available – earliest music education computer assisted instruction (CAI) (music composition, dictation, etc.)	Webster (2002)
Computers available for schools at reasonable price	Webster (2002)
1982 – CD (Compact Disc)	Kingsbury (2006)
1980s (mid) – 1990s (mid)	
MIDI (Music Instrument Digital Interface) utilized in music education	Webster (2002)
CDs playable by music educators on new CD-ROM drives	Webster (2002)
Music education software – e.g. Practica Musica (theory/ear training), Music Mouse (improvisation), Band-in-a-Box (improvisation)	Webster (2002)
MIDI music notation software – e.g. ENIGMA (now Finale), Nightingale, Deluxe Music Construction Set	Webster (2002)
Music creation/sequencing software – e.g. Musicshop, Digital Performer	Webster (2002)

Earliest music education multimedia CD-ROM - Ludwig van Beethoven Symphony No. 9; CD Companion Series (Robert Winter)	Stroh (2000); Webster (2002)
1990s (mid) – 2000s (early)	
Music Ace (1 & 2), Making Music, Making More Music – interactive theory and composition software	Webster (2002)
Music recording & editing software utilized academically – e.g. Sound Forge, Peak	Webster (2002)
Internet – source for music for educators	Webster (2002)
Decrease in hardware size / increased usage of wireless devices	Webster (2002)

APPENDIX B: EXAMPLES OF DIGITAL SHEET MUSIC DATABASES

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
19 th Century California Sheet Music	Download and Streaming (depending on file)	Digital files of 19 th century California sheet music & correlating content / Audio files available for some songs		http://www.sims.berkeley.edu/~mkduggan/neh.htm	Kyriazis (2005)
Brown University Library		African American sheet music			Liu (2004)
Johns Hopkins University – Lester S. Levy Collection of Sheet Music		American sheet music (1780 – 1960) – almost 30,000 items digitized		levysheetmusic.mse.jhu.edu/	Liu (2004); Pardo (2006)
La Trobe University Medieval Music Database		Medieval scores –Gregorian chant from Perugia; non-sacred works (on web since 1994)	Preservation / Access	http://www.lib.la.trobe.edu.au/MMDB/	Chrisfield, Cosgrove & Stinson (2000); Stinson & Chrisfield (2001).

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
UC Berkeley		Medieval /	Preservation /		Liu (2004)
Digital		Renaissance	Access		
Scriptorium		scores			

APPENDIX C: EXAMPLES OF DIGITAL AUDIO DATABASES

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
Alabama Mosaic		Alabama digital archive		www.alabamam osaic.org	Stevens & Latham (2009).
American Memory – Library of Congress			Access		Thomas et al. (2007).
Association for Cultural Equity		Collaborative digital audio archive		www.culturalequ ity.org/ ace/disseminatio n.html	Lyons (2008)
Australian Institute of Aboriginal and Torres Strait Islander Studies Library and Audiovisual Archive		Aboriginal and Torres Strait Islander cultural artifacts - documents, photos, audio recordings, films, etc.; some digitized	Preservation / access	http://www.aiatsi s.gov.au/index.ht ml	Stroud (2009)
Canadian Broadcasting Corporation Radio (CBC)		Concerts on Demand – Live performance recordings			<u>Mason & Wiercinski (2009)</u>

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
Canadian Music Centre		CentreStreams – Archived Canadian composer recordings			<u>Mason & Wiercinski (2009)</u>
Classical World Ltd.	MP3 Downloads (paid per download) or Paid streaming subscription	More than ¾ million “Classical, Jazz & Blues and World” songs (personalized playlists can be created and shared); Provides music suggestions relative to listeners preferences		www.classical.co m	Classical World Ltd. (2010). Subscriptions; Classical World Ltd. (2010). About us
Collect Britain – British Library			Access		Thomas et al. (2007).
DocSouth – University of North Carolina at		14 different collections of digitized history		http://docsouth.u nc.edu	McGlimm (2007); University Library (2004)

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
Chapel Hill's University Library		material (the South and specifically North Carolina) including audio recordings in Oral Histories of the American South			
The Eduard Alekseyev Fieldwork Collection of the Musical Culture of Yakutia, 1969-1990, Archive of World Music, Harvard Music Library, Harvard University		Audio recordings of Sakha (Yakut) folk music			Harvard University (2009)
European Library (General)		Digital Audio recordings from almost 50	Access	www.theeuropeanlibrary.org	Conference of European National Librarians.

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
		European libraries			(2010). Organization. <i>European Library</i>
European Library (Slovenia)		Slovenian hard-to-find audio recordings converted to digital	Preservation / Access	www.theuropea n library.org	Conference of European National Librarians. (2010). Browse collections by subject. <i>European Library.</i>
The Internet Archive		Digital world artifacts; includes Live Music Archive – audio recordings of musicians for free downloading			http://www.archive.org/details/etr ee; Stroud (2009)

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
Jacksonville State University – Oral History Collection		Oral histories (by faculty & students) – bulk being from the South (mostly from Alabama) (started digitizing process in 2007)	Preservation / Access	http://www.jsu.edu/library/collections/oral_history.html	Stevens & Latham (2009).
Maine Music Box		Sheet music including 19 th - 20 th century Americana (majority vocal/piano) – Maine Collection; Parlor Salon Collection; Haywood Jones Collection/ accompanying MIDI files / Scorch files	Access / Preservation		Lutz, 2004; Lutz & Gallucci (2005)

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
MusicAustralia	Streaming	Digital recordings (& links to digital recordings) of Australian music	Preservation / Access	www.musicaustralia.org	Music Australia. (nd) About; Thomas et al. (2007).
New Zealand Digital Library		Includes: Meldex (Melody Index) Music library (started in 2000) – recordings of songs including folk music from North American, Ireland, China and Germany		www.nzdl.org	McPherson & Bainbridge (2001)
Oyez Project – originally at Northwestern University (creator – Jerry Goldman) now at Illinois Institute of Technology,		Supreme Court recordings - Streaming & some mp3 downloads			Stewart & Cervone (2003)

Name	Streaming / Download	Contents	Preservation / Access	Location / URL	Citation
Chicago-Kent College of Law					
Themefinder	Streaming	35,000+ Classical and folk (European) music themes		http://www.themefinder.org/	Pardo (2006); http://www.themefinder.org/help/about/
The Virtual Gramophone	Download or Streaming	Digital Canadian audio recordings originally on cylinder and 78- rpm / Podcasts		http://www.colleotionscanada.ca/gramophone/index-e.html	Kyriazis (2005)

APPENDIX D: SURVEY INSTRUMENT

Music Educators' Usage and Perceptions of Electronic Audio Reserves and Digital Audio

Databases

Survey Questions

The purpose of this survey is to ascertain your usage of and thoughts/opinions on digitally archiving music for educational purposes. Your answers will be part of a study on the usage and perceptions of electronic audio reserves and digital audio databases by the faculties of two Central Florida music departments.

- What is the nature of your position in your music department? (Classroom teacher (subject), studio instructor, etc.)
- What are your thoughts about using audio recordings in your class?
- In what capacity do you utilize audio recordings in your classroom/studio?
- What types/genres of music do you use in your classroom/studio? (ex. classical, folk, tribal/ethnic, etc.)
- What types of audio recordings do you utilize in your classroom/studio? (ex. LP, CD, cassette, other digital)
- To your knowledge, what types of digital audio recordings are available at your university?
- To your knowledge, what types of digital audio recordings are available in your department?

- To your knowledge, what types of streaming digital audio recordings are available at your university?
- To your knowledge, what types of streaming digital audio recordings are available in your department?
- What are your thoughts on utilizing streamed digital audio recordings for education purposes?
- What are your thoughts on utilizing streamed digital audio recordings via e-reserves and/or subscription-based databases (ex. *Naxos*, *Classical Music Library*) for education purposes?
- If applicable, what types of streamed digital audio recordings do you use? (e-reserves, specific databases, etc.)
- What factors are important to you when deciding whether or not to utilize digital audio?
- What factors are important to you when deciding whether or not to utilize streamed digital audio?
- How do you think the use of digital audio reserves and digital audio databases will or will not affect music education?
- Can you think of any questions I should have asked?
- Do you have any comments you would like to add?

Thank you for taking the time to participate in this interview.

APPENDIX E: IRB HUMAN SUBJECTS PERMISSION LETTER



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138
To: Kathleen M. LoPresti
Date: June 11, 2014

Dear Researcher:

On 6/11/2014, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review: Exempt Determination
Project Title: FROM FRANCES ELLIOTT CLARK TO TODAY'S HIGHER
EDUCATION MUSIC EDUCATORS: AN EXPLORATION OF
THE PERCEPTIONS AND USAGE OF DIGITAL AUDIO VIA
ELECTRONIC RESERVES AND DIGITAL DATABASES
Investigator: Kathleen M. LoPresti
IRB Number: SBE-14-10349
Funding Agency:
Grant Title:
Research ID: NA

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 06/11/2014 12:18:20 PM EDT

IRB Coordinator

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