Scott R. Phinney. "Can't I Just Listen to that Online?" Evaluating Electronic Access to Audio for Music Libraries. A Master's Paper for the M.S. in L.S degree. April, 2005. 44 pages. Advisor: Diane Kelly

There has been little published research on the use of electronic audio reserves

and music libraries. There have been several studies published to date regarding the use

of electronic print document reserves. User responses in these studies are very positive in

that they appreciate 24-hour access from any computer with an internet connection. It is

likely that what holds true for electronic print resources will also hold true for electronic

audio reserves. This paper seeks to determine how electronic audio reserves are being

used now and what their use might mean for the future of the physical musical library.

This and other questions are addressed through analysis of written surveys given to

students at the University of North Carolina at Chapel Hill who use electronic access to

audio and analysis of usage statistics on the audio file server. It was determined that

students greatly prefer to use electronic audio reserves to those physical sound recordings

found on reserve in the Music Library. 24-hour access was indeed the largest factor in

choosing a preference, though the ability to listen to reserve recordings from a location

other than the Music Library was also a factor.

Headings:

    College and university libraries -- Reserve collections

    Internet -- Music libraries and collections

    Surveys -- Use studies

    Use studies -- College and university libraries

"CAN'T I JUST LISTEN TO THAT ONLINE?"
EVALUATING ELECTRONIC ACCESS TO AUDIO FOR MUSIC LIBRARIES

by
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INTRODUCTION

In the last eight years, advances in computer processing technology and networking have allowed electronic music to permeate the internet. Though the heyday of "free" music sharing ended in mid-2000 with a legal injunction against Napster's peer-to-peer (P2P) network, demand for electronic music has increased. This can be seen through the growing popularity of Apple's iTunes pay-per-song service and the ubiquity of portable mp3 players. Libraries have recognized this trend and have attempted to tap into the electronic music provider realm with digital music libraries like the VARIATIONS project at Indiana University and electronic audio reserves at the University of North Carolina at Chapel Hill. Through the use of authentication and proxy services, many of these libraries have made electronic music available from outside the Library and often from off-campus. An area in which some research needs to be done is how electronic audio reserves are being used now and what this might mean for the future of the physical musical library.

As of the time of this writing, it is not known what role networked computing plays in the acquisition of knowledge about audio recordings. To be sure, the internet has facilitated the transfer of recordings both legally and illegally from person to person and from server to person on a recreational basis, but how is it used in formal study? What does the availability of music online mean for the future of music libraries?

There have been several studies published to date regarding the usage of electronic document reserves. Generally, the responses from the users are very positive in that they appreciate 24-hour access from any computer with an internet connection. While gate counts have decreased in recent years, the advent of electronic document reserves has brought greater readership to the world of scholarly works. This represents a fundamental shift in the role of libraries from collectors and disseminators of print to aggregators and purveyors of enormous quantities of binary code. What this will mean for the future of the physical building and collections of the library remains to be seen. For the near future, though, it seems people will still come to the building itself to seek larger printed works like books, monograph or otherwise, and go online for periodical literature.

Music libraries will likely follow a similar path with regard to their future and electronic access to audio. If electronic audio reserves are as popular as their lexical counterparts, gate counts will decrease in music libraries as more people do their listening at home, at work, or perhaps by the pool if they are fortunate enough to have wireless access to the internet. However, for the larger print items like books and musical scores of major works, it is likely that patrons will continue to come to the Music Library.

LITERATURE REVIEW

There are several published examples of academic libraries that have placed digitized sound recordings online for use by members of those institutions. Indiana University, the Pennsylvania State University, the University of Tennessee - Knoxville, and Winona (Minn.) State University have all created collections of digital music

available through computer networks to their respective academic communities. They differ in the level of access to the collections that they grant to their users.

Jon W. Dunn and Constance A. Mayer (1999) describe a digital music library project at Indiana University called VARIATIONS that seeks to increase the availability of reserve sound recordings for music students and preserve older and more fragile recordings for future use. This study is one of the first to evaluate such a project over the course of several years and has been cited in subsequent studies of digital music libraries. As a ground-breaking project in this area, Dunn and Mayer focus on the technical implementation of the VARIATIONS library, and conclude with reactions from the project's users and statistics about the projects usage.

The project was begun with focus on recordings placed on course reserve for the music department as usage statistics had shown that nearly half of the recording use in the William and Gayle Cook Music Library was for reserves. Observations revealed that students would often seek the same recording at the same time; a problem exacerbated by the fact that the same recording was often placed on reserve for two or more classes. In a solution to this problem, Dunn and Mayer describe a system whereby musical recordings are digitized in WAV format, compressed into lossy mp1 or mp2 format, placed on a streaming server, and cataloged in the University's IUCAT system. Once the recordings are made available, users go to certain computers in the Music Library preloaded with the VARIATIONS audio playback client and headphones, search for the desired recordings in the catalog or on the reserves listing online, and play the digitized recordings.

VARIATIONS solved the problem of multiple users of a single recording by permitting the simultaneous streaming of a digitized recording to many users. It also

permits one user to access several different recordings simultaneously, a feature not permitted under the reserve rules for physical recordings. Tapes, LPs and other fragile recordings were preserved as statistics showed that demand for these physical materials dropped precipitously over the course of the three-year evaluation. By the end of the study, usage of reserve recordings had increased by more than a factor of five with streaming access accounting for nearly 95% of that total.

Dunn and Mayer claim a successful resolution of the problem of reserve recording availability, but they acknowledge that this study is just a first step in the possibilities for a digital music library. They mention future work in making streaming reserves available to users outside of the Music Library and even off-campus and increased resolution of digitized video recordings as technological advances permit. They also acknowledge the challenges to intellectual property rights that this system could potential create and suggest that further investigation into this issue take place.

Amanda Maple and Tona Henderson (2000) also discussed a solution to the problem of giving multi-person access to sound recordings in their evaluation of the digital music library at the Pennsylvania State University. Their collection was put into use in 1998 using a RealNetworks streaming client, server, and production package, as compared to Indiana University's locally-coded VARIATIONS software system. Maple and Henderson acknowledge the risks associated with using a proprietary format, namely, that the format could fall into disuse and jeopardize the longevity of the collection. However, this "out of the box" approach to digital library creation likely represents a more efficient means of getting a collection online and accessible than devoting the resources to develop code in-house for a system like VARIATIONS.

Their digital music library model departed somewhat from the American Library Association's policy that "fair use" of copyrighted materials for education may be extended from the classroom to the library reserve room (Hutchins 1982). The Penn State library granted access to electronic audio reserves not only from other buildings on campus, but from off campus as well using authentication technologies.

Maple and Henderson discussed some problems with the system, including a lack of uniformity of equipment across the university's several colleges and departments as well as the large amount of time required to process the recordings in to a format ready for use, but consider the effort required to produce and maintain the collections worth the investment. This is in large part due to an enthusiastic student response. The authors noted that the students particularly like the off-campus access and ability to listen to recordings at all hours, especially at night when the physical Music Library is closed.

Pauline S. Bayne and Chris Hodge (2001) wrote about the digital audio reserves project at the University of Tennessee. This article is useful to compare similarities in student responses to the program as well as contrast differences in technology. The collection of electronic sound recordings was built to support specific classes. In the pilot program described in the study, streaming audio supported four semesters of a large survey class in the history of rock music as well as two smaller music classes. The data that supports their report is only taken from the history of rock class, however.

Bayne and Hodge reported that it took nearly 60 hours to completely digitize 10.6 hours of music in RealAudio G2 format, though the rate of digitization increased towards the end of the study. The encoding computer was a 200 MHz Pentium Pro PC with 128 MB RAM and a 6 GB hard drive.

An online survey was used to give the students a chance to evaluate the system. 39% of the students listened from off-campus locations, of which 69% reported using 56 kbps modems or better. 59% of the students listened to the online reserves from computers in locations on campus. These locations include dormitory rooms, the Library, computer laboratories, and other on-campus locations. Among the problems reported were username and password issues, disrupted streaming, and low volume of sound. Despite these problems, 80% of the students gave the system a grade of "good" or better. 63% reported that the ability to listen to recordings at any time was a factor in the decision to show approval for the system while 42% mentioned that not being required to come to the library improved their opinions of the system. 38% of the students reported that the ability access the recordings from any computer was a deciding factor. Finally, 98% stated that they would use online sound reserves again. This indicates strong support for electronic sound reserves as early 1999.

Kathryn Sullivan, John J. Stafford, and Cindy Badilla-Melendez (2004) describe a more recent digital music library initiative at Winona State University in Minnesota. They sought to create better access to the Music Library's CD collection for the students and faculty. Before creating the collection, the designers compared the Indiana University model and the Pennsylvania State University model. In the end, they determined that the users preferred access to all of the digitized CDs at any given time than just to a select few tracks associated with course reserves. As a result, they implemented a system modeled on VARIATIONS with access restricted to the Library (including both library computers and laptops connected within the Library).

In addition to digitizing the audio content of the CDs, Winona State University scanned the liner notes for each CD and made them accessible through the network with the audio content. Though the streamed audio could not be recorded by the user, the liner notes could be printed for use with the recording. By giving the users access to both the recording and the visual material associated with it, Winona State University effectively eliminated the need to circulate the physical recordings, thereby creating an opportunity to protect them from theft or damage in a restricted area of the Library. Like the VARIATIONS and the Pennsylvania State University projects, the digital music library at Winona State University received positive feedback from its users.

Richard Griscom (2003) evaluated the growth of the digital music library in the years since the 1999 data about the VARIATIONS project and Amanda Maple and Tona Henderson's report were released. Using questionnaires, he sought to assess how music librarians have addressed the concerns and issues raised by Maple and Henderson's report. In this paper, Griscom indicates that off-campus access to streaming audio has risen significantly since 1999 and alludes to large numbers of users remaining outside the physical Music Library to do their listening.

Topics covered by the questionnaire include preservation and access, delivery of digital recordings over a network, using digital audio in course reserves, issues related to copyright, and the economic and labor costs of digital library projects. Griscom tabulated the results and found that the vast majority (93%) of the projects were used to provide enhanced access to reserve recordings, a subset of many music libraries' collections which receives sporadically intense use by a defined group of users. He also found that one-third of the respondents viewed digital music libraries as a means to preserving

sound recordings. Several different streaming formats were in use at the time of the survey, though two-thirds of the respondents used RealAudio to deliver digital audio to users. 85% of surveyed digital music libraries provide remote access (outside of the physical Music Library) with password authentication or other restriction, and the remaining 15% restrict streaming access to certain buildings on campus. Almost 50% of the projects were undertaken for less than $5,000, and 67% were established using existing staff.

Griscom concluded that with the improvement of network, server, and client computer technology, it has become feasible for more libraries to use streaming audio to meet the rigorous demands of course reserves while also protecting the originals from excessive wear and tear. The leap in the number of reported digital audio reserves projects from one to thirty-nine over the course of six years seems to support that assessment. With increased broadband access in off-campus locations and large numbers of course readings available in electronic format, users have come to expect that their listening materials will be made available through the computer as well.

Griscom's work shows that the number of institutions granting users access to streamed sound recordings has grown substantially in the years since VARIATIONS was built. The trend seems to have moved solidly on the side of Penn State's model as the majority of libraries provide streaming access only to those patrons who were enrolled in the pertinent classes. The anecdotal evidence has been supportive of the initiatives, but little has been published in the way of quantifiable reports as to the user's positive or negative feelings regarding electronic audio reserves.

While electronic audio reserves evaluation has not been as well represented in the literature, publications do exist that describe evaluation for electronic print document reserves. Anna Klump Pilston and Richard L. Hart provide an example of such a model for evaluation in their 2002 article in the *Journal of Academic Librarianship*. They set out to determine whether students were really as enthusiastic about electronic reserves as library staff supposed they were. Pilston and Hart administered a survey to four classes who used electronic reserves as part of a pilot program at Penn State Erie – Behrend College. To provide comparison, they distributed questionnaires not only to the incoming freshmen, but to the sophomores and upperclassmen that would be more likely to have used the traditional paper copy reserve model. They also compared responses of those students who primarily accessed the electronic reserves from on campus to those who accessed them from off campus.

Pilston and Hart found that a high percentage of students were very pleased with the electronic reserve system. Slightly more students who had used the traditional system had rated the electronic system "very good" or "excellent" than those who had not used the traditional system; similarly, students who used the system from off campus were slightly more appreciative than those who used it on campus. When asked why they liked the electronic system, many responded that they appreciated access from any computer with an internet connection, as well as the flexibility afforded by the 24-hour access and the money saved from using photocopiers with the traditional print copies.

Mary Sellen and Brenda Hazard of SUNY Albany also conducted a survey of new electronic reserves users (2001). They theorize that because similar technologies are used to create and access electronic reserve systems and digital libraries, information

gathered about satisfaction and usage of one would have implications for the other. Their syllogism suggests the question, "At which point do electronic reserves become digital libraries themselves?"

Sellen and Hazard's questionnaires featured an opened-end response space. They received many of the same reasons given for a positive review of the system as other studies: accessibility and convenience, not restricted to the Library, ease of use. Their negative comments also echo other studies: problems with using Adobe Acrobat to read the PDFs, printing difficulties, and slow response from the computer network.

JoAnn Jacoby and Mary S. Laskowski took a different approach to evaluate electronic reserve use at the University of Illinois at Urbana-Champaign (2004). They chose to use statistics from the Systems department of the university library to monitor and analyze usage and compare the results to survey results collected from students. The survey indicated that a majority of students (about 60 %) felt that they were more likely to read more of the course material if it were available electronically than if it was only available in print form.

Before revealing the results of the statistical analysis, Jacoby and Laskowski describe some of the issues associated with analyzing a system on the magnitude of that at UIUC. They acknowledge that processing such a large volume of information can be a daunting task in and of itself, and this can be further hindered by a lack of standardized techniques with which to accomplish the analysis. They also mention that their analysis does not necessarily translate into numbers of unique visitors because of the caching aspect of server technology.

With these caveats addressed, Jacoby and Laskowski state that 69% of the electronic reserves accessed during the Fall of 2002 (and 83% in Spring 2003) were reached from off-campus locations. Further analysis shows that students are indeed accessing the reserves 24 hours a day electronically; they make a point to mention that the least active period for outside library access (4 A.M.) has more requests than the busiest period for inside library access (2 P.M.). Generally, there are ten times as many electronic reserve access sessions from outside the library walls as from within. Finally, Jacoby and Laskowski found that all things being equal for a sample of electronic reserves and their print counterparts, 96% of the electronic reserves were accessed during the semester, compared with 33% of the print reserves. This is evidence to support student's survey responses saying that they would be more likely to read more of the course reserves if it were available electronically.

These publications underscore the fact that electronic reserves in general are thriving at different institutions and that some schools are providing access to sound recordings in digital online format. They also provide a method for evaluating usage of electronic reserves. Bayne and Hodge's study provides empirical data about electronic sound reserve usage, but an updated report is needed to show the results of five years' worth of technological improvement and aggregate familiarity with electronic reserves among students. The following study describes the system in use at the University of North Carolina at Chapel Hill and the application of usage evaluation method described in the literature.

INFRASTRUCTURE

The electronic sound reserve system at the University of North Carolina at Chapel Hill (UNC-CH) is a bit different from those at other institutions. Whereas other institutions like Indiana University or Penn State create and maintain their collections of networked sound recordings through their library systems, the reserve system for electronic sound recordings at UNC-CH was begun (and remains at the time of this writing) as an initiative of a professor in the Music Department. The professor takes responsibility for the digitization of physical recordings and helps to ensure that the course web pages correctly link to the digitized recordings. The actual design of the course web page and selection of recordings to be digitized is largely left up to the discretion of the course professors using the system to allow for individual creativity.

The sound files are encoded in mp3 format at 128 kbps and are then streamed using RealAudio format. The files reside on the Music Department's space on the University's main server array, not on a server specifically dedicated to the purpose of streaming audio files. Access to the course reserve web pages and to the sound files is restricted by username and password, and also by IP address. Normal access is only granted to on-campus IP addresses, though VPN (Virtual Private Networking) is often employed by students wishing to use the system from off-campus. The system has been in place for about three years.

METHOD

Data collection for research into the use of electronic audio reserves was achieved through the combined use of surveys and analysis of electronic reserve statistics. This

method was based on Pilston and Hart's 2002 study and was chosen because it provided both quantitative and qualitative data with which to support conclusions regarding the state of reserve use. Quantitative data was collected about when, where, and how many people were using electronic audio reserves. Qualitative data was collected about the users' positive and negative experiences and preference for mode of sound reserve access based upon these experiences.

Survey

Questionnaires were administered to students in three classes that use electronic audio reserves to ensure access to the population of users. The questionnaires were distributed at the end of each class, where they were completed and returned. The questionnaires were only completed by those students attending class the day they were administered. The respondents were asked such questions as whether they used electronic reserves for class and why they did or did not, whether they have ever used traditional recordings on reserve in the Music Library (e.g. LPs, cassette tapes, CDs), and from what location and time of day they access the reserves. They were also asked if they had had any prior experience using the Music Library and what criticisms they had of the reserve recording system there, if any. Lastly, the students were asked whether they would prefer to listen online or use the Music Library reserve recordings and why. The questionnaire can be viewed in the Appendix.

Usage Analysis

The usage analysis was conducted over the course of one month. Usage statistics

were taken continuously during the month using a freely-available web counter found at

www.sitemeter.com mounted on each class's electronic reserves web page. The counter

noted the IP address from which the page was accessed, the number of unique IP

addresses that accessed the page, how long a user was connected to the page, and what

time the page was accessed. Each registered page hit was counted as a use of an

electronic sound reserve. With this information, it was possible to determine whether or

not students actually accessed the reserves from the locations and at the times they

indicated in the questionnaire. At the end of the month, the online usage statistics were

tabulated and compared to the responses from the questionnaires.

Benefits and Limitations

The advantage to the combined survey/usage analysis approach is that one side of

the study provides a check on and/or clarification for the other. The benefits to

conducting surveys are that validity is high because the users themselves are consulted,

they do not require a major time investment on the part of the subjects, and they provide

easily-tabulated empirical data. Surveys provide a humanizing affect on data that could

be lost through analyzing usage statistics alone. Respondents can add their own feelings

and experiences to help interpret the data. If the stated responses align closely with the

empirical data, the validity of the study increases. The benefits to conducting surveys in

paper form as opposed to a web-based form is that there are hard copy records of the

responses, the participants have more flexibility to complete and change answers as

necessary, and the responses are all collected during the same session, making for a high rate of return.

The limitations to surveys are that people may not fill out and/or return paper copies and that people may not fill them out entirely accurately, particularly if they simply want to finish them so they can continue with their own work. Another limitation of the use of surveys is that it is not a particularly reliable method. The Test-Retest method would help to demonstrate its reliability, but for a truncated study period, this survey must rely on the measures established by earlier studies.

One caveat of using paper surveys administered during a class session is that the students are not in front of computers as they would be while completing a web-based survey. The time that elapses between the last time the students used electronic audio reserves and the time they complete the questionnaire could potentially have a moderating effect. If a long period of time has passed, the strengths of both the positive and negative impressions the students had of the system may diminish as short-term memory fades, thus moderating the impressions created while using the electronic reserve system.

The usage analysis helps to identify and clarify ambiguities in the survey data pertaining to time and location of use. Usage analysis also helps to identify trends in usage through graphical representations of data as supplied by the web counter. A limitation to usage analysis for a study with a truncated time frame is that it does not report data from the beginning of the semester. This makes for a more difficult comparison to survey responses which are based on experiences which may date back to the beginning of the semester or earlier.

Ethical Issues

The ethical issues were minimal during this study. However, as with any study where personal information is gathered, utmost care was given to ensure that privacy is respected. Survey respondents were asked not to include any personally identifying information with their responses to protect anonymity. They were also informed that participation in the study was strictly voluntary. No incentives were given to respondents to induce them to complete the survey aside from the warm feeling they received from helping a fellow university student conduct research.

The online usage statistics were taken with enough specificity to determine whether the reserve recordings were accessed from on-campus or off-campus, and in which type of building or area on campus, however, the last segment of the IP addresses were blocked in the report so as not to point directly to one specific person. This study was approved by the Academic Affairs Institutional Review Board at the University of North Carolina at Chapel Hill under reference number LIBS 05-005.

RESULTS

Questionnaires were distributed to undergraduates in three music classes. Two classes (a diction class for vocal students and an early music history class) were primarily comprised of music majors totaling about 95 students. The third was a large survey class focusing on country music which was primarily comprised of non-music majors with an enrollment of about 300 students. 344 surveys were returned, though 13 were missing information in various areas. Several of these 13 surveys contained token information

not found in great abundance among the other surveys, so they were retained so as not to marginalize results.

Demographics

192 females and 152 males participated in the survey, which can be seen in Figure 1. 106 were first-year undergraduate students, 95 were second-years, 67 were third-years, 68 were fourth-years, and 8 were fifth-years or above, seen in Figure 2. About one-third (34.1%) of students surveyed had used electronic sound reserves in the past. Of those who had used the system before, 46.8% were second-year students, making them the most experienced with it percentage-wise. Figure 3 shows that the first-year students were the least experienced with the system, making up 17.0% of the total number who reported prior use.
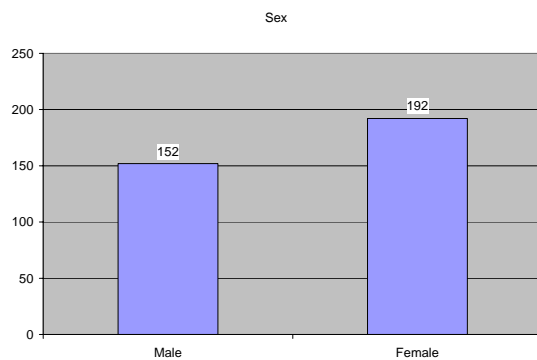
[Figure 1. Survey Participants by Sex]
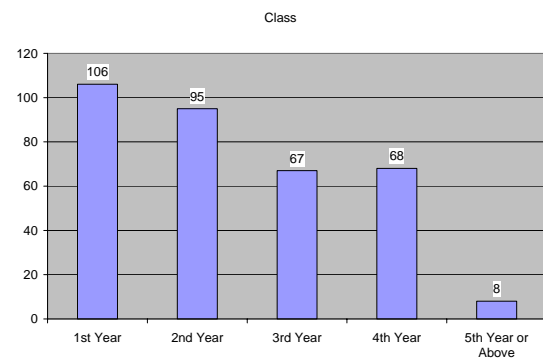
[Figure 2. Survey Participants by Class]

Percentage of Class Familiar with ER
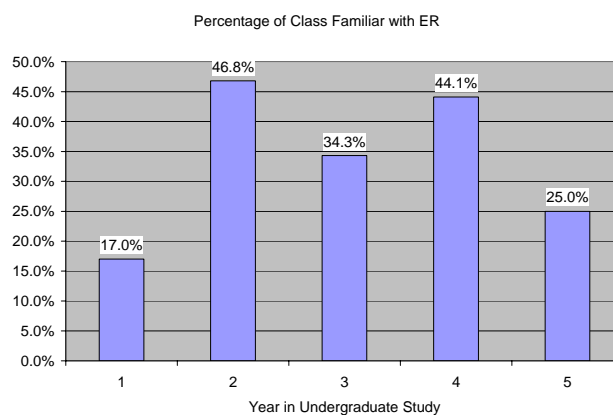
[Figure 3. Familiarity with Electronic Sound Reserves as Measured by Reported Prior Use of System]

Preferences

When asked whether they preferred listening to sound reserves online or using physical recordings in the Music Library, 89.4% of the total number of respondents indicated that they would rather listen online. Further analysis showed this level of support for the online program to be remarkably consistent among subgroups. Students who reported problems using physical sound recordings in the Music Library indicated a strong preference for online reserves. The levels of support ranged from a high of 84.8% among people who reported that the items they had come to the Music Library to use were already checked out to a low of 75.0% for people who described other problems using the Music Library.

Somewhat surprising is the level of support is even higher among students who reported problems using the online reserves. 89.1% of students who reported disrupted streaming problems indicated they would rather listen online, while students whose computers were too slow to adequately play the music as well as those who did not have the correct hardware or software also showed strong support for online reserves at 83.3% and 87.7%, respectively seen in Figure 4.

Percentage Choosing Electronic Reserves
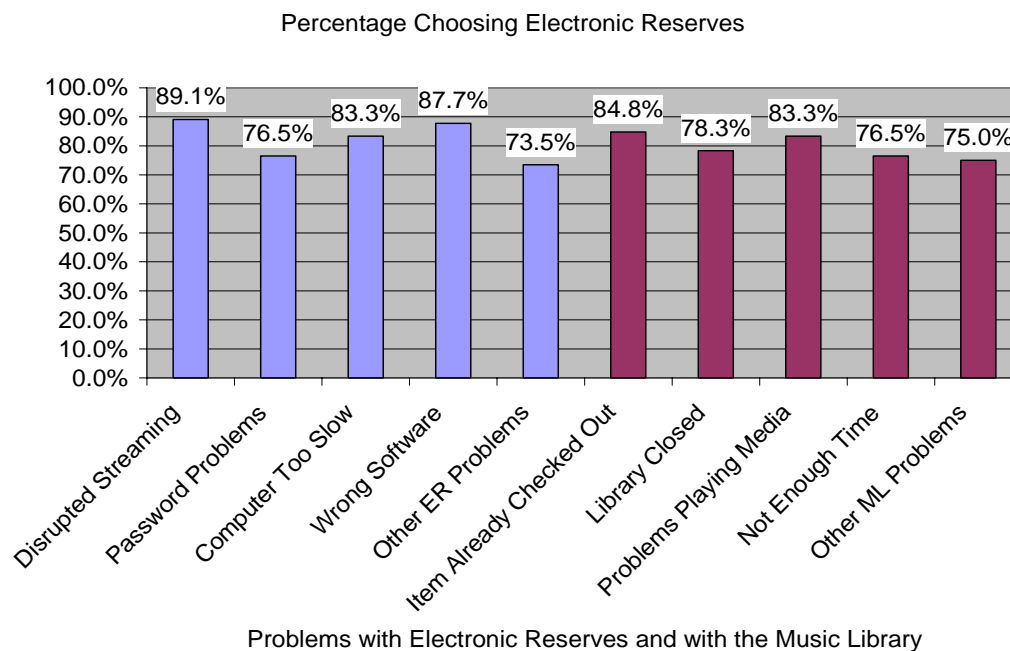
[Figure 4. Percentage of Students who Chose Electronic Reserves over Physical Sound Recordings of Total Reporting Problems]

The majority (69.2%) of students surveyed indicated that they do their electronic sound reserve listening from on-campus locations. Figure 5 shows that 52.2% prefer to use computers in their dormitory rooms, while the remaining 17.0% prefer computer labs, laptops with a wireless connection to the campus network, and computers in the Music Library itself.
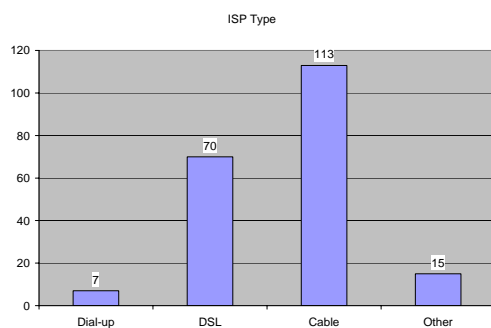
Analysis of online usage statistics collected during the month of the survey shows that 80.2% of listening was done from on-campus locations, with the largest percentage (51.6%) occurring in dormitory rooms. This compares to just 27% of electronic reserve listening done in dormitory rooms in Bayne and Hodge's study at the University of Tennessee. The remainder of on-campus online listening was done using laptops with wireless connections (9.2%), in computer labs (5.5%), in the Music Library (5.5%), and

in other on-campus locations including the Undergraduate Library and Davis Library

(8.4%).
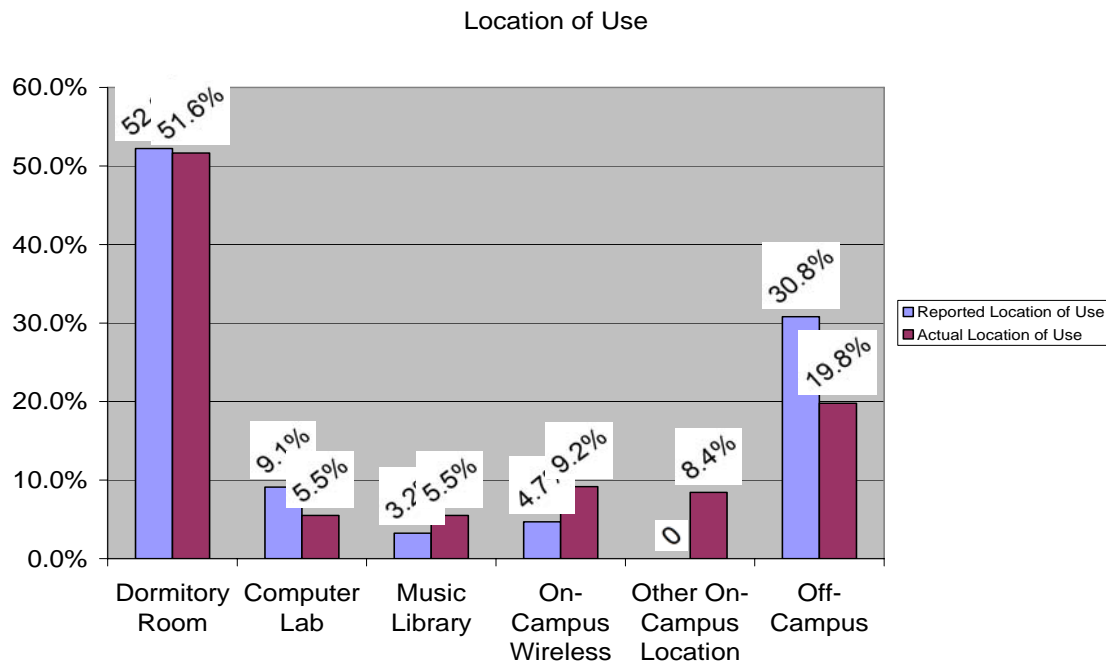
Location of Use

[Figure 5. Comparison of Reported Use Location with Actual Use Location]

For those students that primarily do their listening from off-campus locations,

97.1% (198) indicated that they use a broadband connection to the internet (DSL, cable,

or wireless) as seen in Figure 6. This compares to 69% of participants in Bayne and

Hodge's study using 56 kbps or faster internet connections. Also, most students reported

using relatively new computers to do their listening. Figure 7 shows that 70.1% (237)

used computers that were two years old or less.

ISP Type

```
120 ┤                              113
    │                              ┌──┐
100 ┤                              │  │
    │                              │  │
 80 ┤                              │  │
    │              70              │  │
 60 ┤              ┌──┐            │  │
    │              │  │            │  │
 40 ┤              │  │            │  │
    │              │  │            │  │       15
 20 ┤     7        │  │            │  │     ┌──┐
    │   ┌──┐       │  │            │  │     │  │
  0 ┴───┴──┴───────┴──┴────────────┴──┴─────┴──┴──
     Dial-up       DSL           Cable      Other
```

Age of Computer

```
140 ┤
    │                    124
120 ┤       113         ┌──┐
    │      ┌──┐         │  │        101
100 ┤      │  │         │  │       ┌──┐
    │      │  │         │  │       │  │
 80 ┤      │  │         │  │       │  │
    │      │  │         │  │       │  │
 60 ┤      │  │         │  │       │  │
    │      │  │         │  │       │  │
 40 ┤      │  │         │  │       │  │
    │      │  │         │  │       │  │
 20 ┤      │  │         │  │       │  │
    │      │  │         │  │       │  │
  0 ┴──────┴──┴─────────┴──┴───────┴──┴──────
    Less than 1 Year Old  1-2 Years Old  More than 2 Years Old
```

[Figure 6. Internet Service Providers Used by Survey Participants to Access Electronic Sound Reserves]
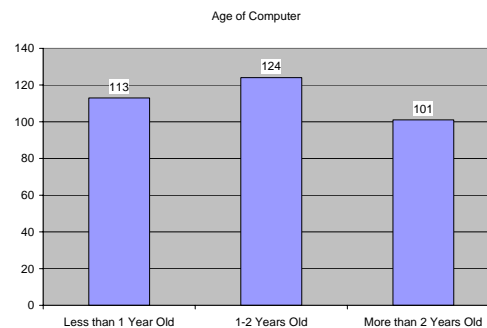
[Figure 7. Age of Computers Used for Electronic Sound Reserves]

Students largely (73.9% - 252) indicated a preference for electronic sound reserve usage during the evening hours (defined as 6:00 PM – 11:59 PM) compared to 3.2% (11) for morning usage (6:00 AM – 11:59 AM), 14.1% (48) for the afternoon (12:00 PM – 5:59 PM), and 8.8% (30) during the overnight hours (12:00 AM – 5:59 AM). Analysis of online usage statistics showed that the actual distribution of use was much more even with 24.5% (67) in the morning, 31.9% (87) during the afternoon, 26.0% (71) in the evening, and 17.6% (48) during the overnight hours. Figure 8 compares the reported time to the actual time of use of online reserves. Figure 9 shows a graphical representation of hits per day of each of the three class reserve pages monitored. Spikes in the number of times electronic reserves were used per day for each class correspond to the days before exams or the due dates for other student projects when large numbers of students consult recordings.
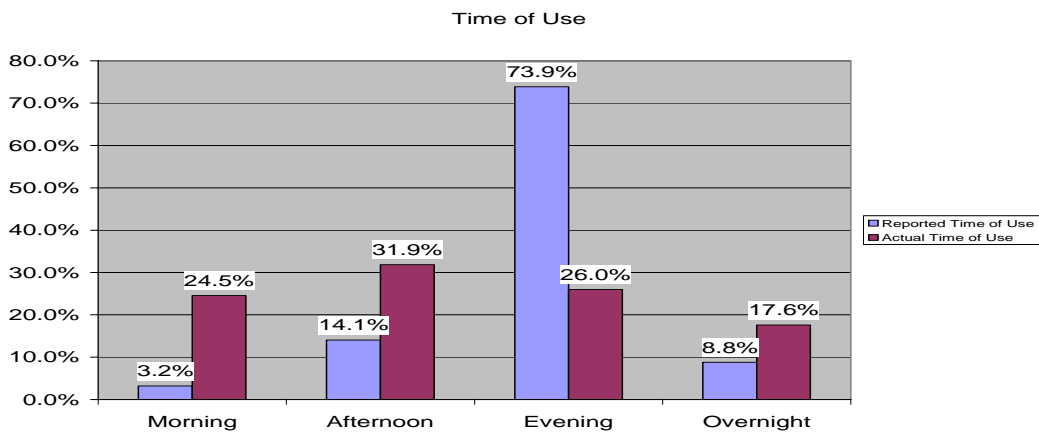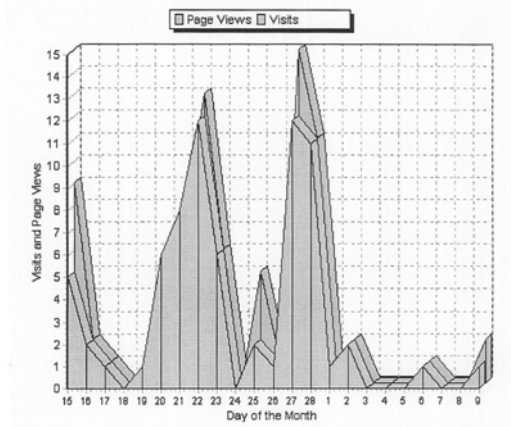
[Figure 8. Comparison of Reported Time of Use to Actual Time of Use]
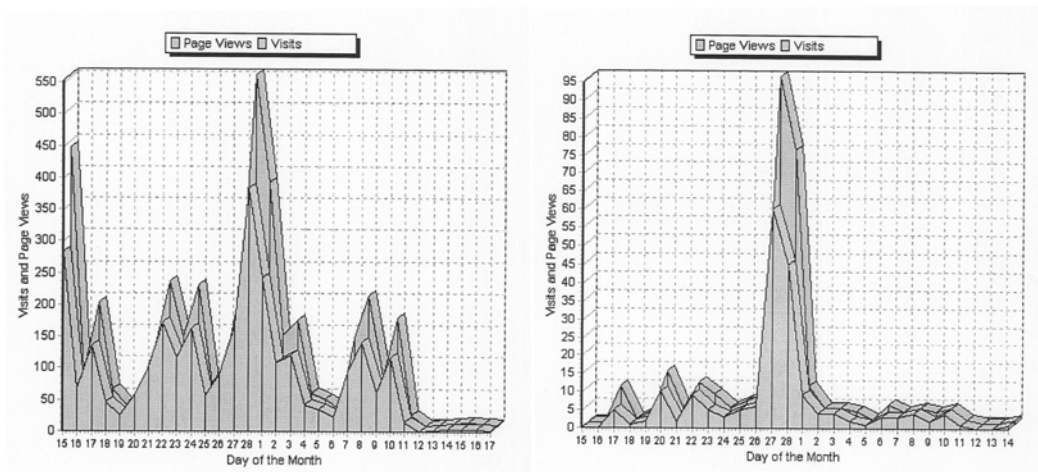
Class 1. History of Country Music

Class 2. Music History to 1650

Class 3. English and Italian Diction

[Figure 9. Hits per Day of Each of the Class Reserve Pages, Feb. 15 - Mar. 17, 2005]

Problems with Electronic Audio Reserves

Questionnaire respondents were encouraged to check the boxes next to all of the problems they encountered with electronic audio reserves and with physical sound recordings on reserve in the Music Library. 331 surveys had valid responses to the question regarding electronic sound reserve problems as seen in Figure 10. From this group, 137 (41.4%) reported disrupted streaming of the sound files due to internet or network traffic and 34 (10.3%) had problems using password and user name authentication. This compares to up to 60% reporting disrupted streaming problems and 58% having some form of username or password difficulties in Bayne and Hodge's study. 36 (10.9%) indicated that their computers were just generally too slow to process streaming sound and 65 (19.6%) did not have the correct hardware or software. 34 (10.3%) respondents listed other problems including difficulties using VPN to access the recordings from off-campus locations, encoding problems with the recordings themselves, the inexplicable tendency of the internet browser to close without warning thus requiring the user to reestablish the connection to the recordings, and general discontent with the RealAudio streaming format.

Problems with Electronic Reserves
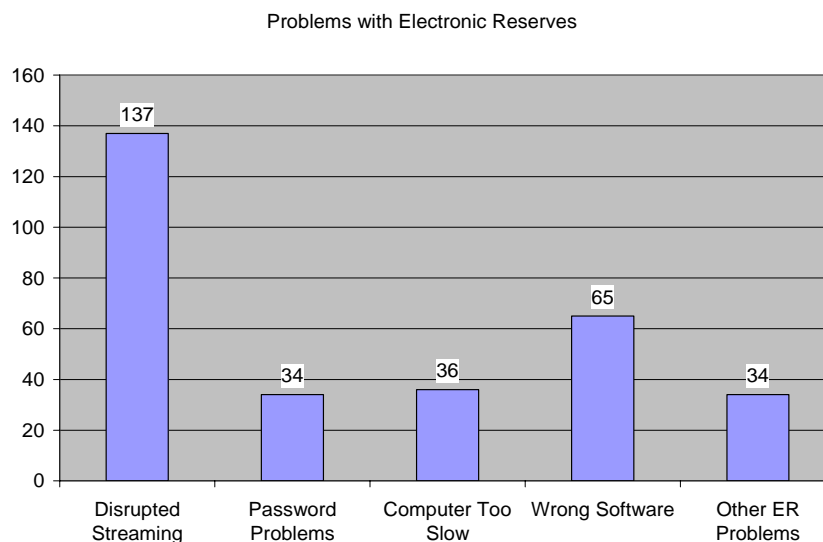
[Figure 10. Reported Problems with Electronic Sound Reserves]

Problems with Physical Sound Recordings on Reserve

A smaller number of respondents reported having problems using physical sound recordings on reserve in the Music Library, though only 97 students (28.2%) indicated that they had used physical sound recordings in the Music Library. Figure 11 shows that 33 reported that they had experienced instances when the items they needed were already checked out, while 23 were inconvenienced by the Music Library being closed when they wanted to do work. Six respondents had difficulty using the equipment to play the reserve recordings in the Music Library and 17 reported that they did not have enough time to listen to the recordings as much as they wanted. Four students listed other problems using the Music Library which included the inability to check out recordings due to loss or misshelving of reserve materials.

Problems with Music Library Reserves
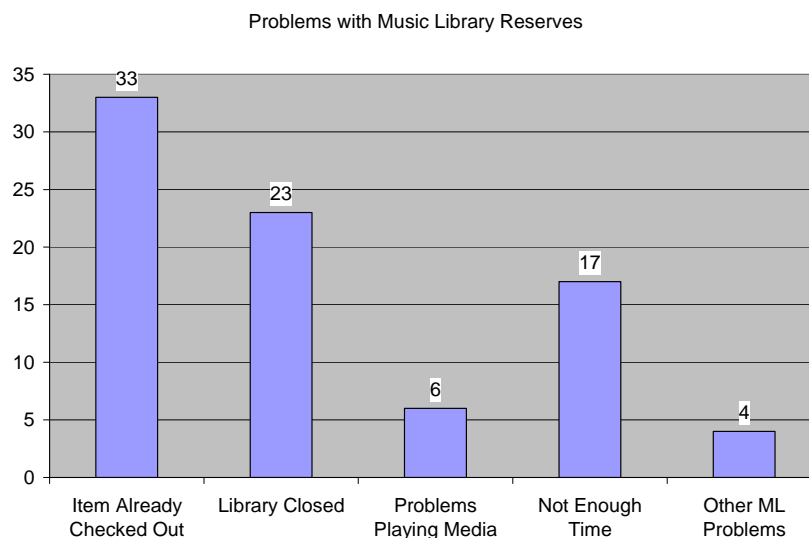
[Figure 11. Reported Problems Using Physical Sound Reserves in the Music Library]

While most of the statistics demonstrate strong support for online reserves, the

number of problems a student has with online reserves seems to increase the chances that

he or she will choose to use the Music Library's collections. For example, among those

students who report no problems, 6.25% chose the Music Library over online reserves.

With 1 problem, 12.5% chose the Music Library; with 2, 13.2%. When the number of

problems reported totaled 5, 100% of the respondents chose the music library as seen in

Figure 12. This relationship is significant: χ^2 (5, 331) = 18.850, p = .002.   It seems that

while no one problem is enough to dissuade people from using online reserves, the

aggregate of a higher number of problems will convince more people to use more

traditional formats in the Music Library.

Percentage Choosing Music Library
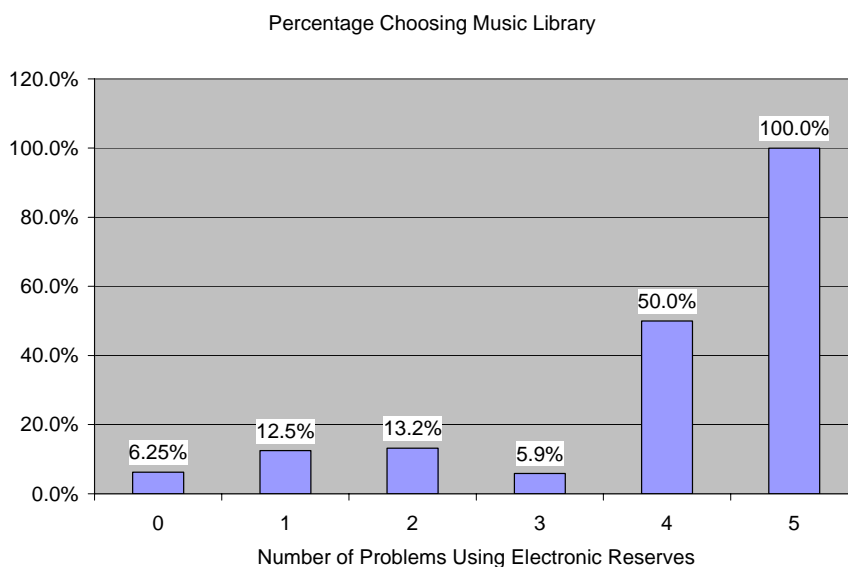
[Figure 12. Percentage of Students who Chose Physical Sound Reserves of Total Reporting Problems Using Electronic Reserves]

Participant Feedback

The questionnaire ended with the opportunity for the respondents to explain for themselves why they chose one listening style over the other. Respondents were encouraged to check boxes next to all of the reasons that they felt described why they preferred one listening style over the other as well as to supply any other reasons not listed. 333 returned questionnaires had valid responses.

Of the 296 people who preferred online reserves, the overwhelming majority (94.9% - 281) indicated that 24-hour access was a determining factor seen in Figure 13. A large majority (80.1% - 237) also indicated that having no time limit with the online reserves was important. 213 people (72.0%) marked that the ability to use any computer was a reason why they chose online reserves, and 179 (60.5%) said having the sound recording always available was a factor. 47 people listed other reasons for preferring online reserves, though most of these said that not requiring a trip to the Music Library

and the convenience of listening from home were important. One student disliked having

to go through the authentication process for every recording, while another remarked that

his roommates became angry with him for playing online music through his computer

speakers in the dormitory room.

Reasons Why Prefer Electronic Reserves
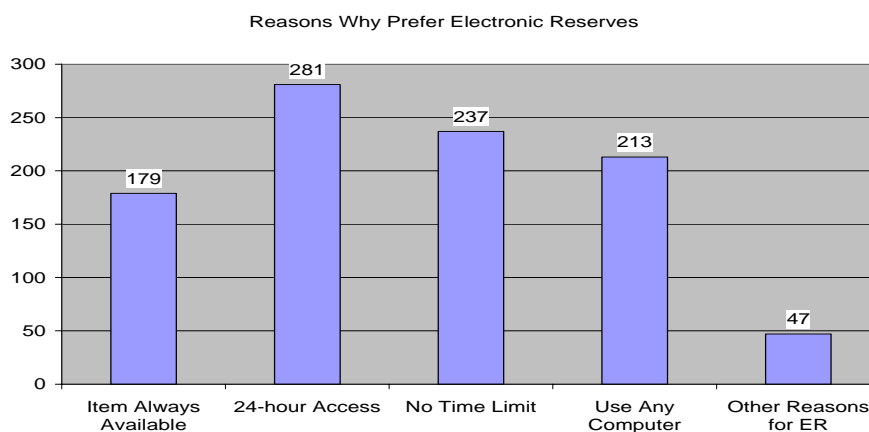
[Figure 13. Reasons Given for Choosing to Use Electronic Reserves]

Figure 14 shows that among the 35 people who preferred listening to recordings

in the Music Library, 22 (62.9%) preferred the sound quality of physical recordings to

streaming sound while 14 (40.0%) liked having access to scores and other materials in

the Music Library to enhance the listening experience. Seven people each (20.0%)

enjoyed having access to librarians and desk staff, found the online reserves system too

difficult to use, or listed other reasons for the preference. Some of the other reasons were

the ability to take the sound recording elsewhere (e.g. car, home stereo, personal CD

player) to listen, not being required to sit in front of a computer, the availability of liner

notes usually found in CD jewel cases for further information, and the general comment

that the Library is a good place to study.

Reasons Why Prefer Music Library
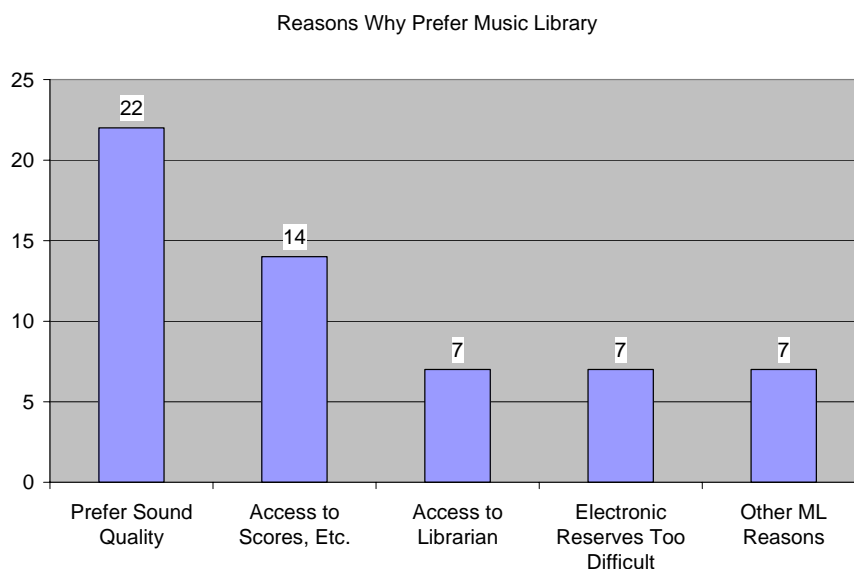
[Figure 14. Reasons Given for Choosing to Use Physical Sound Recordings in the Music Library]

DISCUSSION

It is clear from the survey results and the usage analysis that the electronic sound reserves program is quite popular among those students who have used it. In this era when students expect everything to be made available to them online, 24-hour access to electronic sound reserves from a variety of computers seems to fill an important niche for undergraduate students. Part of the reason for this high level of support might be how the expanded access to sound recordings parallels many undergraduate students' lifestyles.

Studying late at night (especially on the night before an exam) has long been one of the hallmarks of the undergraduate student's experience. Some may want to have the information they need as fresh as possible before an early morning class the next day, some need the pressure of an imminent deadline to produce quality work, while many others simply put off doing work until the last possible minute. For courses which focus primarily on materials that the students purchase for themselves, 24-hour access has

always been an option. However, for music courses which necessarily require listening to materials held by the Music Library, students in the past have had to either plan their studying schedules around the Music Library's hours or forego doing assignments. With online reserves, students can do their listening assignments whenever they have the time available (or feel sufficiently motivated to study).

Another aspect of online reserves that serves students well is the fact that the recordings are always available when they want to listen. As many a music librarian can attest to, circulation statistics for reserves rise dramatically the night before an exam when many of the students choose use the same group of recordings. This invariably leads to students waiting for their peers to finish using a recording so they can check it out. Not only is this frustrating for students, but it can be a challenge for the circulation staff at the desk as well. With large numbers of people using the same group of materials, it becomes difficult to keep track of who has checked out and returned which items, particularly when people share items before checking them back in. Using streaming audio takes care of this problem in that many people can use the same recording simultaneously from different locations. Furthermore, by enabling multiple simultaneous usages, there is no reason to place a limit on the amount of time one can spend with a particular recording. This can be especially helpful for longer recordings which may require the entire two hours normally allocated to users of physical reserve recordings for a single listening.

A third reason why students prefer online reserves is the ability to listen from a location other than the Music Library. Online reserves technically can be used from any computer with an internet connection, sound card, and speakers or headphones. Many

said that they preferred listening from home, and indeed the usage statistics showed that the majority (71.4%) of online listening was done either from dormitory rooms or from off-campus residences.

It is surprising that the number of people listening online from on-campus dormitories was much higher than those using from off-campus. It was initially supposed that the number of people using online reserves from an off-campus location would be much higher as only just over one-quarter of students live on campus. In Jacoby and Laskowski's study, nearly 8 times as many people used electronic reserves from off-campus as on-campus locations. However, the system requires VPN secure tunneling for off-campus access to online reserves and several students reported having difficulties with VPN.

Some problems using VPN are that the software must be downloaded from the university's secure server and installed on each machine using it. This normally requires that the user have administrative privileges on the computer and enough computer savvy to successfully make VPN work. Another problem is that VPN can only be used with one computer per internet connection. This means that for the large and ever-growing number of off-campus students using broadband connections with wired and wireless routers, only one computer at a time on the local network may use VPN. The potential conflict arises when a student who needs to access online reserves and is unable to do so because another person on the local network is already using the secure tunneling connection.

Another problem that may affect students' decision to listen to reserves from other on-campus locations like computer labs or libraries is disrupted streaming.

Disrupted streaming was reported by a high percentage of respondents in Bayne and

Hodge's study and although a lower percentage reported that problem in this study, the

rate of disruption is still relatively high despite improvements in networking over the past

five years. Disrupted streaming can result from a breakdown anywhere between the

location of the actual sound file on the server and the conversion to audio by the user's

computer. Since students reported that they generally had new computers (less than two

years old), it seems unlikely that raw processing power is the culprit. It is more likely

that most disruptions are caused by periods of increased traffic on the internet and

specifically on the user's ISP network that can interfere with smooth streaming of

information from the university's servers. Reports of disrupted streaming were

consistently higher among students who used an off-campus connection than those who

connected directly through the campus network.

Many of these problems might be alleviated if the electronic sound reserves

system was removed from departmental administration and brought into the larger

university electronic reserves system. The university's system for electronic print

reserves is operated by staff at the undergraduate library. Access is granted to off-

campus users by means of authentication through the EZproxy server. The main

advantage of this system is that any computer with an internet connection and a browser

may use it. It does not require any software downloads nor any special configuration on

the part of the user to gain access. All that might remain for the user to do is to download

RealPlayer to stream the files, but even this is unlikely given the ubiquity of this

particular software.

Another advantage of moving the online sound reserves program into the library system is the issue of quality control. Students complained of skips and low volume levels in the sound files themselves. Converting physical sound recordings to electronic formats can be challenging, especially when the original recordings are in non-digital formats like vinyl LPs or cassette tapes. With professional staff overseeing quality control during the encoding process for sound recordings, there is a smaller chance of getting skips or improper volume levels in the sound file.

It is likely that demand for electronic sound reserves will continue to grow in the near future as more students become familiar with the system and relatively small problems like streaming disruptions are resolved. With so much interest in online reserves, the question remains, what will the role of the physical Music Library space become? If people have the option of listening to sound recordings online or coming to the Music Library to listen to them, nearly 9 out of 10 choose the online reserves.

Several Scandinavian libraries have embraced the "music purveyor" role. The Libraries' Net Music program allows its users to borrow individual tracks from one to seven days in a downloadable format protected by Microsoft's Digital Rights Management (DRM) system. Phonofile, a group of Scandinavian music recording publishers, agreed to the idea of downloadable music through libraries with the idea that the libraries would function as a "display window" for the publisher's music and could direct users to a site to purchase the individual tracks if they sufficiently enjoyed them (Larsen 2004).

Additionally, several American colleges and universities including the Pennsylvania State University, Vanderbilt University, the University of Southern

California, and the University of Rochester have adopted the Napster model whereby students can download tracks from the university network to their computers and use them for the duration of their association with the university. These are called "tethered downloads": files that exist on personal computers in non-streaming formats but whose licenses need to be refreshed through the university's connection to Napster. When the student leaves the university and has opted not to purchase the files, the files cease to function (Maple 2005).

To be fair, Napster is being implemented through the residence hall networks at these institutions, but it does not take much imagination to see how this technology could be applied to a library electronic sound reserve system. If the electronic sound reserves existed as tethered downloads (assume licensing agreements and copyright issues were addressed), students could play them directly off of their own hard drives which would virtually eliminate the problem of disrupted playback. This would also give students the option of creating their own playlists of reserve material, a feature that some said was lacking in the current system. The downloaded files could be configured to "expire" at the end of the class, thus being functionally equivalent to borrowing from the Library. One could even imagine this technology perhaps being expanded one day to allow for the downloading of electronic sound reserves onto portable mp3 players.

Libraries are already becoming distributors of electronic items. Between local electronic reserves and interlibrary loan of electronic documents through Ariel, patrons are using libraries more and more as access points and retrieval services than locations where they can use physical items. Does this mean that music libraries are doomed to become rooms of servers full of mp3 files? Not likely.

The research for this paper has focused on the usage patterns of undergraduate music classes. These classes tend to be large and focus on core music recordings. However, the needs of upper-level music students are likely to be different. As the coursework becomes more in-depth and less survey-oriented, the physical Music Library becomes more important. The Music Library has often has many different recordings of a given work in various formats. These are useful to compare and contrast different performers' interpretations of musical compositions. The main difference between the upper-level classes and the larger survey classes in terms of sound recording use is that significantly fewer people will use a given sound recording in the upper-level classes. With only a handful of people using a particular recording, the value of providing electronic access to it decreases to the point where it would not worth the library staff's time and energy to digitize it.

CONCLUSION

The results of this study conclude that undergraduates prefer electronic sound reserves to physical sound recordings on reserve in the Music Library. Furthermore, demand for electronic sound reserves is likely to increase. This finding suggests that the Music Library should continue its active support of the system and encourage its expansion among the larger undergraduate music classes. Students do in fact use online reserves during every hour of the day and most often from home or their dormitory rooms. While there are some problems with the system as it exists now, they are largely technical issues that could be resolved if the system was brought under the larger university electronic reserves system. The most telling sign of the system's success is that the vast majority of students prefer to use it in spite of the problems. It generally

takes four or more problems using the system for a student to reject it in favor of using reserves located in the Music Library.

This recommendation by no means is meant to suggest that the Music Library is obsolete. The Music Library contains many other items that are used more easily in physical form than online. Print resources like books and monumental scores are not easily digitized, nor easily read online by patrons. The large scale needed to read scanned text and scores requires more scrolling than many people care to do.

The Music Library will continue to be valuable as a repository of print resources and less-frequently requested sound recordings as well as a source of excellent assistance and guidance from the music librarians. Knowing these strengths, the Music Library should concentrate its efforts maintaining and building its collection as a research facility and minimize its involvement with physical sound reserves.

As with any challenge in policy, a reduction in sound reserves will likely be met with some opposition; in this case, from those relatively few patrons who prefer CDs, LPs, and tapes to computer files. In an ideal environment, the Library would be able to provide both physical reserves and electronic reserves, but if a choice must be made between the two, students will be much happier with the electronic reserves. Moreover, the numbers of patrons who approve of electronic reserves will likely increase as the technical problems are resolved.

There is room for further research on this topic. At the time of this writing, it was not possible to conduct a parallel study on physical sound reserves at the Music Library to compare usage statistics with those of the electronic sound reserves. Such a study would be valuable to confirm that many more students are using electronic reserves than

their physical counterparts. It would also be useful to note any differences that occur between the ways in which the reserves are used to provide information to further improve the electronic system. Do students listen to more of the recordings using the electronic system than the physical reserves?

Other research might focus on the actual impact electronic sound reserves has on students' grade-point averages. Do those students who prefer electronic reserves receive better grades in class than those who use the Library's reserves? Such a finding would be quite valuable when determining whether or not to continue electronic reserves.

More research could center on the upper-level music students and their relationship to electronic reserves. Would digitizing recordings be of as much value to graduate students as to undergraduates? The author suspects not, but actual research would confirm or disprove that theory.

This paper opens up a dialogue about the importance of electronic sound reserves. It seems that computers will continue to have significance in the future of the Music Library and in libraries in general. Careful evaluation of the actual usage and limitations of electronic resources remains a must, however. In this way, those who have a stake in it can continue to plan for what is best for the future of the Library.

APPENDIX

Electronic Sound Reserve Usage at UNC

This is survey is being conducted as part of a study regarding electronic (online) sound reserves and the music library for INLS 392 in the School of Information and Library Science at the University of North Carolina at Chapel Hill. Completion of this questionnaire, while appreciated, is strictly voluntary. It should take about 10 minutes to complete. Participation does not affect your grade in this class. Your responses will be anonymous. Your consent to participate in this survey is implied by your completion of this questionnaire.

If you have any questions or concerns about this study, please contact Scott Phinney at 919-933-6965 or at phinney@email.unc.edu, or his advisor, Professor Diane Kelly, at 919-962-8065 or at dianek@email.unc.edu.

The Behavioral Institutional Review Board (Behavioral IRB) of the University of North Carolina at Chapel Hill has approved this study. If you have any questions about your rights as a research participant in this study, please contact the Behavioral IRB at 919-962-7761 or at aa-irb@unc.edu.

Instructions: Please check the box next to the response that you feel best answers the question. Check only one box per question unless otherwise instructed. Do not sign your name as this will compromise your anonymity.

Please detach this cover sheet and keep it for your records.

1. What is your sex?

   ☐ Male   ☐ Female

2. In what year of study are you?

   ☐ Undergraduate first year
   ☐ Undergraduate second year
   ☐ Undergraduate third year
   ☐ Undergraduate fourth year
   ☐ Undergraduate fifth year or above

3. Have you ever used electronic sound reserves before in other classes?

   ☐ Yes ☐ No

4. Where do you use electronic sound reserves most often?

   ☐ Dormitory Room
   ☐ Computer Lab
   ☐ Music Library
   ☐ Using a wireless laptop on campus
   ☐ Off-campus

(If you don't use electronic sound reserves from off-campus, skip to question 6.)

5. What type of internet connection do you use off-campus?

   ☐ Dial-up
   ☐ DSL
   ☐ Cable
   ☐ Other (Please specify) _____

6. What is the age of the computer you most commonly use to access electronic sound reserves?

   ☐ Less than 1 year old
   ☐ 1-2 years old
   ☐ More than 2 years old

7. When do you usually listen to electronic sound reserves?

   ☐ Morning (6:00 AM – 11:59 AM)
   ☐ Afternoon (12:00 PM – 5:59 PM)
   ☐ Evening (6:00 PM – 11:59 PM)
   ☐ Overnight (12:00 AM – 5:59 AM)

8. What problems have you had, if any, with electronic sound reserves? Check all that apply.

   ☐ Disrupted streaming/Network or internet slow
   ☐ Password/User name problems
   ☐ Computer too slow
   ☐ Didn't have the right software/hardware
   ☐ No problems
   ☐ Other (Please specify) _____

9. Have you ever used reserve sound recordings located in the Music Library for this or any other class?

☐ Yes ☐ No

(If you selected "No" for question 9, skip to question 11.)

10. What problems have you had, if any, with using reserve sound recordings in the Music Library? Check all that apply.

☐ Item already checked out
☐ Library closed
☐ CD/record/tape didn't work
☐ Not enough time
☐ No problems
☐ Other (Please specify) _____

11. If you had the option of either listening to sound reserves online or using a physical copy of a sound recording (for example, a CD, record, or tape) available from the Music Library, which would you choose?

☐ Listen online ☐ Use the Music Library recordings

(If you selected "Listen online", please answer question 12a and skip question 12b.
If you selected "Use the Music Library recordings, please answer question 12b and skip question 12a.)

12. a. Why would you rather listen online? Check all that apply.

☐ Item never checked out
☐ 24-hour access
☐ No time limit
☐ Use any computer
☐ Other (Please specify) _____

b. Why would you rather use the Music Library recordings? Check all that apply.

☐ Prefer sound quality of records, CDs, tapes, etc. to online streaming
☐ Access to scores and/or other print materials to enhance listening experience
☐ Access to librarian or desk staff for help or questions
☐ Too difficult to use electronic sound reserves
☐ Other (Please specify) _____

Thank you for completing this questionnaire! Please return it to the envelope at the front of the classroom.

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