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A quasi-experimental study on students' perceptions and intended use of digital recording technology in a college technology classroom

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Running Head: USE OF DIGITAL RECORDING TECHNOLOGY

A Quasi-Experimental Study on Students' Perceptions and Intended Use of Digital Recording Technology in a College Technology Classroom

by

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Abstract

This quasi-experimental study employed a modified Technology Acceptance Model approach in conjunction with a Perceived Classroom Interaction Model. The study investigated the impact of digital audio recording of college classroom lectures on students' perceptions of interaction levels, usefulness, and use of the digital media.

The study surveyed six introductory computer science and technology classes. Previous computer knowledge was not assumed. The results found no significant differences of students' perceptions of interaction levels in traditional classroom lectures. However, gender was found to have a significant effect on speaking in class when a recorder was present. No significant differences were found when it came to perceived usefulness. Most students had used or intended to make use of the recorded lectures.

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CHAPTER 1

Introduction

Overview

As faculty begin to digitize traditional face-to-face classroom sessions as audio files and look for institutional hosting options, certain questions relating to students' acceptance and use of the technology should be addressed. Will the presence of digital recording devices affect perceived classroom interaction levels, thereby limiting their involvement in classroom discussion? Will relationships exist between students' perceived involvement in classroom discussions, perceived usefulness of the digital recordings, and perceived ease of use of the means used to disseminate the digital audio files? Will these perceptions affect the use of the digital audio files? Will age and/or gender affect the perceptions and usage of these files? Do these perceptions change over time? A quasi-experimental study was used to answer these questions.

The quasi-experimental study was used to investigate two groups of three classes. The first group had traditional face-to-face classroom lecture sessions digitally (audio) recorded and had these audio recordings made available to them online. The other group of three classes did not have their traditional classroom sessions recorded, nor were recordings made available to them. Three variables relating to the social influences on students' perceptions of digital recording media were investigated here. The first construct related to the social perceptions of digital recording media. The factors included here were those that relate to students' comfort levels when speaking in front of peers, in front of the instructor, and when speaking in class with a recorder present.

The second and third constructs include those that relate to students' perceived use and perceived usefulness of the digital (audio) recording technology. The scales used to measure the acceptance and use of technology were originally developed by Fred Davis to predict the acceptance and use of technology based on the perceived usefulness, the perceived ease of use, and self-reported measures of the use of the technology (Davis, 1989).

In this new Digital Audio Technology Acceptance Model (DATAM), the questions related to the Perceived Ease of Use construct were modified to relate to digitized audio media. These survey questions inquired whether the digitized audio communication technology was easy to learn, whether the interface used to download and play back the recorded media was clear and understandable, whether students believed that it was easy to become skilled in the use of the interface used to download and play back the recorded media, whether the process used to play back the recorded media was easy to use, and whether the process used to play back the recorded media was controllable.

The questions relating to perceived usefulness, but again modified to relate to digitized audio recordings in the DATAM, included: whether by using the recorded media, the students perceived that they would learn the material more quickly; whether the digital recordings would improve grade performance; whether the digital recordings would improve effectiveness of learning the material presented in the classroom lecture session; whether the use of recorded media would make learning the material easier; and whether the students perceived that the recorded media was useful to them.

Purpose of the Study and Research Questions

The purpose of this quasi-experimental study was to determine whether the social factors that affect student involvement in classroom discussions as perceived by the students

had an effect on students' perceived usefulness, perceived ease of use, and self-reported measures of use of the digital recordings of traditional classroom sessions. If a relationship was found to exist, did it change over time? Did age and/or gender factor in to this relationship? (See Figure 1)

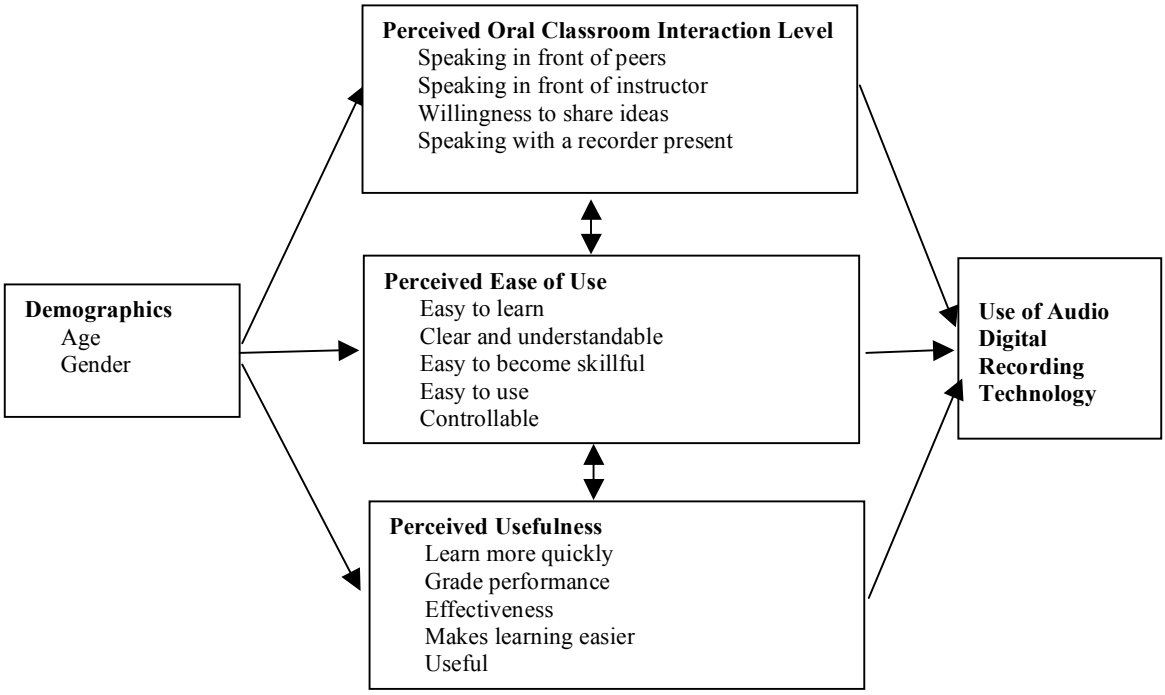

Figure 1. Digital Recording Technology Acceptance Model (Modification of Davis's Technology Acceptance Model).

The following research questions were posed:

- Does the presence of a digital recorder affect student perceived participation levels during a traditional classroom session?
- Once students become accustomed to the digital recorder, would perceived participation levels increase?

- Does age have an effect on the perceived usefulness and perceived ease of use of the recorded classroom session?
- Does gender have an effect on the perceived usefulness and perceived ease of use of the recorded classroom session?
- Are those who perceive the digital recordings as useful more likely to use the digital recordings?
- Are those who perceive the digital recording as easy to use more likely to use the recordings?

Delimitations

This study investigated the perceptions of the students as related to using digital audio recordings of traditional classroom sessions. Therefore, actual counts of participation were not examined in this study. As had been done in the original Davis study, self-reported usages of the digital recordings were requested of the students to reflect the use of the recordings. In addition, the initial surveys were distributed during the first or second lecture of the semester. Since this had taken place at the beginning of the semester, this decreased the likelihood that gender bias by faculty or students would have affected the responses made by the respondents on the surveys.

Significance of the Study

Faculty, students, and information technology administrators need to become part of the democratic process when selecting and implementing appropriate technology in the college classroom. Technology administrators, in order to justify the expense of training faculty to use the technology and the added expense incurred in hiring the personnel necessary to manage and maintain the restricted servers, will need to know whether students

will make use of the technology. Additionally, faculty embracing this method of disseminating recordings of the traditional classroom session discussions will need to be advised of possible adverse effects of digital files that include student voices or likenesses. Students will need to become involved to determine whether the device will affect participation and use of the digital recordings. Those already using this technology will be able to justify or make adjustments in their use of the digital recordings to further enhance student learning.

Definitions

iPod: An iPod is an Apple brand mp3 player.

iTunes: This is Apple Computer Corporation's version of a multimedia player (computer application). If the computer is connected to the Internet and the person running the program requests access to Apple's site, iTunes can acquire content such as real-time radio broadcasts, audio, data files, and/or visual files from podcast sites (see the definition of podcast below), music files from Apple's iTunes store (some of these music files are free; some have a fixed fee), and course content through connection to iTunesU (see below). The home page for iTunes can be found at http://www.apple.com.

iTunesU: This service, provided by Apple Computer Corporation, allows instructors of member institutions to upload multimedia files and related course materials to the iTunesU Web site. The recordings of the classroom sessions and supporting materials are accessed through the iTunes application by going to the iTunes store, then selecting podcasts.

mp3: An mp3 is an audio file compression standard used by the recording industry.

participation: Student participation includes verbally answering questions posed by the instructor, asking questions, or otherwise verbally participating in discussions during the

classroom session. Participation also includes nonverbal communication such as raising a hand in response to questions. However, this study will concentrate on the verbal form of participation.

podcast: A podcast is a set of audio files that pertain to one theme. These files are usually, but not always, obtained by requesting a subscription to the podcast site using proprietary software such as iTunes. The process of subscribing to a podcast usually begins with obtaining the address of the podcast. This is typically followed by a request from the software that any updates be automatically downloaded to the requesting computer whenever updates to the podcast site are made (as long as the requesting software is executing). Another way to obtain the files from the podcast site is to visit the location of the site using a World Wide Web browser directly. The user may then select from the list of audio files directly by clicking on the link (or image) of the audio file that is of interest. The audio files that are part of the podcast are in mp3 standard audio format and can be played by any computer.

recorded classroom sessions: These classroom sessions will include all of the instructional methods included in the "Traditional classroom sessions" definition except for those times where there are long periods of silence such as during quizzes and tests.

traditional classroom sessions: The term *traditional classroom*, or *classroom session*, as it is being used in this manuscript, has the meaning of a face-to-face meeting period scheduled by the institution where the methods of instruction include all in-class teaching/learning strategies. These strategies will consist of, but are not limited to, teacher-led instruction, student-led instruction, teacher posing questions, students answering questions, student led-discussions, planned student activities, small student group

discussions, large student group discussions, quizzes, tests, and so on. These traditional classroom sessions may also be called “lectures” or “lecture sessions” within this document.

CHAPTER 2

Literature Review

Fritschner (2000) defines participation as the "interaction between students and instructors in the classroom" (p. 342). Research shows that this active student involvement in the classroom has a positive affect on the learning process (Vavilis, 2004; Weaver, 2005). Both students and teachers strongly agree with this premise (Nunn, 1996). Weaver also found that not only does participation increase one's own understanding of the topic, but, by participating in discussion, the students must come to class better prepared, which will increase the understanding of the topic for themselves as well as their classmates.

Another possible reason for decreased classroom interactions levels is that some students may fear disapproval of peers and may choose not to participate in classroom discussions (Weaver, 2005). According to Weaver, "These findings support our and others' argument that conformity to peer pressures and group norms will restrict the amount of students' participation in class" (p. 588).

Yet another reason why classroom interaction levels may be reduced is that some students, by sharing their ideas in classroom discussion, may fear that they will lose their intellectual property rights. As students' ideas become part of the classroom session recording, students may retain a joint ownership of the copyright of the "published" works (Ludlow, 2003; Bahorski, 2007). It would be beneficial to determine whether these recordings stifle interjection of ideas from students for fear of losing their intellectual property rights.

To better understand if students who have access to digitally recoded classroom session files via the Internet will, as stakeholders, accept the technology and plan to use it,

research projects searching for answers for the same type of questions were used as reference here. Of these studies, the most well known was performed by Fred Davis. The Technology Acceptance Model (TAM) developed by Davis (1989) had been intended to "pursue better measures for predicting and explaining use" of technology systems (p. 320). Davis set out to develop new measurement scales for perceived usefulness and perceived ease of use. See Appendix A for the original questions relating to perceived usefulness and perceived ease of use.

Davis addressed the validity of the instrument by presenting a rigorous construction regime. Davis used the Spearman-Brown Prophecy formula to reliably determine the number of questions needed for each scale. He determined that he would need 10 questions per construct. He included 14 questions for each construct based on the formula. Davis conducted 15 interviews as a pre-test to detect semantic inconsistencies in the questionnaire for content validity. Davis updated the instrument. Then, to check reliability, he performed a pilot study with 112 computer users using "two different computer systems" (Davis, 1989, p. 323). Davis checked the items for convergent validity (checking to see if items in each construct resulted in measures reflecting the same construct), for discriminant validity (checking to see if measures for each item were differentiated from the other items in the construct), and factor validity. Interestingly, upon checking for convergent validity and discriminant validity, Davis found that he needed to change the negatively phrased items to be positively phrased. The final instrument resulted in six questions for each construct.

In the second part of Davis's study, the survey was given to 40 participants, this time using two different IBM graphical systems. Again, Davis checked the items for convergent validity, discriminant validity, and factor validity. Davis found that the new measurement

scales returned consistent results and could be used to reliably determine computer use based on perceived usefulness and perceived ease of use.

In a subsequent study, Adams, Nelson, and Todd (1992) replicated the previous research by Davis. The intent of the study was to test the validity of Davis's measurement scales purported to determine computer use based on perceived usefulness and perceived ease of use of computer-based systems.

In this research study, Adams et al. (1992) mimic the two-stage test design of Davis. In the first study, the authors selected two different types of communications systems: four email systems and two voice mail systems. The instrument was distributed to 260 participants. Of these, 118 were returned. Discriminant validity, convergent validity, and factor validity were tested and found to be in line with Davis's findings. The authors concluded that this first study demonstrated that the measurement scales could be used to determine computer use based on the perceived usefulness and perceived ease of use of homogeneous computer systems.

For the second part of the Adams' two-stage design, the authors used the same questions as the Davis study except that they added two questions: "It was easy to become skillful using …" and "It is easy to remember how to perform tasks using …" (Adams et al., 1992, p. 237). These questions, according to the authors, made their study and the Davis study equivalent.

The questionnaire was made available over a one-week period to students who made use of a business school's computer lab. Although the study did not state the total number of students who used the computer lab, of those students who did make use of the lab, 73 students completed the questionnaire. Again, discriminant validity, convergent validity, and

factorial validity were tested on the instrument and found to be in line with Davis's findings. The results of the study, however, were inconsistent. With regard to WordPerfect and Lotus 1-2-3, like Davis's findings, this study revealed that perceived usefulness was a more important indicator of computer use than was the perceived ease of use of the WordPerfect and Lotus 1-2-3 software applications. However, Harvard Graphics application users indicated that ease of use was more important than perceived usefulness.

In 1993, Hendrickson, Massey, and Cronan investigated the test-retest reliability of the Davis scales. They stated that, although the Davis study had been reproduced by Adams in 1992, no one had analyzed test-retest reliability. Test-retest reliability, as opposed to replication, uses "the same subject group for multiple instrument administrations" (Hendrickson et al., 1993, p. 227). The advantage here, as pointed out by the study, is that "this eliminates any potential confounding due to heterogeneous subjects" (p. 227).

The Hendrickson study noted that the Davis study instrument was given to two heterogeneous groups, one using an application program for email and the other using a database application program. In the Hendrickson study, the authors administered the instrument to two samples, one using the spreadsheet application Lotus 1-2-3, and the other using the database application, Paradox. The study determined that the Davis instrument "exhibits a high degree of test-retest reliability" (Hendrickson et al., 1993, p. 229).

In 2004, Alshare, Grandon, and Miller presented the study of the relationship between perceived ease of use and perceived usefulness as developed by Davis in the Technology Acceptance Model (TAM), added the relationship of these to students' own perception of their computer literacy, and then investigated the social influences of negative attitude on computer usage (Alshare et al., 2004). In addition, the authors considered the effect of

gender, age, educational background, classification, and income on computer use. To test the reliability of the instrument items, they used Cronbach coefficient reliability test. A factor analysis was performed to test the validity of the items. The authors concluded that gender was an issue when it came to computer literacy and computer usage. Gender did affect self-perceptions of the level of computer knowledge. The study showed that students with lower incomes did perceive themselves as having less computer knowledge than those students with high incomes. Not investigated as being a factor in the Davis study, Alshare found that perceived ease of use and perceived usefulness is influenced by gender. It was found that "men's technology decisions were more strongly influenced by the perceptions of usefulness, while women were more strongly influenced by perceptions of ease of use" (p. 168).

Age and gender may influence the acceptance of digital audio technology in the classroom. As acknowledged by Ipsos (2006), a marketing research organization, age and gender already play a large role in the purchase of mp3 players:

> -Younger Americans are driving recent growth, with over half of teens now owning a Portable MP3 Player (54%), and one third of 18-34 year olds (30%). Older Americans are less likely to own these devices overall, but still represent a sizable and consistent presence in the market (13% of 35 – 54 year olds report owning a Portable MP3 Player).
>
> -Males continue to lead females in Portable MP3 Player ownership, with nearly one quarter (24%) of U.S. males aged 12 and older owning a device, compared to 16% of females. (¶ 4)

As discussed, it has been found that participation has a positive effect on the learning process. However, as Fassinger (2000) stated, "Students may not possess the comfort levels"

that lead to participation as assumed by their professors (p. 45). In addition, certain social factors have been found to have an effect on students' classroom participation. Using the research by Davis and those who followed him, this study investigated whether the inclusion of the digital audio recorder in the classroom, recording comments made by the teacher and the students, had an effect on the level of participation in the classroom and on the acceptance of the digital audio recording technology by the students, and whether this acceptance had an effect on the student's intent to use the digital audio recording technology. As gender and age have been found to influence the acceptance of technology, this was also investigated.

CHAPTER 3

Methods and Procedures

The purpose of this study was to determine whether a relationship exists between student perceived involvement in classroom discussions during recorded classroom sessions and the self-reported use of the digital recordings for study purposes. If a relationship was found to exist, did it change over time? Did age and gender have an effect on these relationships?

This study made use of a quasi-experimental design to investigate whether students' perception of the levels of participation had an effect on the students' perceived usefulness and perceived use of the digital audio communication technology. Student participation includes verbally answering questions posed by the instructor, asking questions, and verbally participating in class discussions during the recorded classroom sessions. Two groups of introductory technology courses were selected: classes where the lecture sessions were recorded and made available online to the students in those courses, and classes where the lecture sessions were not recorded. Survey data were collected from the students and analyzed to test the hypotheses of the study.

Hypotheses

H_1: There is no difference between perceived student interaction levels during traditional classroom sessions where a digital recorder is recording the classroom sessions and in those traditional classroom sessions where a recorder is not present.

H_2: In classes where the sessions are recorded, students' perceived participation levels will not change over time.

H_3: Age will not have an effect on perceived usefulness of the recorded sessions.

H_4: Age will not have an effect on perceived ease of use of the recorded sessions.

H_5: There is no significant difference between men and women as to the perceived usefulness of recorded sessions.

H_6: There is no significant difference between men and women as to the perceived ease of use of the recorded sessions.

H_7: Students who perceive the recorded classroom sessions as useful are no more likely to use the digital recordings than students who do not perceive the recorded sessions as useful.

H_8: Students who perceive the digitally recorded classroom sessions as easy to use are no more likely to use the digital recordings than those who do not perceive the digitally recording as easy to use.

Instrument Development

Prior to the pilot study, the instruments went through a development phase. Students and faculty were interviewed individually as well as in small groups. First, the interviewees were given time to complete the survey. Then, each question was discussed individually to determine whether 1) the interviewee(s) understood the question and 2) if they understood that the question reflected what was intended. After some adjustments to the questions and ordering, another set of interviews ensued, following the same interview pattern as the first set of interviews. After further adjustments, a third group of students was interviewed. The survey was then sent to three faculty members, two of whom were expert at survey design and construction, and one administrator for their critique and suggested modifications. By the beginning of the Fall 2008 semester, eleven students had been interviewed individually and in small groups, as well as five faculty members, and two administrators. Less than ten

minutes was needed to complete the surveys by the interviewees. Therefore, it was determined that ten minutes would be allocated to complete the surveys when it came time to distribute them in the classroom. The final survey instruments were ready for the pilot that was to take place during the Fall 2008 semester.

The Pilot Study

To prepare for the pilot, two faculty members who showed interest in participating in the practice research study had been contacted. One of the faculty members had agreed to be recorded while the other had agreed to be the control "group." Several procedural areas needed to be piloted for the research study. These were

- Selecting an appropriate digital audio recording device
- Training faculty in the use of the digital recording device
- Acquiring space on the institution's podcasting site for each of the faculty members who were to record their classroom lectures
- Training faculty in the creation and maintenance of a podcasting site
- Timing and dissemination of the survey instruments
- Collecting classroom observational data
- Organizing the data into the SPSS program application

Note that only those faculty who were recording their classroom lectures were given instruction on the use of the digital audio recording device and instruction on the use and maintenance of the podcasting site.

Selecting Appropriate Digital Recorder Technology: Several possible digital recording devices were selected and tested during the pilot study that was performed during the Fall 2008 semester to find the most appropriate recording media for the research study that was

to commence during the Winter of 2009. The recording media that were tested included an Apple iPod, a laptop with digital voice recording software with and without an external microphone, a Sony model ICD-P620 digital audio recorder with and without an external microphone, and a Sony model ICD-UX80 digital audio recorder with and without an external microphone. Each had advantages and disadvantages related to recording classroom conversations.

The first digital recording device tested to record the classroom sessions was an iPod with an optional microphone system. An iPod is an Apple brand mp3 player. The iPod was selected because of the students' familiarity with the device; it is owned by a majority of people who own mp3 players (Apple, 2006). With an optional microphone with built-in speaker attachment, the iPod adequately recorded conversations in a classroom. As the instructor moved about the room, the sound continued to be of high quality. Student questions were heard clearly in a typical-size classroom. The disadvantage to using the iPod and external microphone was the cost. Having to record three classes would have been cost-prohibitive.

Next, a laptop was tested with and without an external microphone as a recording media. Audacity, a free downloadable software application, was tested as the software to record the audio. The software was easy to use, and the Blue Snowflake microphone, a commercially available, professional model, worked well to pick up voices anywhere in the room. The disadvantage of this method was that the laptop was bulky and had to be transported to the classroom. The use of the laptop for the recording may have been an issue if the instructor also needed to use the machine during the classroom lecture while recording

was in progress.

The next method of recording tested the use of the Sony model ICD-P620 digital audio recorder. This model was very affordable and recorded well with the use of an external microphone. It was found that the internal microphone picked up noises when handling the recorder especially when turning it on, turning it off, or when pausing. The biggest disadvantage to this device was the process that was needed to export the digital audio file from the device. This model needed a special cable and a proprietary software application supplied by Sony to access the recordings on the device. Once the software program accessed the recording and downloaded it to the computer, the proprietary software would again be needed to export the audio file into a format that would be recognized by another computer program. Audacity was then used to translate the wav audio file (the recorder stored the file in this audio format) to the required mp3 audio file format. This process seemed too cumbersome and inefficient for the number of recordings that needed to be translated.

The final and most promising test was based on the use of Sony model ICD-UX80 digital audio recorder. This recorder has a built-in USB port (so no cables are necessary) and records directly in mp3 format. Once the recording device was attached to the computer via the USB port, the computer treated the device as an external hard disk drive. Accessing the audio mp3 file was as easy as dragging the file from the device and dropping it into a folder on the computer. Used in conjunction with the Sony model ECM-DS70P stereo microphone especially made for digital recorders, the sound quality was excellent and the device was extremely easy to use.

In addition to testing the recording devices, five external microphones were also

tested. These included the

1) MicroMemo microphone specifically manufactured for the iPod family
2) The Snowflake microphone manufactured by Blue Microphones
3) The ECM-CS10 stereo microphone by Sony
4) The ECM-DS70P stereo microphone by Sony
5) The ECMMS907 battery powered, stereo microphone by Sony.

As implied under number one above, the MicroMemo microphone was used to test the appropriateness of the iPod as a digital audio recorder. It performed well in a classroom situation. The Snowflake microphone did an excellent job in conjunction with the computer and the Audacity program. The smaller microphones, the Sony ECM-CS10, the Sony ECM-DS70P, and the Sony ECMMS907 were tested with the smaller hand-held digital voice recorders for ease of portability. It was found that the most expensive microphone, the ECMMS907 that had an internal battery, increased the life of the digital recorder's battery. However, the microphone did not pick up voices in the room as well as the other two smaller microphones. The microphone of choice turned out to be the ECM-DS70P, which did an excellent job of recording in the intended classroom environment when paired with the small Sony digital recorder (model ICD-UX80).

Training faculty in the use of the digital recording device: During the pilot, the final model of digital recording device was selected. This selection was based on ease of use, portability, and ease of accessing the saved digital audio file. The directions on how to use the recorder were discussed orally with the participating faculty members.

Acquiring space on the institution's podcasting site for each of the faculty members that were to record their classroom lectures: The institution's technology department podcasting liaison was contacted. Each faculty member was granted podcasting access.

Training faculty in the creation and maintenance of a podcasting site: Each faculty member received individualized instruction on creating and updating the podcasting site. In addition to this initial instruction, a podcasting instructions handout was created and distributed to them. See Appendix B for the podcasting instruction document.

Timing and dissemination of the survey instrument: Prior to the pilot, recording classroom lectures was planned to begin during the third week of the semester. This time was selected to wait until the student class list had stabilized. The faculty member who was involved in the pilot suggested that the recordings be made available sooner in the semester. Also, those faculty members who had voiced their interest in having their classroom lectures recorded as part of the study that was to take place the following semester requested that recording begin earlier as well. As a result of these faculty requests, the classroom lecture recordings were moved from the third week to the beginning of the semester for the research study.

Collecting classroom observational data: During the pilot observations, everything that the faculty member did was written down. Also, each time a student asked a question, it was noted. As a result of the tedious note-taking, a chart was created to aid in the notation of classroom activities. What resulted was a chart that listed instructor and student activities across the top of the page and a time-line down the side of the sheet. Whatever actions the instructor took could then be noted with a time-line marking the number of minutes consumed by the activity as well as indicating the method of instruction used in each type of

activity. Likewise, the number of questions by instructor and/or by students could be indicated on the timeline. See Appendix C for a sample chart.

Organizing the data into the SPSS program application: The pilot resulted in the creation of two SPSS data files, one for the comparison of the experimental and control group, and one for the pretest and posttest questions given to the experimental group. The pilot was time well spent in preparation for the research study that was to commence the following semester.

Research Study Participants and Sampling Method

The research study took place during a fifteen-week semester in the winter of 2009 at a regionally accredited public university of approximately 24,000 students. The students enrolled in introductory computer science and technology courses were selected as the population. These courses did not assume prior computer knowledge. These introductory computer science and technology courses were open to students from any major or minor throughout the university. Historically, half of the students who had taken the introductory technology courses were freshmen, with the other half of the students made up of other levels of students from sophomores to graduate students. Recent changes in the general education guidelines have resulted in a more balanced number of students coming from all levels, mainly freshmen through seniors. The number of introductory technology courses taught throughout the university fluctuated as more sections were offered during the fall semester than during the winter semester. The sample was composed of students attending six sections of computer science and introductory technology courses. The selection of classes was made based on the willingness of the instructors to become part of the study.

Of the six classes selected for this study, three were assigned to Group A with the remaining three classes assigned to Group B. The first group, Group A, received the surveys, were notified that their classroom sessions would be recorded, and were advised that their recorded sessions would become available to them online. Group B became the control group. Group B's classes received the surveys but were not recorded.

The Survey Instruments

Two survey instruments were used in this study. The first instrument consisted of two parts. The first part of this instrument requested demographic data. The demographic data collected in this survey included questions requesting information about age, gender, class-standing, major, and perceived computer literacy knowledge. The data collected as a result of this instrument were used to test if the non-randomly assigned students in classes were equivalent prior to the start of the study. Age and gender were then used in conjunction with the data gathered by the second part of this first survey instrument and again in conjunction with the results gathered by the second instrument.

In addition to the demographic data, the second part of this first survey instrument requested information related to the following constructs: perceived classroom interaction, perceived usefulness, and self-reported measures of forecasted use of the digital recordings of classroom sessions. To gather data on the social influences of perceived classroom interaction, the students were asked to rate the effect that the digital recorder would have on classroom interaction. This second part of the first survey instrument relied heavily on the Likert scale format.

The questions relating to perceived usefulness and perceived ease of use were based

on the instrument developed and validated by Davis in 1989 and again validated in subsequent studies (Adams et al., 1992; Hendrickson et al., 1993; Alshare et al., 2004). Subsequent studies performed by Adams et al., Hendrickson et al., and Alshare et al. modified the original measurement scales developed by Davis to relate to the particular technology being studied at that time. Following this pattern, this study included the Davis questions similarly modified to reflect the current technology in question, namely, the use of digital audio communication technology.

Both Groups A and B received the first survey containing the Demographic, Perceived Classroom Interaction, the Perceived Usefulness, and the Intended Use questions at the beginning of the semester. A second survey containing Perceived Classroom Interaction, Perceived Usefulness, and Perceived Ease of Use questions was distributed to the classes that made up the recorded group (Group B) after the third week of recorded classroom lectures. See Appendix D for the first survey given to both groups. See Appendix E for the follow-up survey distributed to the recorded classes.

Research and Collection Procedures

Prior to the beginning of the semester, those instructors who had their classroom lectures recorded as part of the study needed to be trained in using the digital recorder, connecting the digital recorder to a computer, using a software application to extract the recorded session if necessary, and in uploading the session to an online podcasting hosting site on the World Wide Web (WWW). The podcasting host site held a collection of mp3 standard audio format files that were made available online to persons who 1) have the address of the site and 2) are interested and request the file(s) that make up the podcast. Since

some digital audio recorders need proprietary software to extract the digital audio file, training in this area would be necessary if such a device were selected. This extraction software, if used, would have imported the recorded session from the digital recorder and saved the extracted files onto the computer. Since podcast host sites require that digital audio files be of the mp3 format type, translation to this type file format would have been necessary by the manufacturer's proprietary software. Once the file was in the mp3 format, it was ready to be uploaded to the podcasting host site. (The proprietary software mentioned here was not needed because the device used for this study recorded and stored the digital audio files directly in mp3 format.) The instructor distributed the podcasting host Web address to the students once the files had been uploaded and made available to them. The students then were able to access the podcasting host Web site and download the digital audio file(s) to their computers. This allowed the students to play back the audio file using any Web browser, audio multimedia application, or mp3 player.

In order to upload the digital audio files to a podcasting (host) site, the instructor needed to have access to a computer with Internet capability with an up-to-date Web browser. The digital audio recording device required that the correct cables or direct connection port be accessible in order to connect it to the computer. The computer needed to have the correct software, if the format of the audio recording differed from that of mp3, to import the recorded classroom session files and save the recording in an mp3 format.

The students of each class in Group A, the recorded group, needed access to the digitized classroom sessions. To gain access to the recordings, the students needed to know the Web address of the class podcast site. Students were given instructions on how to find

and access the recorded sessions. In order to listen to the recorded lectures, the students needed to have access to a computer, that the computer be connected to the Internet, and that the computer have an up-to-date Web browser. At that point, any up-to-date Web browser could have been used to play back the recorded classroom sessions. The students could, if they had access to an mp3 player, download the classroom session to their own computer and then download the file(s) to an mp3 player in order to play back the session as many times as they wished, at their own convenience. See Appendix F to see a sample of a student instruction sheet with written directions to access the class podcasting site.

At the beginning of the semester, both groups were surveyed. This survey was distributed in paper format to the classes by the researcher. The researcher then collected the surveys from the students.

After the third week of recording the classroom lectures, the recorded classes received a second survey. This survey included questions on perceived classroom interaction if a digital recorder were present during classroom session, questions on perceived usefulness of recorded classroom sessions, questions regarding perceived ease of use, and a self-reporting of the use of digital recorded classroom sessions. This survey was distributed in paper format to the classes by the researcher. The researcher again collected the surveys from the students. This survey was made up mainly of Likert scale questions.

Response Rate

All students who were in attendance in the six classes on the day the first surveys were distributed decided to participate in the study. The first survey had a total of 107 respondents. The second survey was also distributed in the three experimental classrooms

three weeks later. All 53 students who were in attendance on the day the second instrument was distributed participated in the survey.

Data Analysis

This study investigated perceived levels of student participation at the beginning of the semester for both groups, and again after three weeks of recording classroom lectures for those classes that were recorded. The first survey included two sections. The first section of the survey instrument contained questions that pertained to demographic information. These data were used to determine if the non-randomly assigned classes were equivalent prior to the start of the study. A factorial analysis was performed on the questions to reduce the number of questions to a more manageable amount. ANOVA and *t* tests were then used on the data to determine if the groups were equivalent.

The second part of the first survey contained questions pertaining to perceived vocal classroom interaction levels, perceived ease of use, and perceived usefulness, and questions on self-reported level of intended use of the digital audio communication technology. These surveys were given to both groups at the beginning of the semester. Independent *t* tests were used to determine gender differences of the Likert scale items of perceived oral classroom interaction, perceived usefulness, and perceived ease of use items individually. The ANOVA was used "for comparing sample means to see if there is sufficient evidence to infer that the means of the corresponding population distributions also differ" (George, 2007, p. 144). To determine gender differences among the groups, independent *t* tests were used on the data. To determine differences in age groups, the ANOVA was used to perform the tests on the data. Since the ANOVA "does not indicate where the difference is or what the differences are" (if differences are found), other tests, although not used in this study, such as "Tukey's

honestly significant difference (HSD), least significant difference (LSD), and Bonferroni" tests, would be appropriate to indicate these differences (p. 144).

The second survey repeated the questions on perceived classroom interaction and perceived usefulness of the first survey and added the questions on perceived ease of use. This survey instrument was distributed after the third week of recording classroom lectures to the recorded classes. The intent of this survey was to see if a change had occurred over time for perceived classroom interaction and perceived usefulness. Also, the survey intended to measure perceived ease of use of the digital playback technology. The type of analyses that were performed on the perceived classroom interaction and perceived usefulness responses utilized paired sample *t* tests. Further analysis using ANOVA and independent *t* tests were performed on the use questions to determine if age, gender, and ownership of an mp3 player had an effect on perceived ease of use.

Validation

Face validity: In order to test for face validity of the survey instruments, two faculty members who were expert at creating surveys were recruited to give feedback on the structure and design of the surveys during the design process.

History: Both groups, Group A and Group B, were selected from different times of the morning, afternoon, and evening. This decreased the likelihood that the internal validity would be threatened.

Maturation: As this study was performed during a short time period to adults, maturation changes should not occur.

Testing: As there was a pre-test and a post-test, the selection of three groups should alleviate the threat of the post-test altering the results of the study.

Instrumentation: As previously discussed, a total of eleven students, five faculty members, and five administrators were interviewed or otherwise enlisted to determine clarity of the questions and to determine whether the responses relate to the intended constructs. A pilot study was then used to test the instrumentation. The instruments were then "set" before the surveys were distributed to the classes as part of the research study.

Statistical regression: Students were not selected based on a test score. Therefore, only the experimental group of students saw the survey questions twice. The control group saw the survey questions once. The results of the surveys should not have been affected by a progressive series of repeated questions.

Differential selection of participants: This study had no control over which students enrolled in which classes. This was a purposive sample. The demographic information was gathered to determine whether differences existed between the groups. In this study, the groups could not be randomized. There was no control over who would teach which class. Teachers were trained to try to reduce the threats to differential selection.

Mortality: In order to maintain motivation, one winner per class was randomly selected by the instructor to win an iPod shuffle. The random drawing was made at the time that the surveys were completed. Those who were in attendance the day of the survey were part of the drawing. The number of surveys submitted by the class determined the number of cards that were placed into a paper bag. The instructor drew a number from a paper bag that coincided with the winning survey form. As a means of maintaining a pool of students in the experimental and control groups, the study selected three classes for each group.

Selection-maturation interaction: Both groups were observed and surveyed during the

same time period. Training of the faculty who taught the classes as to procedures of the recordings in the experimental group took place at the beginning of the semester. Each faculty member worked with the same set of procedures.

Human Subjects Protection

Because this study made use of student participants, it needed the approval of the Eastern Michigan University Institutional Review Board (IRB) for human subjects protection. Participation in this study was completely voluntary and confidential. The student could withdraw from the study at any time. Students and faculty in past practice have used video and voice recordings in classrooms. Therefore, no new treatments were being proposed that are not currently being used in educational settings. (See Appendix G for a copy of the Human Subjects Approval Letter.)

Resources

Three digital recording devices capable of recording at least two hours of classroom sessions were purchased for the three classes that recorded the classroom sessions. The Department of Computer Science absorbed paper and copy costs. An incentive for students to participate in the study was included as part of the resources needed for the study. For those students who participated in the study, one student per class was randomly selected to receive an iPod shuffle.

CHAPTER 4

Data Analysis

The purpose of this study was to determine whether social factors that affect student involvement in classroom discussions as perceived by the students have an effect on students' perceived usefulness, perceived ease of use, and self-reported measures of use of digital audio recordings of traditional classroom sessions. If a relationship does exist, does it change over time? Do age and gender factor in to this relationship?

Description of Classes Selected for the Research Study

The research study was made up of two groups of three classes. Three classes were to make up the experimental group. These three classes had their classroom lectures recorded and made available to them online in the form of podcasts. The other three classes did not have their classroom lectures recorded, nor did they have access to recorded lecture sessions online. Six classes in introductory computer science and technology were selected for the study. Of these, all six classroom lecture sessions were observed for a period of three weeks. Each classroom lecture was led by tenured faculty with at least ten years' experience at the university. All six classes had 100 minutes of classroom lecture per week and 100 minutes of computer lab time for hands-on projects. During the classroom lecture, all faculty involved lectured at least 85% of the time, periodically asked questions to check for understanding, and had included time during the classroom lectures for student activities.

Description of Sample Demographic Data

The two groups of three classes each had a total of 107 students. Of these, 38 students were among the control group (Group 0), leaving 69 students in the experimental group (Group 1). The two groups were made up of the following classes: Group 0 was made up of

classes 2, 4, and 5; Group 1 was made up of classes 1, 3, and 6. The number of students and percentages that made up each class were as follows: 28 students in class 1 made up 26.2% of the sample; 13 students in class 2 made up 12.1% of the sample; 16 students in class 4 made up 15.0% of the sample; 12 students in class 5 made up 12.0% of the sample; and 25 students in class 6 made up 23.4% of the sample. A table describing the six classes as they compared to the two groups is presented in Table 1.

Table 1

Dispersion of students among classes and groups

Class	Group	Frequency	Percent
1	1	28	26.2
2	0	13	12.1
3	1	16	15.0
4	0	13	12.1
5	0	12	11.2
6	1	25	23.4

The students were asked questions that related to demographic data that included the characteristics of age, gender, academic status, and whether the students owned an mp3 player. The results of the demographic section of the survey revealed that most students (57.5% or 61 students) were 21 or younger. Of these, 10.4% (or 11 students) were 18 years old, 15.1% (or 16 students) were 19 years old, 15.9% (or 17 students) were 20 years old, and 15.9% (or 17 students) were 21 years old. Of the remaining students, 15.9% (or 17 students) were between the ages of 22 and 23, 15.9% (or 17 students) were between the ages of 24 and

28, and 10.4% (or 11 students) were 30 and over. To aid in the analysis of the data, the ages were distributed proportionately among the age groups (see Table 2 for the list of the age distributions.) Of the student respondents, 41 were female and 66 were male. Their academic status included 15 freshmen, 24 sophomores, 30 juniors, 32 seniors, 3 students working on their second bachelor degree, 1 student who was a non-degree student, and 2 students were post-bachelor degree students who were adding a teaching certificate. As to how many students owned mp3 players, whereas 14.0% (or 15) stated that they did not own mp3 players, 86.0% (or 92 students) stated that they did own mp3 players. Table 2 shows the breakdown of the demographic data. See Appendix H, SPSS Output - Demographic Data, for the SPSS statistical application output for the demographic data.

Table 2

Student Demographic Characteristics

	Frequency	Percent
Age Groups		
18	11	10.4%
19	16	15.1%
20	17	15.9%
21	17	15.9%
22 – 23	17	15.9%
24 – 28	17	15.9%
30 and over	11	10.4%
Gender		
Female	41	38.3%
Male	66	61.7%
Academic Status		
Freshman	15	14.0%
Sophomore	24	22.4%
Junior	30	28.0%
Senior	32	29.0%
Second Bachelor	3	2.8%
Non-degree	1	0.9%
Post-Bach. Teaching Cert.	2	1.9%
Ownership of mp3 player		
Don't own mp3 player	15	14.0%
Own mp3 player	92	86%

None of the classes required prerequisite computer knowledge. To further determine if there were differences between the groups, questions pertaining to student self-assessment of computer knowledge were asked. The questions included:

1. I can use a word processing program on a computer with no trouble.

2. I can use an email program to compose and read email with no trouble.

3. I can send attachments using email with no trouble.

4. I can surf the Web with no trouble.

5. I can refine a search on the Web with no trouble.

6. I can download music to a computer from a CD with no trouble.

7. I can download music to a computer from the Web with no trouble.

8. I can load music onto an mp3 player with no trouble.

9. I can connect to eLearning environments such as eCompanion, EMUonline, or WebCT, with no trouble.

10. I can upload files to eLearning environments such as eCompanion, EMUonline, or WebCT, with no trouble.

The students were to rate their computer knowledge on a Likert scale with rankings of Strongly Agree (SA), Agree (A), Neither Agree Nor Disagree (NA/ND), Disagree (D), and Strongly Disagree (SD). A ranking for No Experience in this area (NE) was included for students who felt that they did not know enough about the technology in question to rate the question. (See Appendix I, SPSS Output - Survey I Response Data, for frequency charts of all questions included in the first survey instrument.)

The results of these self-assessment computer literacy questions showed that, for all students:

Question 1 response: A majority of the students (98.1%) responded that they either strongly agreed or agreed that they could use a word processing program with no trouble.

Question 2 response: 100% of the students responded that they either strongly agreed or agreed that they could use an email program to compose and read email with no trouble.

Question 3 response: A majority of the students (99.1%) responded that they either strongly agreed or agreed that they could send attachments using email with no trouble.

Question 4 response: 100% of the students responded that they either strongly agreed or agreed that they could surf the Web with no trouble.

Question 5 response: 100% of the students responded that they either strongly agreed or agreed that they could refine a search on the Web with no trouble.

Question 6 response: A majority of the students (93.5%) responded that they either strongly agreed or agreed that they could download music to a computer from a CD with no trouble. Two students, or 1.9%, responded that they neither agreed nor disagreed that they could perform the task. Four students, or 3.7%, responded that they disagreed that they could perform the task. One student, or 0.9%, responded that he or she did not have experience in this area.

Question 7 response: A majority of the students (91.6%) either strongly agreed or agreed that they could download music to a computer from the Web with no trouble. Five students, or 4.7%, responded that they neither agreed nor disagreed that they could perform the task. Two students, or 1.8%, responded that they either disagreed or strongly disagreed that they could perform the task. Two students, or 1.8%, responded that they did not have experience in this area.

Question 8 response: A majority of the students (86%) responded that they either strongly agreed or agreed that they could load music onto an mp3 player with no trouble. Six students, or 5.6%, responded that they neither agreed nor disagreed that they could perform the task. Five student, or 4.6%, responded that they either disagreed or strongly disagreed that they could perform the task. Two students, or 1.9% responded that they did not have experience in this area.

Question 9 response: A majority of students (90.7%) responded that they either strongly agreed or agreed that they could connect to eLearning environments such as eCompanion, EMUonline, or WebCT with no trouble. Five students, or 4.7%, responded that they neither agreed nor disagreed that they could perform the task. Two students, or 1.9%, responded that they disagreed that they could perform the task. Three students, or 2.8%, responded that they did not have experience in this area.

Question 10 response: A majority of the students (72.0%) responded that they either strongly agreed or agreed that they could upload files to eLearning environments such as eCompanion, EMUonline, or WebCT with no trouble. Ten students, or 9.3%, responded that they neither agreed nor disagreed that they could perform the task. Four students, or 15.0% responded that they disagreed that they could perform the task. Sixteen students, or 15.0%, responded that they did not have experience in this area.

Table 3 includes a summary of the tabulations of the self-assessment of computer knowledge as given by the students.

Table 3

Student Responses to Self-Assessment of Computer Knowledge

	Frequency	Percent
1. I can use a word processing program with no trouble.		
Strongly Agree	84	78.5%
Agree	21	19.6%
Neither Agree nor Disagree	2	1.9%
Disagree	0	0.0%
Strongly Disagree	0	0.0%
No Experience in this area	0	0.0%
2. I can use an email program to compose and read email with no trouble.		
Strongly Agree	97	90.7%
Agree	10	9.3%
Neither Agree nor Disagree	0	0.0%
Disagree	0	0.0%
Strongly Disagree	0	0.0%
No Experience in this area	0	0.0%
3. I can send attachments using email with no trouble.		
Strongly Agree	94	87.9%
Agree	12	11.2%
Neither Agree nor Disagree	0	0.0%
Disagree	1	0.9%
Strongly Disagree	0	0.0%
No Experience in this area	0	0.0%
4. I can surf the Web with no trouble.		
Strongly Agree	95	88.8%
Agree	12	11.2%
Neither Agree nor Disagree	0	0.0%
Disagree	0	0.0%
Strongly Disagree	0	0.0%
No Experience in this area	0	0.0%
5. I can refine a search on the Web with no trouble.		
Strongly Agree	83	77.6%
Agree	24	22.4%
Neither Agree nor Disagree	0	0.0%
Disagree	0	0.0%
Strongly Disagree	0	0.0%
No Experience in this area	0	0.0%

6. I can download music to a computer from a CD with no trouble.

Strongly Agree	85	79.0%
Agree	15	14.0%
Neither Agree nor Disagree	2	1.9%
Disagree	4	3.7%
Strongly Disagree	0	0.0%
No Experience in this area	1	0.9%

7. I can download music to a computer from the Web with no trouble.

Strongly Agree	78	72.9%
Agree	20	18.7%
Neither Agree nor Disagree	5	4.7%
Disagree	1	0.9%
Strongly Disagree	1	0.9%
No Experience in this area	2	1.9%

8. I can load music onto an mp3 player with no trouble.

Strongly Agree	75	70.1%
Agree	17	15.9%
Neither Agree nor Disagree	6	5.6%
Disagree	4	3.7%
Strongly Disagree	1	0.9%
No Experience in this area	4	3.7%

9. I can connect to eLearning environments such as eCompanion, EMUonline, or WebCT, with no trouble.

Strongly Agree	76	71.0%
Agree	21	19.6%
Neither Agree nor Disagree	5	4.7%
Disagree	2	1.9%
Strongly Disagree	0	0.0%
No Experience in this area	3	2.8%

10. I can upload files to eLearning environments such as eCompanion, EMUonline, or WebCT, with no trouble.

Strongly Agree	52	48.6%
Agree	25	23.4%
Neither Agree nor Disagree	10	9.3%
Disagree	4	3.7%
Strongly Disagree	0	0.0%
No Experience in this area	16	15.0%%

Determining Equality of Groups

To determine whether there was a significant difference between the groups, the first statistical procedure performed on the self-assessment of computer knowledge was a factorial analysis. The factorial analysis was performed to reduce the number of questions to a more manageable number of variables for use in comparing the groups. The first five questions were extracted as a single component without the need for rotation. Questions six, seven, and eight were extracted as a single component without the need for rotation. Questions nine and 10 were extracted as a single component without the need for rotation. What resulted were three variables that could reflect the answers to the questions in the self-assessment of computer knowledge construct. With these three variables and the demographic information, it is now possible to compare if the mean differences between the groups (the experimental and control groups) are significantly different.

To determine if the groups were significantly different, independent *t* tests were performed to compare the means of age group, gender, academic status, ownership of an mp3 player, and the three extracted variables that related to the 1) word processors, email, and Web questions, 2) downloading music to a computer (and/or mp3 player) from a CD or the Web, and 3) questions relating to the eLearning environment.

- The independent *t* test was performed comparing the mean **Age Groups** with respect to **Groups** (Control $M = 22.53$, $SD = 4.712$; Experimental $M = 23.15$, $SD = 6.414$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated ($p<.719$). The groups were not found to be significantly different, $t(104)= -.294$, $p < .769$.

- The independent *t* test was performed comparing the **Gender** means with respect to **Groups** (Control *M* = .61, *SD* = .495; Experimental *M* = .62, *SD* = .488) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.725). The groups were not found to be significantly different, *t*(105)= -.181, *p* < .857.
- The independent *t* test was performed comparing the **Academic Status** means with respect to **Groups** (Control *M* = 2.16, *SD* = 1.551; Experimental *M* = 1.88, *SD* = 1.231) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.295). The groups were not found to be significantly different, *t*(105) = 1.002, *p* < .319.
- The independent *t* test was performed comparing the means of the **Ownership** of an mp3 player variable with respect to **Groups** (Control *M* = .84, *SD* = .370; Experimental *M* = .87, *SD* = .339) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.443). The groups were not found to be significantly different, *t*(105)= -.388, *p* < .699.
- The independent *t* test performed comparing the means of the factored variable relating to knowledge of **Word processing, Email, and the Web** with respect to **Groups** (Control *M* = -.191, *SD* = .835; Experimental *M* = .105, *SD* = 1.071) using an alpha level of .05 was not found to be significantly different, *t*(105)= -1.473, *p* < .144.

- The independent *t* test was performed comparing the means of the factored variable relating to **Downloading Music** from a CD player, the Web, and uploading music to an mp3 player means with respect to **Groups** (Control *M* = -.357*, SD* = .459; Experimental *M* = .196*, SD* = 1.155) using an alpha level of .05 was found to be significantly different, $t(105) = -3.505$, $p < .001$.
- The independent *t* test was performed comparing the factored variable relating to the **eLearning** knowledge questions means with respect to **Groups** (Control *M* = -.025*, SD* = 1.040; Experimental *M* = .0140*, SD* = .985) using an alpha level of .05 was not found to be significantly different, $t(105) = -.194$, $p < .847$.

The results of the independent *t* tests resulted in a significant difference between the groups when comparing the means of the downloading music variable. Upon further investigation, each of the questions was analyzed separately. Independent *t* tests were conducted on the three questions with respect to group. All three questions were significantly different between the two groups.

- The independent *t* test was performed comparing "**Download music from CD**" response means with respect to **Groups** (Control *M* = .05*, SD* = .226; Experimental *M* = .49*, SD* = .980) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated ($p < .000$). Therefore, the degrees of freedom had been adjusted to find the critical *F*. With this adjustment, the response means were found to be significantly different, $t(80.430) = -3.564$, $p < .001$.

- The independent *t* test was performed comparing "**Download music from Web**" response means with respect to **Groups** (Control *M* = .11, *SD* = .311; Experimental *M* = .62, *SD* = 1.113) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated (p<.000). Therefore, the degrees of freedom had been adjusted to find the critical *F*. With this adjustment, the response means were found to be significantly different, $t(85.497) = -3.618$, $p < .001$.
- The independent *t* test was performed comparing "**Download music onto mp3 player**" response means with respect to **Groups** (Control *M* = .32, *SD* = .933; Experimental *M* = .77, *SD* = 1.308) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated (p<.000). Therefore, the degrees of freedom had been adjusted to find the critical *F*. With this adjustment, the response means were found to be significantly different, $t(97.971) = -2.071$, $p < .041$.

Although the two groups were not significantly different with regard to age groups, gender, academic status, ownership of an mp3 player, knowledge of word processing, email, Web surfing, Web searching, and eLearning environments, a significant difference in the means between the groups was found when it came to knowledge of downloading music from a CD, downloading music from the Web, and downloading music onto an mp3 player. To determine whether gender and/or age group had an effect on these three variables, a further investigation was needed.

- The ANOVA test was performed comparing "**Download music from CD**" response means with respect to **Age Group** using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated (p<.000). However, the response means were not found to be significantly different, $F(6, 99)= 1.695$, $p<.130$.
- The ANOVA test was performed comparing "**Download music from Web**" response means with respect to **Age Groups** using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.063). The response means were not found to be significantly different, $F(6, 99)= .531$, $p<.783$.
- The ANOVA test was performed comparing "**Download music onto mp3 player**" response means with respect to **Age Groups** using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated (p<.000). However, the response means were found not to be significantly different, $F(6, 99)= -2.071$, $p<.080$.

The ANOVA tests performed on the three variables with respect to age groups found no significant difference between the age groups. Continuing on, independent *t* tests were performed on the three variables with respect to gender.

- The independent *t* test was performed comparing "**Download music from CD**" responses with respect to **Gender** (Female $M = .68$, $SD = 1.192$; Male $M = .12$, $SD = .329$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated (p<.000). Therefore, the degrees of freedom had been adjusted to

find the critical *F*. With this adjustment, the response means were found to be significantly different, $t(43.809)= 2.947$, $p<.005$.

- The independent *t* test was performed comparing "**Download music from Web**" response means with respect to **Gender** (Female $M = .88$, $SD = 1.327$; Male $M = .17$, $SD = .414$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated ($p<.000$). Therefore, the degrees of freedom had been adjusted to find the critical *F*. With this adjustment, the response means were found to be significantly different, $t(44.897)= 3.334$, $p<.002$.
- The independent *t* test was performed comparing "**Download music onto mp3 player**" response means with respect to **Gender** (Female $M = 1.07$, $SD = 1.421$; Male $M = .32$, $SD = .947$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated ($p<.001$). Therefore, the degrees of freedom had been adjusted to find the critical *F*. With this adjustment, the response means were found to be significantly different, $t(62.210)= 3.012$, $p<.004$.

In all three cases here, it was found that gender did have a significant effect on responses when it came to knowledge of downloading music from a CD, downloading music from the Web, and downloading music onto an mp3 player. In each of the questions, females felt that they had less knowledge to perform these tasks than did the males. See Appendix J, SPSS Output – Equality of Group Comparisons, for this section.

Attitudes Toward Speaking up in Class

Questions related to speaking in class were asked of the students. The students were asked about their comfort level when speaking up in class when peers are present, when the instructor is present, and when sharing research ideas with the class. These included:

11. In general, I feel comfortable speaking up in class when my peers are present.

12. In general, I feel comfortable speaking up in class when the instructor is present.

13. I feel comfortable sharing my research ideas with the class.

Question 11 response: A majority of the students (77.6%) responded that they agreed or strongly agreed that they were comfortable speaking up in class when peers are present. Six and one half percent of the students responded either disagree or strongly disagree.

Question 12 response: A majority of students (85.1%) responded that they agreed or strongly agreed that they were comfortable speaking up in class when the instructor is present, whereas 2.8% of the students responded as either disagree or strongly disagree.

Question 13 response: A majority of the students (71.9%) responded that they agreed or strongly agreed that they were comfortable sharing research ideas with the class. Seven and one half percent either responded disagree or strongly disagree.

Table 4 lists the questions with the responses to this set of questions posed to the students.

Table 4

Student Responses to Speaking up in Class Questions

	Frequency	Percent
11. In general, I feel comfortable speaking up in class when my peers are present.		
Strongly Agree	31	29.0%
Agree	52	48.6%
Neither Agree nor Disagree	17	15.9%
Disagree	6	5.6%
Strongly Disagree	1	0.9%
12. In general, I feel comfortable speaking up in class when the instructor is present.		
Strongly Agree	34	31.8%
Agree	57	53.3%
Neither Agree nor Disagree	13	12.1%
Disagree	2	1.9%
Strongly Disagree	1	0.9%
13. I feel comfortable sharing my research ideas with the class.		
Strongly Agree	27	25.2%
Agree	50	46.7%
Neither Agree nor Disagree	22	20.6%
Disagree	6	5.6%
Strongly Disagree	2	1.9%

Attitudes Toward Recording of Classroom Conversations

The next set of questions, still dealing with classroom interaction, requested information on comfort levels when a recorder is present recording classroom discussion.

14. I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will not be publicized or broadcast in any way.

15. I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will be made available over the Internet.

16. I feel comfortable sharing my research ideas with the class when a recorder is present, knowing that it will be made available over the Internet.

17. I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present.

Question 14 response: A majority of the students (71.0%) responded that they agreed or strongly agreed that they were comfortable speaking up in class when a recorder is present, knowing that the recording will not be publicized in any way, whereas 11.2% responded as either disagree or strongly disagree.

Question 15 response: A majority of the students (62.6%) responded that they agreed or strongly agreed that they were comfortable speaking up in class when a recorder is present, knowing that the recording will be made available over the Internet. Almost 17% of the students responded either disagree or strongly disagree.

Question 16 response: A slim majority of the students (57.9%) responded that they were comfortable sharing research ideas in class when a recorder is present, knowing that the recordings will be made available of the Internet, whereas 16.8% responded as either disagree or strongly disagree.

Question 17 response: The question: "I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present" had about as many who agreed than who disagreed with the question. Those who strongly agreed or agreed represented 34.6% of the responses, while those who strongly disagreed or disagreed with the statement represented 37.4% of the responses.

Table 5 shows the responses made of the students to these questions.

Table 5

Student Responses to Speaking up in Class with Recorder Present Questions

	Frequency	Percent
14. I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will not be publicized or broadcast in any way.		
Strongly Agree	29	27.1%
Agree	47	43.9%
Neither Agree nor Disagree	19	17.8%
Disagree	9	8.4%
Strongly Disagree	3	2.8%
15. I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will be made available over the Internet.		
Strongly Agree	24	22.4%
Agree	43	40.2%
Neither Agree nor Disagree	22	20.6%
Disagree	10	9.3%
Strongly Disagree	8	7.5%
16. I feel comfortable sharing my research ideas with the class when a recorder is present knowing that the recording will be made available over the Internet.		
Strongly Agree	23	21.5%
Agree	39	36.4%
Neither Agree nor Disagree	27	25.2%
Disagree	10	9.3%
Strongly Disagree	8	7.5%
17. I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present.		
Strongly Agree	9	8.4%
Agree	28	26.2%
Neither Agree nor Disagree	30	28.0%
Disagree	22	20.6%
Strongly Disagree	18	16.8%

Perceived Usefulness Questions

Those questions that related to the perceived usefulness of recording classroom lectures and making them available online were:

18. Having access to recorded classroom sessions will allow me to learn more quickly.

19. Having access to recorded classroom sessions will improve my grade performance.

20. Having access to recorded classroom sessions will improve my effectiveness in learning the presented classroom session content.

21. Having access to recorded classroom sessions will make the learning of the material presented easier.

22. Having access to recorded classroom sessions will be useful in my studies.

The responses of the students were as follows:

Question 18 response: A majority of the students (73.8%) either agreed or strongly agreed that having access to recorded classroom sessions would allow them to learn more quickly, whereas 4.6% strongly disagreed or disagreed with the statement.

Question 19 response: A majority of the students (66.4%) agreed or strongly agreed that having access to recorded classroom sessions would improve grade performance, as opposed to 4.6% who strongly disagreed or disagreed with the statement.

Question 20 response: A majority of the students (75.7%) either agreed or strongly agreed that having access to recorded classroom sessions would improve their effectiveness in learning the presented classroom session content, whereas 4.6% either strongly disagreed or disagreed with the statement.

Question 21 response: A majority of the students (75.7%) either agreed or strongly agreed that having access to recorded classroom sessions would make learning of the material presented easier. Almost 5% either strongly disagreed or agreed with the statement.

Question 22 response: A majority of the students (81.3%) either agreed or strongly agreed that having access to recorded classroom sessions would be useful in their studies. Only 2.8% of the students either disagreed or strongly disagreed with the statement.

Table 6 lists the responses to questions 18 through 22 relating to the perceived usefulness of access to recorded classroom sessions.

Table 6

Perceived Usefulness of Recorded Classroom Sessions Questions

	Frequency	Percent
18. Having access to recorded classroom sessions will allow me to learn more quickly.		
Strongly Agree	30	28.0%
Agree	49	45.8%
Neither Agree nor Disagree	23	21.5%
Disagree	4	3.7%
Strongly Disagree	1	0.9%
19. Having access to recorded classroom sessions will improve my grade performance.		
Strongly Agree	31	29.0%
Agree	40	37.4%
Neither Agree nor Disagree	31	29.0%
Disagree	4	3.7%
Strongly Disagree	1	0.9%
20. Having access to recorded classroom sessions will improve my effectiveness in learning the presented classroom session content.		
Strongly Agree	29	27.1%
Agree	52	48.6%
Neither Agree nor Disagree	21	19.6%
Disagree	4	3.7%
Strongly Disagree	1	0.9%
21. Having access to recorded classroom sessions will make the learning of the material presented easier.		
Strongly Agree	32	29.9%
Agree	49	45.8%
Neither Agree nor Disagree	21	19.6%
Disagree	4	3.7%
Strongly Disagree	1	0.9%
22. Having access to recorded classroom sessions will be useful in my studies.		
Strongly Agree	38	35.5%
Agree	49	45.8%
Neither Agree nor Disagree	17	15.9%
Disagree	2	1.9%
Strongly Disagree	1	0.9%

Responses to Use of Digital Audio Communication Technology Questions

The students were asked to rate their perceived use of the digital audio recordings if classroom sessions were to be recorded and made available to them online. The questions that related to perceived use were:

23. This question asked the students to answer, to the best of their knowledge, how many of the recordings they would likely listen to.

24. I foresee that having access to recorded classroom sessions will affect my classroom attendance.

25. I foresee that having access to recorded classroom sessions will affect the attendance of some of my classmates.

The responses of the students were as follows:

Question 23 responses: The students were asked to rank their perceived use of recorded classroom lectures on a scale from listening to all of the recordings to none of the recordings. Almost 90% of the students responded that they would listen to at least one recorded classroom session, leaving 10.3% responding that they were unlikely to listen.

Question 24 responses: The students were asked if having access to recorded classroom sessions would affect their classroom attendance. A majority of the students (53.2%) responded that they either disagreed or strongly disagreed that their attendance would be affected, whereas 25.2% responded that they agreed or strongly agreed that their attendance would be affected.

Question 25 responses: A majority of the students (72.9%) either agreed or strongly agreed that having access to recorded sessions would affect the attendance of some of their

classmates, whereas 4.6% responded that they either disagreed or strongly disagreed with the statement.

Table 6 lists the responses to questions 18 through 22 relating to the perceived usefulness of access to recorded classroom sessions.

Table 7 includes the responses to questions 23 through 25 relating to students' perceived use of digital audio classroom recorded sessions.

Table 7

Student Responses to Perceived Use Questions

	Frequency	Percent
23. Once made available to me online, I will likely access classroom session recordings to listen		
to all of the recordings	22	20.6%
to most of the recordings	26	24.3%
to some of the recordings	44	41.1%
to at least one of the recordings	26	3.7%
I am unlikely to listen	22	10.3%
24. I foresee that having access to recorded classroom sessions will affect my classroom attendance.		
Strongly Agree	10	9.3%
Agree	17	15.9%
Neither Agree nor Disagree	23	21.5%
Disagree	39	36.4%
Strongly Disagree	18	16.8%
25. I foresee that having access to recorded classroom sessions will affect the attendance of some of my classmates.		
Strongly Agree	32	29.9%
Agree	46	43.0%
Neither Agree nor Disagree	24	22.4%
Disagree	4	3.7%
Strongly Disagree	1	0.9%

Analysis of Interaction Levels: Recorded Classroom vs. Non-recorded Classroom

To analyze whether there were significant differences in the responses dealing with students' perceived interaction levels if a digital audio recorder were present in the classroom and to students' interaction levels without the presence of the recorder, questions 11 through 17 were investigated. First, a factorial analysis was performed to attempt to reduce the number of questions to a more manageable number of variables. As a result, questions 11 through 13 and questions 14 through 17 were extracted as separate components. Questions 11 through 13 relate to comfort levels of speaking in class. Questions 14 through 17 relate to speaking with a recorder present. These two new variables, speaking up in class without a recorder and speaking up in class when a recorder is present, were compared to see if differences existed between these independent variables.

- The independent *t* test was performed comparing the "**Speaking up in class**" response means with respect to **Groups** (Control M = -.0383, SD = 1.1359; Experimental M = .0211, SD = .9249) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.172). The response means for this question were not found to be significantly different, $t(105)$= -.293, p<.770.
- The independent *t* test was performed comparing the " **Speaking with recorder present** " response means with respect to **Groups** (Control M = .2354, SD = 1.1348; Experimental M = -.1296, SD = .9001) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated (p<.033). Therefore, the degrees of freedom had been adjusted to find the critical F. With this adjustment, the

response means were not found to be significantly different, $t(62.966) = 1.709$, $p < .092$.

- The ANOVA test was performed comparing "**Speaking up in class**" response means with respect to **Class** (Class 1 $M = .1528$, $SD = 1.0099$; Class 2 $M = -.4387$, $SD = .8374$; Class 3 $M = .2755$, $SD = .8962$; Class 4 $M = .0903$, $SD = 1.5028$; Class 5 $M = .2559$, $SD = .8987$; Class 6 $M = -.2892$, $SD = .7815$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated ($p < .564$). The response means were found not to be significantly different, $F(5, 101) = 1.505$, $p < .195$.
- The ANOVA test was performed comparing "**Speaking with recorder present**" response means with respect to **Class** (Class 1 $M = .0259$, $SD = .9841$; Class 2 $M = -.1338$, $SD = .9994$; Class 3 $M = -.2654$, $SD = .7288$; Class 4 $M = .7502$, $SD = 1.2714$; Class 5 $M = .0775$, $SD = .9884$; Class 6 $M = -.2169$, $SD = .9085$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated ($p < .287$). The response means were found not to be significantly different, $F(5, 101) = 2.091$, $p < .073$.
- The independent *t* test was performed comparing the "**Speaking up in class**" response means with respect to **Gender** (Female $M = .2254$, $SD = .9732$; Male $M = -.1400$, $SD = .9979$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had

not been violated (p<.881). The response means were not found to be significantly different, $t(105)= 1.859$, $p<.066$.

- The independent *t* test was performed comparing the "**Speaking with recorder present**" response means with respect to **Gender** (Female $M = .3021$, $SD = 1.0367$; Male $M = -.1876$, $SD = .9359$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.881). The response means were found to be significantly different, $t(105)= 2.524$, $p<.013$.
- The ANOVA test was performed comparing "**Speaking up in class**" response means with respect to **Age Group** (Age Group "18" $M = .2998$, $SD = 1.0016$; Age Group "19" $M = .0826$, $SD = .8138$; Age Group "20" $M = .3906$, $SD = 1.0761$; Age Group "21" $M = -.2898$, $SD = .8314$; Age Group "22-23" $M = -.1443$, $SD = .7677$; Age Group "24-29" $M = -.1835$, $SD = 1.2969$; Age Group "30 and over" $M = -.0704$, $SD = 1.1832$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.707). The response means were found not to be significantly different, $F(6, 99)= 1.008$, $p<.425$.
- The ANOVA test was performed comparing "**Speaking with recorder present**" response means with respect to **Age Group** (Age Group "18" $M = -.3474$, $SD = .7599$; Age Group "19" $M = -.1321$, $SD = .7810$; Age Group "20" $M = .4850$, $SD = .8951$; Age Group "21" $M = -.2602$, $SD = .8186$; Age Group "22-23" $M = -.0362$, $SD = 1.1211$; Age Group "24-29" $M = .0885$, $SD = 1.2728$; Age Group "30 and over" $M = .0739$, $SD = 1.1986$) using an alpha level of .05. The

Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.219). The response means were found not to be significantly different, $F(6, 99)= 1.164$, $p<.332$.

- The independent *t* test was performed comparing the "**Speaking up in class**" response means with respect to **mp3 Player Ownership** (Do Not Own $M = -.0187$, $SD = 1.1133$; Own $M = .0030$, $SD = .9870$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.636). The response means were not found to be significantly different, $t(105)= -.078$, $p<.938$.
- The independent *t* test was performed comparing the "**Speaking with recorder present**" response means with respect to **mp3 Player Ownership** (Do Not Own $M = -.1776$, $SD = .9510$; Own $M = .0289$, $SD = 1.0098$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.495). The response means were not found to be significantly different, $t(105)= -.740$, $p<.461$.

With respect to determining whether there was a significant difference between speaking up in class with or without a recorder present, by investigating all of the independent variables, all but gender showed no significant difference. Gender had an effect on speaking up in class with a recorder present.

As shown in this study, 71.9% of the students felt comfortable sharing research ideas with the class, whereas this number drops to 57.9% with the inclusion of having the class

session recorded and put online as part of the question. To test if the means were significantly different, the ANOVA was used. The results were as follows:

- The ANOVA test was performed comparing **"Speaking up in class"** response means (Strongly Agree: *M* = ".17", *SD* = ".388"; Agree: *M* = "1.08", *SD* = ".532"; Neither Agree nor Disagree: *M* = "1.52", *SD* = ".753"; Disagree: *M* = "1.70", *SD* = "1.059"; Strongly Disagree: *M* = "2.00", *SD* = ".335") with respect to "**Speaking with recorder present"** (Strongly Agree: *M* = ".59", *SD* = "1.083"; Agree: *M* = "1.42", *SD* = ".971"; Neither Agree nor Disagree: *M* = "2.00", *SD* = ".690"; Disagree: *M* = "2.67", *SD* = "1.033"; Strongly Disagree: *M* = "4.00", *SD* = ".000") using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had been violated ($p<.036$). Therefore, the degrees of freedom had been adjusted to find the critical *F*. With this adjustment, the response means were found to be significantly different, $F(4, 102)= 2.670$, $p<.000$.

See Appendix K, SPSS Output – Analysis of Interaction Levels, for the SPSS statistical application output for this section.

Analysis of the Effect of Age on Perceived Usefulness of Recorded Sessions

To analyze whether age had a significant effect on students' perceived usefulness of recorded sessions, questions 18 through 22 were investigated. First, a factorial analysis was performed to attempt to reduce the number of questions to a more manageable number of variables. As a result of the factorial analysis, questions 18 through 22 were extracted as one single component. First, the new Perceived Usefulness factored variable was tested using an independent *t* test to see if there was a difference between the group means.

- The independent *t* test was performed comparing the **Perceived Usefulness** factored variable response means with respect to **Group** (Control *M* = -.2107*, SD* = 1.0419; Experimental *M* = .1160*, SD* = .9642) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.951). The response means were not found to be significantly different, *t*(105)= -1.630, *p*<.106.

As there was not a significant difference between the two groups, this new variable, Perceived Usefulness, was compared with Age Groups to see if age had an effect on perceived usefulness of all students in the study.

- The ANOVA test was performed comparing **Perceived Usefulness** means with respect to **Age Group** (Age Group "18" *M* = .2210, *SD* = .6457; Age Group "19" *M* = -.1510, *SD* = .8737; Age Group "20" *M* = .2607, *SD* = 1.1046; Age Group "21" *M* = -.3263, *SD* = .9622; Age Group "22-23" *M* = -.0701, *SD* = .7601; Age Group "24-29" *M* = .1401, *SD* = 1.3101; Age Group "30 and over" *M* = .0851, *SD* = 1.1799) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.234). The response means were found not to be significantly different, *F*(6, 99)= .714, *p*<.639.

See Appendix L, SPSS Output – Perceived Usefulness, for the SPSS output for this section.

Analysis of the Effect of Gender on Perceived Usefulness of Recorded Sessions

As there was not a significant difference between the two groups, Perceived Usefulness was compared with Gender to analyze whether gender had a significant effect on students' perceived usefulness of recorded sessions, for all students in the study.

- The independent *t* test was performed comparing the **Perceived Usefulness** factored variable response means with respect to **Gender** (Female $M = .1382$, $SD = .9004$; Male $M = -.0859$, $SD = 1.0547$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated ($p<.227$). The response means were not found to be significantly different, $t(105)= 1.129$, $p<.262$.

See Appendix L, SPSS Output –Perceived Usefulness, for the SPSS output for this section.

Analysis of Perceived Usefulness on Perceived Use

To analyze whether perceived usefulness had a significant effect on students' perceived use of recorded sessions, the factored perceived usefulness variable was compared with question 23, whether students perceived that they would access classroom session recordings once they were made available online.

- For this analysis, the Pearson correlation was used to test if a relationship existed between **Perceived Usefulness** ($M = .87$, $SD = .814$) and **Perceived Use** ($M = 2.41$, $SD = 1.165$) for the responses of the first survey instrument. For the alpha level of .01 level, the correlation between Perceived Usefulness and Use was found to be statistically significant, $r(105) = -.600$, $p < .000$. This shows that as Usefulness increases (0 = Strongly Agree to 4 = Strongly Disagree), the value of

Use decreases (0 = "I am unlikely to listen" to 4 = "I will likely listen to all of the recordings"). There is a negative relationship between Perceived Usefulness and Use. In this case, those who strongly agree (0) that the classroom session audio recordings are useful are more likely to access and use the recorded media (4). Those who strongly disagree (4) that the classroom session audio recordings are useful are less likely to access and use the recorded media (0).

See Appendix L, SPSS Output – Perceived Usefulness, for the SPSS output for this section.

Responses to Second Survey

The second survey was distributed after three weeks of the start of the study to the students who had had their lecture classroom sessions recorded. The intent of this second survey was to attempt to determine if changes had occurred in the responses of Perceived Classroom Interaction and Perceived Usefulness. Also, questions on Ease of Use and Intended Use had been added. The numbering system used for the Perceived Classroom Interaction and Perceived Usefulness questions coincide with the same questions from the first survey given earlier in the semester, followed by a 'B'. What follows are the responses to the questions on Perceived Classroom Interaction.

Question 11B response to the statement: "In general, I feel comfortable speaking up in class when my peers are present." A majority of the students (81.1%) responded that they agreed or strongly agreed that they were comfortable speaking up in class when peers are present. Almost 6% of the students responded that they either disagreed or strongly disagreed.

Question 12B response to the statement: "I feel comfortable speaking up in class when the instructor is present." A majority of students (84.9%) responded that they agreed or strongly agreed that they were comfortable speaking up in class when the instructor is present, whereas 5.7% of the students responded that they disagreed with the statement.

Question 13B response to the statement: "I feel comfortable sharing my research ideas with the class." A majority of the students (71.7%) responded that they agreed or strongly agreed that they were comfortable sharing research ideas with the class. A little over 13% responded either that they disagreed or strongly disagreed.

Question 14B response to the statement: "I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will not be publicized or broadcast in any way." A majority of the students (75.5%) responded that they agreed or strongly agreed that they were comfortable sharing research ideas with the class. Almost 6% either responded that they disagreed or strongly disagreed.

Question 15B response to the statement: "I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will be made available over the Internet." A majority of the students (71.7%) responded that they agreed or strongly agreed that they were comfortable sharing research ideas with the class. Nine and one half percent either responded that they disagreed or strongly disagreed.

Question 16B response to the statement: "I feel comfortable sharing my research ideas with the class when a recorder is present knowing that it will be made available over the Internet." A majority of the students (73.6%) responded that they agreed or strongly agreed that they were comfortable sharing research ideas with the class. Almost 8% either responded that they disagreed or strongly disagreed.

Question 17B response to the statement: "I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present." Almost 38% of the students either agreed or strongly agreed with this statement, whereas 41.5% either disagreed or strongly disagreed with this statement.

Table 8 lists the student responses to the Perceived Classroom Interaction questions.

Table 8

Student Responses to Speaking up in Class Questions

	Frequency	Percent
11B. In general, I feel comfortable speaking up in class when my peers are present.		
Strongly Agree	14	26.4%
Agree	29	54.7%
Neither Agree nor Disagree	7	13.2%
Disagree	3	5.7%
Strongly Disagree	0	0.0%
12B. In general, I feel comfortable speaking up in class when the instructor is present.		
Strongly Agree	18	34.0%
Agree	27	50.9%
Neither Agree nor Disagree	5	9.4%
Disagree	3	5.7%
Strongly Disagree	0	0.0%
13B. I feel comfortable sharing my research ideas with the class.		
Strongly Agree	10	18.9%
Agree	28	52.8%
Neither Agree nor Disagree	8	15.1%
Disagree	6	11.3%
Strongly Disagree	1	1.9%
14B. I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will not be publicized or broadcast in any way.		
Strongly Agree	15	28.3%
Agree	25	47.2%
Neither Agree nor Disagree	10	18.9%
Disagree	2	3.8%
Strongly Disagree	1	1.9%

15B. I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will be made available over the Internet.

Strongly Agree	14	26.4%
Agree	24	45.3%
Neither Agree nor Disagree	10	18.9%
Disagree	3	5.7%
Strongly Disagree	2	3.8%

16B. I feel comfortable sharing my research ideas with the class when a recorder is present, knowing that the recording will be made available over the Internet.

Strongly Agree	12	22.6%
Agree	27	50.9%
Neither Agree nor Disagree	10	18.9%
Disagree	2	3.8%
Strongly Disagree	2	3.8%

17B. I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present.

Strongly Agree	2	3.8%
Agree	18	34.0%
Neither Agree nor Disagree	11	20.8%
Disagree	15	28.3%
Strongly Disagree	7	13.2%

The responses to the questions related to Perceived Usefulness were as follows:

Question 18B response to the statement: "Having access to recorded classroom sessions will allow me to learn more quickly." A majority of the students (67.9%) responded that they agreed or strongly agreed with the statement, while 5.7% responded that they disagreed with this statement.

Question 19B response to the statement: "Having access to recorded classroom sessions will improve my grade performance." A majority of the students (62.3%) responded that they agreed or strongly agreed with the statement, while 7.5% responded that they disagreed with this statement.

Question 20B response to the statement: "Having access to recorded classroom sessions will improve my effectiveness in learning the presented classroom session content."

A majority of the students (73.6%) responded that they agreed or strongly agreed with the statement, while 5.7% responded that they disagreed with this statement.

Question 21B response to the statement: "Having access to recorded classroom sessions will make the learning of the material presented easier." A majority of the students (66.0%) responded that they agreed or strongly agreed with the statement, while 5.7% responded that they disagreed with the statement.

Question 22B response to the statement: "Having access to recorded classroom sessions will be useful in my studies." A majority of the students (81.1%) responded that they agreed or strongly agreed with the statement, while 1.9% responded that they disagreed with the statement.

Table 9 presents the Perceived Usefulness responses for this second survey.

Table 9

Second Survey Responses to Perceived Usefulness Questions

	Frequency	Percent
18B. Having access to recorded classroom sessions will allow me to learn more quickly.		
Strongly Agree	12	22.6%
Agree	24	45.3%
Neither Agree nor Disagree	14	26.4%
Disagree	3	5.7%
Strongly Disagree	0	0.0%
19B. Having access to recorded classroom sessions will improve my grade performance.		
Strongly Agree	11	20.8%
Agree	22	41.5%
Neither Agree nor Disagree	16	30.2%
Disagree	4	7.5%
Strongly Disagree	0	0.0%
20B. Having access to recorded classroom sessions will improve my effectiveness in learning the presented classroom session content.		
Strongly Agree	12	22.6%
Agree	27	50.9%
Neither Agree nor Disagree	11	20.8%
Disagree	3	5.7%
Strongly Disagree	0	0.0%
21B. Having access to recorded classroom sessions will make the learning of the material presented easier.		
Strongly Agree	14	26.4%
Agree	21	39.6%
Neither Agree nor Disagree	15	28.3%
Disagree	3	5.7%
Strongly Disagree	0	0.0%
22B. Having access to recorded classroom sessions will be useful in my studies.		
Strongly Agree	14	26.4%
Agree	29	54.7%
Neither Agree nor Disagree	9	17.0%
Disagree	1	1.9%
Strongly Disagree	0	0.0%

Responses to Ease of Use Questions

The students were asked to rate the perceived ease of use of the process of acquiring and playing back the digital audio recordings of the classroom lecture sessions. The responses to the questions were as follows:

Question 23B response to the statement: "Learning to operate a computer or mp3 player to listen to podcasts would be easy for me." A majority of the students (90.6%) responded that they agreed or strongly agreed with the statement, while 3.8% responded that they disagreed with the statement.

Question 24B response to the statement: "I would find that I can get the podcast site to do what I want it to do." A majority of the students (84.9%) responded that they agreed or strongly agreed with the statement, while 5.7% responded that they disagreed with the statement.

Question 25B response to the statement: "I would find interaction with the podcast site to download files to be clear and understandable." A majority of the students (77.4%) responded that they agreed or strongly agreed with the statement, while 5.7% responded that they disagreed with the statement.

Question 26B response to the statement: "It would be easy for me to become skillful at retrieving podcasts from online." A majority of the students (90.6%) responded that they agreed or strongly agreed with the statement, while 3.8% responded that they disagreed with the statement.

Question 22B response to the statement: "I would find that the online podcast site would be easy to use." A majority of the students (90.6%) responded that they agreed or

strongly agreed with the statement, while 3.8% responded that they disagreed with the statement.

Table 10 lists the responses to the perceived ease of use questions.

Table 10

Second Survey Responses to Perceived Ease of Use Questions

	Frequency	Percent
23B. Learning to operate a computer or mp3 player to listen to podcasts would be easy for me.		
Strongly Agree	25	47.2%
Agree	23	43.4%
Neither Agree nor Disagree	3	5.7%
Disagree	2	3.8%
Strongly Disagree	0	0.0%
24B. I would find that I can get the podcast site to do what I want it to do.		
Strongly Agree	18	34.0%
Agree	27	50.9%
Neither Agree nor Disagree	5	9.9%
Disagree	3	5.7%
Strongly Disagree	0	0.0%
25B. I would find interaction with the podcast site to download files to be clear and understandable.		
Strongly Agree	19	35.8%
Agree	22	41.5%
Neither Agree nor Disagree	9	17.0%
Disagree	3	5.7%
Strongly Disagree	0	0.0%
26B. It would be easy for me to become skillful at retrieving podcasts from online.		
Strongly Agree	24	45.3%
Agree	24	45.3%
Neither Agree nor Disagree	3	5.7%
Disagree	2	3.8%
Strongly Disagree	0	0.0%

27B. I would find that the online podcast site would be easy to use.

Strongly Agree	22	41.5%
Agree	26	49.1%
Neither Agree nor Disagree	3	5.7%
Disagree	2	3.8%
Strongly Disagree	0	0.0%

Analysis of Changes of Participation Levels Over Time

To determine whether the responses of the students' perceptions of their participation had altered over the length of the study, the initial participation questions were compared to the set of participation question responses on the second survey instrument. These comparisons were analyzed using paired sample *t* tests. The results of the analyses:

- Pair 1: Comparing "In general, I feel comfortable speaking up in class when my peers are present.": The paired samples with $M = .132$, $SD = .761$ were tested using an alpha level of .05. The paired samples were not found to be significantly different, $t(52) = 1.264$, $p < .212$.
- Pair 2: Comparing "In general, I feel comfortable speaking up in class when the instructor is present.": The paired samples with $M = .132$, $SD = .708$ were tested using an alpha level of .05. The paired samples were not found to be significantly different, $t(52) = 1.358$, $p < .180$.
- Pair 3: Comparing "I feel comfortable sharing my research ideas with the class.": The paired samples with $M = -.075$, $SD = .874$ were tested using an alpha level of .05. The paired samples were not found to be significantly different, $t(52) = -.629$, $p < .532$.
- Pair 4: Comparing "I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will not be

publicized or broadcast in any way.": The paired samples with $M = .132$, $SD = .652$ were tested using an alpha level of .05. The paired samples were not found to be significantly different, $t(52) = 1.476$, $p < .146$.

- Pair 5: Comparing "I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will be made available over the Internet.": The paired samples with $M = .151$, $SD = .818$ were tested using an alpha level of .05. The paired samples were not found to be significantly different, $t(52) = 1.343$, $p < .185$.
- Pair 6: Comparing "I feel comfortable sharing my research ideas with the class when a recorder is present knowing that it will be made available over the Internet.": The paired samples with $M = .113$, $SD = .698$ were tested using an alpha level of .05. The paired samples were not found to be significantly different, $t(52) = 1.181$, $p < .242$.
- Pair 7: Comparing "I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present.": The paired samples with $M = .000$, $SD = .920$ were tested using an alpha level of .05. The paired samples were not found to be significantly different, $t(52) = 000$, $p < .1.000$.

As a result of this series of paired samples *t* tests, no significant differences were found between the first and second instrument with regard to the responses related to classroom interaction. See Appendix N, Paired Sample *t* Tests – Test for Changes in Classroom Interaction for the SPSS output for this section.

Second Survey Responses to Use of Digital Audio Recordings

The students were asked to identify their use of the audio digital classroom recorded lecture sessions that had been put online for them. This question gave the respondents three possible choices: 1) I have listened to at least one of the lecture recordings; 2) I have not listened to any of the recordings, but intend to listen soon; 3) I have not listened to any of the recordings and do not intend to listen. The responses to this question were as follows:

- Response to "I have listened to at least one of the lecture recordings": Ten students, or 18.9 percent of the students, responded that they had listened to at least one recorded lecture session. Thirty-three students, or 62.3 percent of the students, responded that they had not listened but intend to listen soon. The remaining ten students, or 18.9 percent, have not listened and do not intend to listen to the lecture recordings.

Of those students who responded to this second survey, 81.1% had or intended to listen to the classroom recorded sessions.

Analysis of Use of Digital Recordings by Gender

Comparisons of the intent to use the digital audio recordings in the first survey and the use (actual and intended use) of the second survey with regard to gender were analyzed by using independent *t* tests. The results of these *t* tests were as follows:

- The independent *t* test was performed comparing the responses of the first survey that included all 107 students of both groups. The **Perceived Use** of the digital audio recording means with respect to **Gender** (Female $M = 2.27$, $SD = 1.096$; Male $M = 2.50$, $SD = 1.206$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the

variances are homogeneous had not been violated (p<.178). The response means were not found to be significantly different, $t(105)= -1.000$, $p<.320$.

- The independent *t* test was performed comparing the responses of the second survey that included the 53 students from the experimental group. The **Perceived Use** of the digital audio recording means with respect to **Gender** (Female $M = .91$, $SD = .610$; Male $M = 1.06$, $SD = .629$) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.942). The response means were not found to be significantly different, $t(51)= -.897$, $p<.374$.

In both cases, it was found that there were no significant differences in students' perceptions of use as obtained from the first instrument and in intended use of digital audio recordings as obtained by the second instrument. See Appendix O, SPSS Output - Analysis of Use by Gender for the SPSS output for this section.

Analysis of Perceived Ease of Use by Age Group

Before attempting to perform analyses on the perceived ease of use construct, a factorial analysis was performed to attempt to reduce the number of questions to a more manageable number of variables. As a result of the factorial analysis, questions 23B through 27B were extracted as a single component. This new Perceived Ease of Use variable was tested using the ANOVA test to see if there was a significant difference in the means of the responses given by each of the age groups.

- The ANOVA test was performed comparing Perceived Ease of Use factored construct means with respect to **Age Group** (Age Group "18" $M = -.0400$, $SD =$

.7762; Age Group "19" *M* = -.1946, *SD* = .9093; Age Group "20" *M* = -.2661, *SD* = .9928; Age Group "21" *M* = -.3040, *SD* = .8329; Age Group "22-23" *M* = .3931, *SD* = 1.0711; Age Group "24-29" *M* = -.1447, *SD* = .7931; Age Group "30 and over" *M* = .7648, *SD* = 1.5114) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.951). The response means were not found to be significantly different, *F*(6, 45)= 1.074, *p*<.392.

See Appendix P, SPSS Output – Analysis of Ease of Use by Age Group for the SPSS output for this section.

Analysis of Perceived Ease of Use by Gender

This Perceived Ease of Use variable was then tested using the independent *t* test to see if there was a significant difference in the means of the responses of males and females.

- The independent *t* test was performed comparing the factored **Perceived Ease of Use** variable with the means of the responses given by **Gender** (Female *M* = .4987*, SD* = 1.1033; Male *M* = -.3539*, SD* = .7546) using an alpha level of .05. The Levene's Test for Equality of Variances showed that the assumption that the variances are homogeneous had not been violated (p<.653). The response means were found to be significantly different, *t*(51)= 3.345, *p*<.002.

In this case, there was found to be a significant difference between the female and the male respondents to the perceived ease of use construct. See Appendix Q, SPSS Output – Analysis if Ease of Use by Gender for the SPSS output for this section.

Analysis of Relationship between Perceived Usefulness and Use

Is there a relationship between Perceived Usefulness of the digital audio technology medium and the Use of that technology?

- For this analysis, the Pearson correlation was used to test if a relationship existed between Perceived Usefulness (M =.0000, SD = 1.000) and Use (M =1.000, SD = .620). For the alpha level of .01 level, the correlation between Perceived Usefulness and Use was found to be statistically significant, $r(51) = -.657$, $p < .000$. This shows that as Usefulness increases (0 = Strongly Agree to 4 = Strongly Disagree), the value of Use decreases (0 = not accessed recordings to 2 = accessed recordings). Therefore, those who strongly agreed (0) that the classroom session audio recordings were useful were more likely to access and use the recorded media (2). Those who strongly disagreed (4) that the classroom session audio recordings were useful were less likely to access and use the recorded media (0).

See Appendix R, SPSS Output – Perceived Usefulness and Use for the SPSS output for this section.

Analysis of Perceived Ease of Use and Use of the Digital Audio Technology

One question remains, was there a relationship between perceived ease of use the digital audio technology and the use of that technology?

- For this analysis, the Pearson correlation was used to test if a relationship existed between Ease of Use (M =.0000, SD = 1.000) and Use (M =1.000, SD = .620). For the alpha level of .01 level, the correlation between Perceived Ease of Use and Use was found to be statistically significant, $r(53) = -.379$, p

< .005. This shows that as Perceived Ease of Use increases (0 = Strongly Agree to 4 = Strongly Disagree), the value of Use decreases (0 = not accessed recordings to 2 = accessed recordings). Therefore, those that strongly agreed (0) that the classroom session audio recordings were easy to use were more likely to access and use the recorded media (2). Those that strongly disagreed (4) that the classroom session audio recordings were easy to use were less likely to access and use the recorded media (0). Here, the perceived ease of use of the digital audio technology had an influence on use of the technology.

See Appendix S, SPSS Output – Perceived Ease of Use and Use for the SPSS output for this section.

Hypotheses Discussion

H_1: There is no difference between perceived student interaction levels during traditional classroom sessions where a digital recorder is recording the classroom sessions and in those traditional classroom sessions where a recorder is not present. To determine whether this hypothesis could be supported, tests were performed to determine if the groups (experimental and control), classes, gender, age groups, or mp3 ownership had an effect on either interaction levels during traditional classroom session or sessions where a digital recorder was present recording the classroom session. In all but one case, the comparisons resulted in differences that were not significant. However, there was a significant difference when gender was tested with the responses related to perceived interaction when a recorder was present. This hypothesis, therefore, was not supported.

H_2: In classes where the sessions are recorded, students' perceived participation levels will not change over time. Paired sample *t* tests were performed comparing the initial survey

instrument and second survey instrument responses on perceived classroom interaction. None of the comparisons resulted in a significant difference between the first and second surveys. Therefore, this hypothesis was supported.

H_3: Age will not have an effect on perceived usefulness of the recorded sessions. The ANOVA test was performed on age and perceived usefulness, using the data supplied by the respondents of the first survey instrument. The resulting analysis did not show a significant difference in the means of the age groups with regard to perceived usefulness. This hypothesis was supported.

H_4: Age will not have an effect on perceived ease of use of the recorded sessions. The ANOVA test was performed on age and perceived ease of use as a result of the data collected by the second survey instrument. The ANOVA test showed that there were no significant differences between the age groups. This hypothesis was supported.

H_5: There is no significant difference between men and women as to the perceived usefulness of recorded sessions. An independent *t* test was performed to determine if a significant difference existed. As a result of the *t* test, it was found that there were no significant differences between men and women as to perceived usefulness of recorded sessions. This hypothesis was supported.

H_6: There is no significant difference between men and women as to the perceived ease of use of the recorded sessions. The independent *t* test was used if there was a significant difference in the means of the responses of males and females. The results of the independent *t* test showed that there was a significant difference in the responses of the groups. Therefore, this hypothesis was not supported.

H_7: Students who perceive the recorded classroom sessions as useful are no more likely to use the digital recordings than students who do not perceive them as useful. As a result of the previous analysis, it was found that those students who found that the recorded classroom sessions were useful were more likely to use the digital audio recordings. On the other hand, those students who responded that the recordings were not useful were less likely to make use of the digital audio recordings. This hypothesis was not supported.

H_8: Students who perceive the digitally recorded classroom sessions as easy to use are no more likely to use the digital recordings than those who do not perceive the digitally recording as easy to use. As a result of the analysis to find if a relationship existed between ease of use and students' use of the digital audio recordings, it was found that those students who found that the recorded classroom sessions were easy to use were more likely to use the digital audio recordings. On the other hand, those students who responded that the recordings were not easy to use were less likely to use the digital audio recordings. Therefore, this hypothesis was not supported.

The analyses of the hypotheses proposed in this research study resulted in four hypotheses that were supported and four that were not supported. See Table 11 for the results of the hypotheses after analyses.

Table 11

Results of the Hypotheses after Analyses

Result	Hypothesis
Not Supported	H_1: There is no difference between perceived student interaction levels during traditional classroom sessions where a digital recorder is recording the classroom sessions and in those traditional classroom sessions where a recorder is not present.
Supported	H_2: In classes where the sessions are recorded, students' perceived participation levels will not change over time.
Supported	H_3: Age will not have an effect on perceived usefulness of the recorded sessions.
Supported	H_4: Age will not have an effect on perceived ease of use of the recorded sessions.
Supported	H_5: There is no significant difference between men and women as to the perceived usefulness of recorded sessions.
Not Supported	H_6: There is no significant difference between men and women as to the perceived ease of use of the recorded sessions.
Not Supported	H_7: Students who perceive the recorded classroom sessions as useful are no more likely to use the digital recordings than students who do not perceive the recorded sessions as useful.
Not Supported	H_8: Students who perceive the digitally recorded classroom sessions as easy to use are no more likely to use the digital

recordings than those who do not perceive the digitally recording as easy to use.

CHAPTER 5

Discussion and Implications of the Research

Summary of Research

This quasi-experimental research study was designed to investigate the acceptance and use of digital recording devices taking into account differences in age, gender, and ownership of an mp3 player and the effects of the recording devices on classroom participation. The study took place at the beginning of the winter semester of 2009. As this was a purposive study and limited to 107 students at a regionally accredited four-year university of 24,000 students, the results cannot be generalized to a larger population.

Two groups of three classes each were selected to be a part of the study based on the willingness of the instructors to be a part of the study. Three classes were part of the experimental group. The three classes making up the experimental group had their face-to-face traditional classroom sessions (lecture sessions) digitally recorded. The instructors of the experimental group were trained to digitally record the audio portion of classroom lecture sessions and upload the digital audio files to an online podcasting site. These digital audio recordings were then made available to the students in the class. The other three classes, or the control group, were not recorded, nor did they have recorded lecture sessions made available to them. All lecture sessions were observed beginning with the first or second lecture. It was during the first observed lecture session that all students in attendance were given the opportunity to become part of the study and complete the first survey instrument. Over the course of the next three weeks, the experimental group was recorded and had their classroom lectures uploaded to the podcasting site. At the end of this three-week period, the experimental group received a second survey instrument.

The total number of students in both groups who responded to the first survey was 107. Of these, 69 were among the experimental group and 38 were among the control group. The gender makeup of the groups was 66 males to 41 females. Of the students who participated, 92 owned an mp3 player. In contrast to what Ipsos found in 2006 where more males owned mp3 players than females, there was not a significant difference in the ownership of mp3 players between the males and females who were a part of this study.

The makeup of each of the classes and groups was similar.

- There was no significant difference in the number of females and males between groups or classes.
- There were no significant differences in the age groups between groups or classes.
- There were no significant differences in the academic status between groups or classes.
- There were no significant differences in ownership of mp3 players between groups or classes.

Additional tests were performed on computer literacy, comparing the means of the groups, gender, and age groups. Significant differences did surface when testing computer knowledge and gender. The tasks that were found to be significantly different among males and females included:

- Knowledge about downloading music to a computer from a CD
- Knowledge about downloading music to a computer from the Web
- Knowledge about loading music onto an mp3 player

As reported in Chapter 2, Alshare, Grandon, and Miller found similar gender differences in perceived computer knowledge. Likewise, this study found that males were more comfortable than females at performing tasks related to downloading music to a computer and mp3 player.

Significant gender differences also arose when participation responses were investigated. As previously acknowledged, classroom participation has had a positive affect on the learning process (Vavilis, 2004, p. 286; Weaver, 2005). Increased participation in classes creates a positive environment for student and teacher engagement that:

- Aids students in understanding course material (Weaver, 2005)
- Forces students to come to class better prepared to engage in discussion (Weaver, 2005)
- Increases understanding of the topic for themselves as well as others' discussion (Weaver, 2005)
- Results in classes that are more cooperative (Fassinger, 2000)
- Results in classes that are more respectful of others (Fassinger, 2000)
- Results in classes that are less teacher centered (Fassinger, 2000)
- Results in professors having positive feelings toward the class (Fassinger, 2000)

Looking at the percentages from the data from the first survey, the students responded that, for the most part, they were comfortable speaking up in class with or without a digital audio recorder present. Upon further investigation it was found that there was not a significant difference related to gender and speaking up in class when a recorder is not present. Conversely, there was found to be a significant difference in perceived participation when a recorder was present in the classroom. It was found that females were less

comfortable than males when it came to participating in class when a digital audio recorder was present.

Again by looking at the percentages, most students found that they would use the digital recorded lecture sessions if they were to become available to them (first survey = 89.7%, second survey = 82.2%). Looking at the results of the analyses for perceived use, it was found that there were no significant differences between the groups, gender, or age groups.

Comparisons were made between the first and second surveys to determine whether changes occurred over time in attitudes toward speaking up in class with and without a recorder present. It was determined that significant changes did not occur in these areas.

According to the percentages, most students found that the podcasts would be easy to use (90.6%). However, upon closer investigation, males were more likely than females to find that the procedure of accessing the podcasts was easy.

The results of this study showed that there was a connection between perceived usefulness and whether the student would make use of the digital audio recordings. It was found that the more useful the student thought the recordings were, the more likely he or she was to access and use them. The study results also showed, to a lesser degree, that the easier the interface was perceived to be to access the digital audio files, the more likely the students were to use them.

Implications of the Study

There was a significant difference in student comfort levels when speaking up in class during usual classroom lecture sessions and during lecture sessions when the class was recorded. As noted, there was not a significant difference between males and females when

speaking up in a traditional face-to-face classroom when a digital audio recording device was not present in the classroom. One of the most significant findings, however, related to questions where comparisons could be made between classrooms where a digital recorder was present and classrooms where digital recorders were not present. Here, the females in this study were less likely than males to feel comfortable speaking in class when a digital recorder was present recording classroom discussions.

Another significant finding was that 71.9% of the students felt comfortable sharing research ideas with the class. However, this number was reduced to 57.9% with the inclusion of having the class session where research ideas are discussed digitally recorded and put online. The analysis of this finding, which was not part of the original research, showed that the means were significantly different.

The use of digital audio recording media in the classroom may exclude more women than men from participating in classroom discussions. This, as supported by Weaver (2005), may result in lower levels of understanding of the concepts. This reduced participation may also result in a more negative attitude toward the class for those women who are less willing to participate during classroom sessions that are recorded and put online.

As stated by Fassinger (2000), "Students may not possess the comfort levels" that their teachers assume they have (p. 43). Instructors need to be made aware that recording lectures and requiring classroom participation may adversely affect more female students than male students. This may be more enhanced during discussions where students are required to participate and discuss research ideas aloud. As a result, requiring discussion during recorded classroom lecture sessions may result in lower grades for female students who may not be willing to participate.

This research study also found that females are less comfortable than males with uploading and downloading music files from the Internet and CDs to computers and mp3 players. Instructors, again, should be made aware of this deficiency; otherwise, it might have an effect on the completion of classroom assignments if such teachers assume that the students have knowledge of how to download music or audio files to a computer or mp3 player from the Internet.

This study found that ease of use affects students' intended use of the digital audio technology. It may be the case that some students, who feel that the technology is cumbersome, may not be willing to use the technology because of this.

Suggested Research

Because this study cannot be generalized beyond the computer science and technology classes in which the study took place, this research does raise questions for further study. Since there were no significant differences between the pre-test and post-test survey results, and since the initial survey was distributed at the beginning of the semester, the initial survey could be used to expand the study to a larger number of students. The study need not be restricted to the classroom. This would mean that a true random sample of students could be selected from the whole student population or, possibly, among the student populations of several universities and colleges.

Another possible expansion of this research would be to add video to the digital audio questions to see if this makes an impact on the results.

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Appendix A. Original Instrument Developed by Davis (1989).

Final Measurement Scales for Perceived Usefulness and Perceived Ease of Use

Perceived Usefulness

Using CHART-MASTER in my job would enable me to accomplish tasks more quickly.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

Using CHART-MASTER would improve my job performance.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

Using CHART-MASTER in my job would increase my productivity.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

Using CHART-MASTER would enhance my effectiveness on the job.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

Using CHART-MASTER would make it easier to do my job.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

I would find CHART-MASTER useful in my job.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

Perceived Ease of Use

Learning to operate CHART-MASTER would be easy for me.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

I would find it easy to get CHART-MASTER to do what I want it to do.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

My interaction with CHART-MASTER would be clear and understandable.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

I would find CHART-MASTER to be flexible to interact with.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

It would be easy for me to become skillful at using CHART-MASTER.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

I would find CHART-MASTER easy to use.

likely |_____|_____|_____|_____|_____|_____|_____| unlikely
extremely quite slightly neither slightly quite extremely

Appendix B. Podcasting Instructions for Faculty.

Podcasts on EMU's Podcasting Site

What is covered in this document:
1. Logging on
2. Creating a New Podcast (theme)
3. Uploading files to your Podcast File Library
4. Creating a new Episode to add to your Podcast (theme)
5. Publishing the Podcast Address

1. Logging on

   Before you start, you'll need to use either Internet Explorer or Safari (Firefox will not work).

   To log on to the EMU Podcasting site, go to:
   https://elocker.emich.edu/ePodcast/index.php

   - Enter your EMU username and password.
   - Click on the Sign in button.

2. Creating a New Podcast (theme)

   A Podcast is a set of files that pertain to one theme. This theme can be a group of files for a single class, a committee, or some other homogeneous group that would request the podcast files.

   Clicking on the "New Podcast" link will create a new "theme" or "grouping" to which you can upload files to distribute. To do this:

   - Click on the link: "New Podcast" (This will let you add a new "theme" to the "Podcast List")
   - Enter the information regarding your new podcast theme. You can define this new theme to include your name, class name, and semester.

   NOTE: The next time you log in, you'll click on the title of the Podcast theme from within the Podcast List (You will not create another theme for the same class.)

   You'll now have something that looks like this:

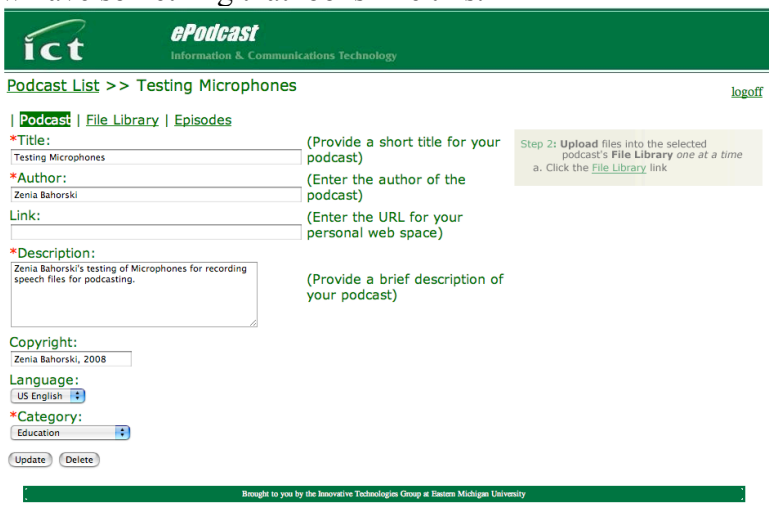


Figure 1: The Podcast Theme Description Screen.

3. Uploading files to your Podcast File Library.

To add files to your new Podcast (theme), you'll first need to upload these files to your Library. These files can be of any type that you wish to "publish". (The file types I have tried include MP3 format speech files, Microsoft® Word files, image files (.jpg, .png, .gif), .PDF files, html files, and Microsoft® PowerPoint files.)

To add your files to your Podcast (theme):

a. IF you are back at the Podcast list screen, click on the title of the Podcast you just created.

b. If you are on the screen that looks like figure 1, then click on the Podcast "File Library" link. (The window will look like figure 2 below). You'll be able to add your files to the Podcast File Library. You will then be able to choose whichever files you wish to include in your Podcast theme.
If you have already uploaded files to your Podcast File Library, the list of files will appear in the window.

c. To Upload the files you wish to ***add*** to your podcast file library:
   - Click on the Browse button
   - Find the file you wish to upload
   - Click on the Upload button to add the file to your Podcast

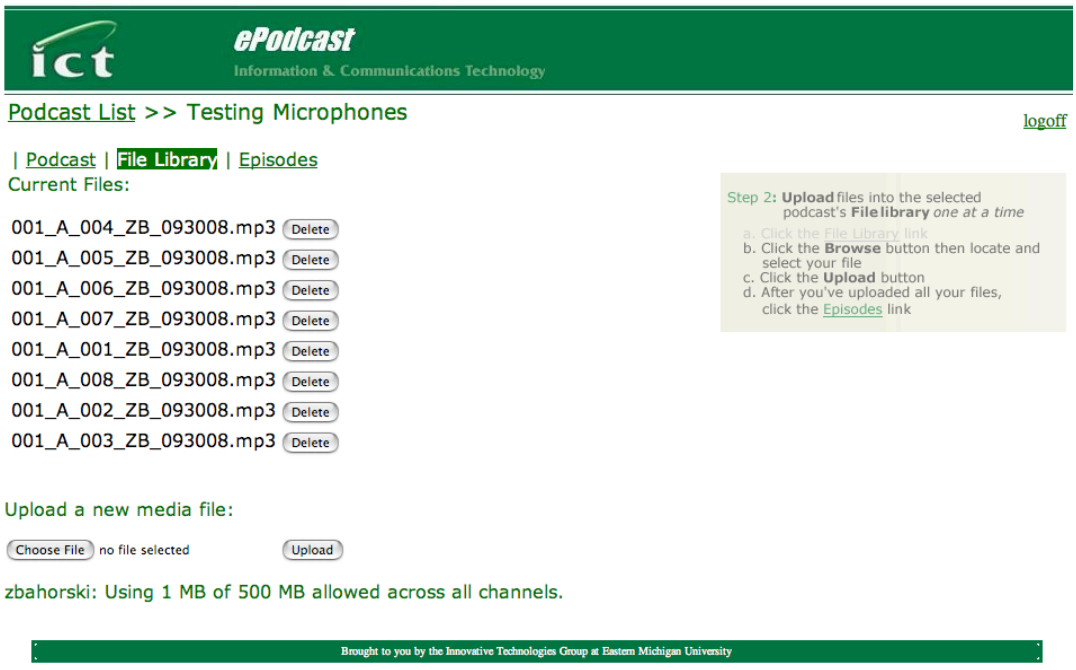


Figure 2. The File Library Screen.

4. Creating a new Episode to add to your Podcast (theme)

After you have uploaded the files you wish to include in your Podcast theme, you will be given the opportunity to include them in separate "Episodes". Each Episode will include a name, a description, and a link to the file. It is advisable to order your Episodes in some way. Episode numbers are common as are dates in which the podcast had been uploaded.

To Create your new Episode:

- Click on the Episodes link
- Click on New Episode
- Enter the descriptive information regarding your New Episode (You may wish to include the date of the recording and the topics covered in that recording. See figure 3 for an example.)
- Select the file you wish to include in your Episode
- Click on the Create button

Your New Episode will now be included in the "Current Episodes" list window.

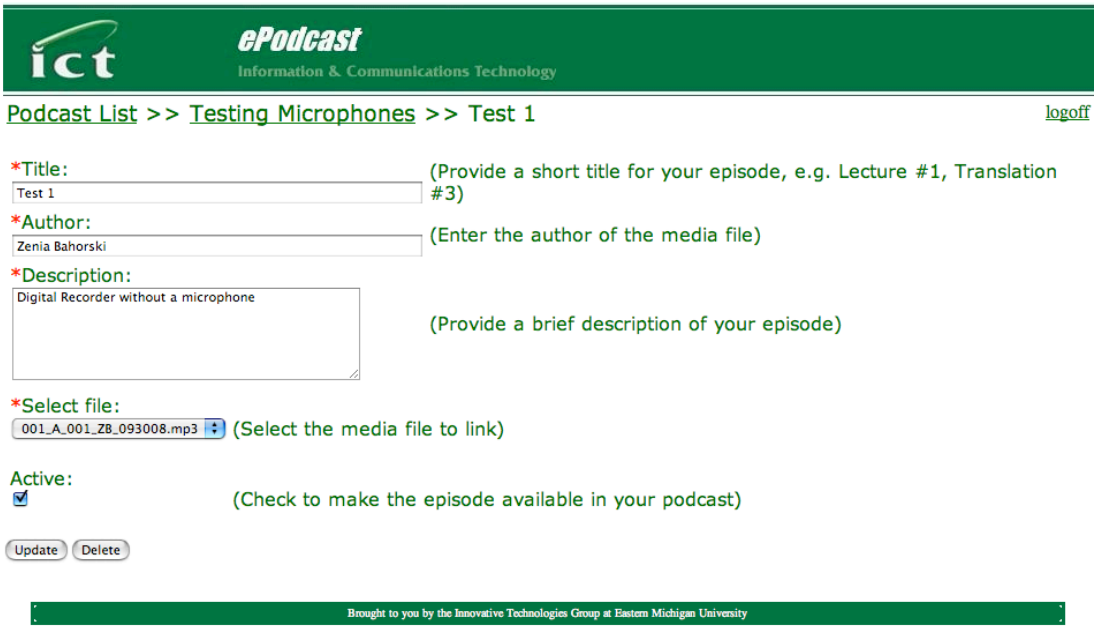
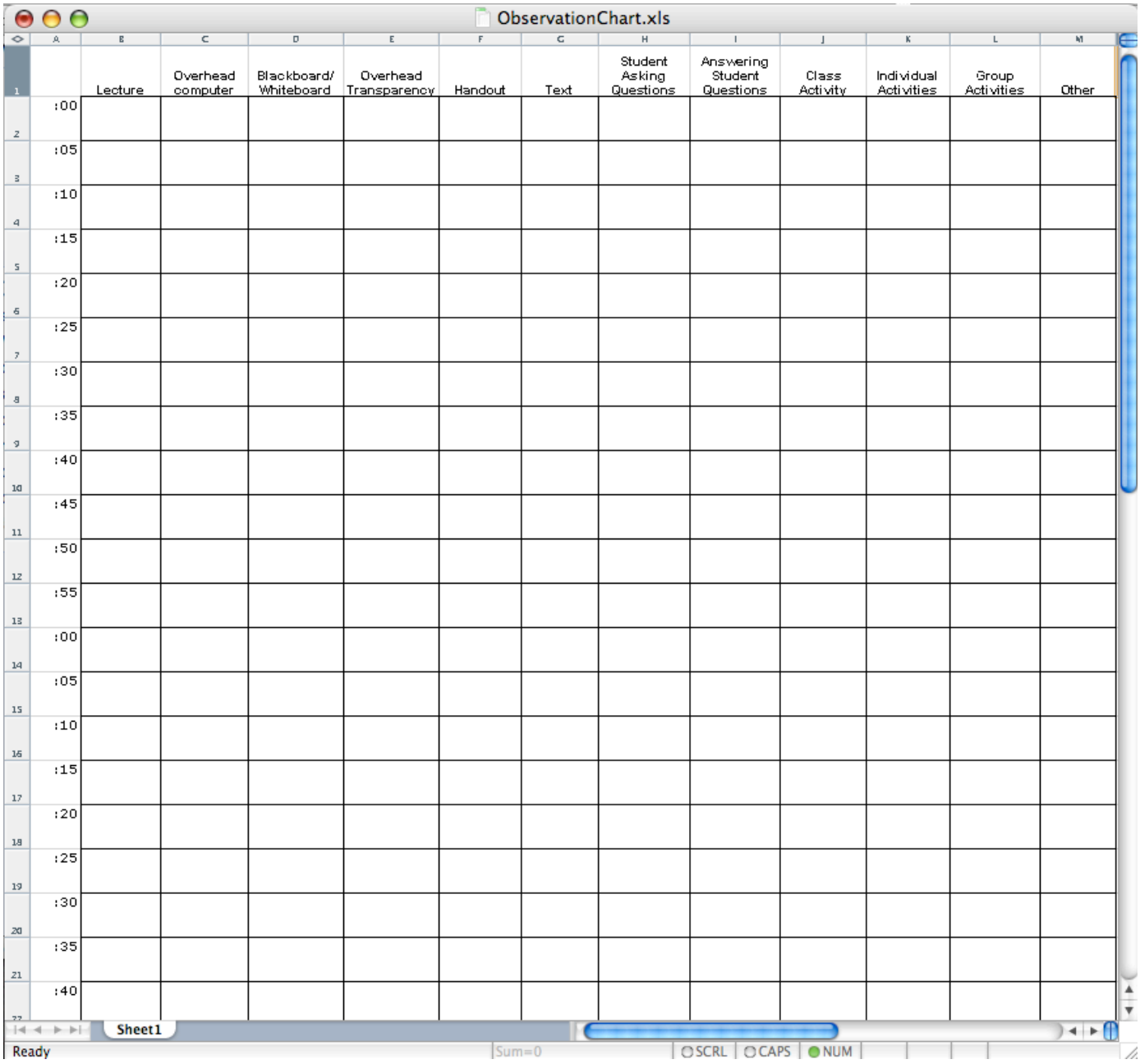


Figure 3. Example of "New Episode" Screen.

5. Publishing the Podcast Address

Click on the Podcast List link
Highlight and copy the URL of the Podcast address
Send out the URL (You only need to send out this address once.)

Appendix C. Observation Chart Sample Sheet.



Appendix D. First Survey Instrument with Consent Letter

HUMAN SUBJECTS RESEARCH CONSENT LETTER

Eastern Michigan University
Letter of Informed Consent

January 7, 2009

I am a graduate student doing research for my PhD through the College of Technology under the direction of Phillip Cardon, PhD here at Eastern Michigan University.

The use of digital audio recording technology is currently used in the college classroom. I am conducting a research study to investigate whether the students perceive that having access to these audio recordings is a useful and effective instructional tool. The students who participate in this study will know that they are being asked for their input about their perceptions of the acceptance and use of digital audio technology in the college classroom.

Your participation will involve answering questions relating to your demographic background and questions relating to your perceptions of the acceptance and use of the digital audio technology in the college classroom. These questions dealing with your perceptions will relate to recorded face-to-face classroom sessions and should take no longer than 10 minutes to answer. Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. It will not affect your grade. I, or someone I may choose, will distribute the surveys during the semester. Your instructor will not be present during the surveys nor will your instructor learn of your individual answers. The results of the research study may be published, but your name will not be used.

There are no foreseeable risks or discomforts to you if you agree to participate in the study.

This research protocol and informed consent document has been reviewed and approved by Eastern Michigan University Human Subjects Review Committee for use from August 2008 to July 2009. If you have any questions about the approval process, please contact Dr. Deb de Laski-Smith (734.487.0042, Interim Dean of the Graduate School and Administrative Co-chair of UHSRC, human subjects@emich.edu).

I truly appreciate your time and effort in answering the survey questions for my research. If you have any questions concerning this research study, please call me at 734-487-1063 or Dr. Cardon at 734-487-4330. Or if you prefer, my email address is zbahorski@emich.edu. Dr. Cardon's email address is cardonp@yahoo.com.

Sincerely,
Zenia Bahorski

* * * * * * * * * * * *

I give my consent to participate in the above study.

Please print your name in full: _____

Signature: _____ Date: _____

Section A: Demographics

Age _____

Gender: ***Circle one:*** Female Male

Academic Status ***Circle one:***

Freshman

Sophomore

Junior

Senior

Second Bachelor

Graduate Student

Special Status

Other: Please describe:

Major _____

Do you now own, or have owned an mp3 player (iPod, Zune, cell phone with mp3 capabilities, etc.) Circle one: No Yes

If yes, which mp3 player(s)? _____

Continue on to the next page…

Section B: Self-Assessment of Computer Knowledge

The following questions use the Likert Scale: Strongly Agree=SA, Agree=A, Neither Agree Nor Disagree=NA/ND, Disagree=D, Strongly Disagree=SD, No Experience in this area = NE

Circle your selected answer…

I can use a word processing program on a computer with no trouble.	SA	A	NA/ND	D	SD	NE
I can use an email program to compose and read email with no trouble.	SA	A	NA/ND	D	SD	NE
I can send attachments using email with no trouble.	SA	A	NA/ND	D	SD	NE
I can surf the Web with no trouble.	SA	A	NA/ND	D	SD	NE
I can refine a search on the Web with no trouble.	SA	A	NA/ND	D	SD	NE
I can download music to a computer from a CD with no trouble.	SA	A	NA/ND	D	SD	NE
I can download music to a computer from the Web with no trouble.	SA	A	NA/ND	D	SD	NE
I can load music onto an mp3 player with no trouble.	SA	A	NA/ND	D	SD	NE
I can connect to eLearning environments such as eCompanion, EMUonline, or WebCT, with no trouble.	SA	A	NA/ND	D	SD	NE
I can upload files to eLearning environments such as eCompanion, EMUonline, or WebCT, with no trouble.	SA	A	NA/ND	D	SD	NE

Continue on to the next page…

Section C: Perception Questions

The following questions use the Likert Scale: Strongly Agree=SA, Agree=A, Neither Agree Nor Disagree=NA/ND, Disagree=D, Strongly Disagree=SD

Note: If you have not had experience in the area in question, please enter your ***best guess*** of how you ***think*** you would act in that situation.

Perceived Classroom Interaction

In general, I feel comfortable speaking up in class when my peers are present.	SA	A	NA/ND	D	SD
In general, I feel comfortable speaking up in class when the instructor is present.	SA	A	NA/ND	D	SD
I feel comfortable sharing my research ideas with the class.	SA	A	NA/ND	D	SD
I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will not be publicized or broadcast in any way.	SA	A	NA/ND	D	SD
I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will be made available over the Internet.	SA	A	NA/ND	D	SD
I feel comfortable sharing my research ideas with the class when a recorder is present knowing that it will be made available over the Internet.	SA	A	NA/ND	D	SD
I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present.	SA	A	NA/ND	D	SD

Perceived Usefulness

Having access to recorded classroom sessions will allow me to learn more quickly.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will improve my grade performance.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will improve my effectiveness in learning the presented classroom session content.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will make the learning of the material presented easier.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will be useful in my studies.	SA	A	NA/ND	D	SD

Use of Digital Audio Communication Technology:

For this question, please check the best answer.

Once made available to me online, I will likely access classroom session recordings to listen….

- ☐ To **all** of the recordings once they had become available to me.
- ☐ To **most** of the recordings once they had become available to me.
- ☐ To **some** of the recordings once they had become available to me.
- ☐ To **at least one** of the recordings once they had become available to me.
- ☐ I am **unlikely to listen** to any of the classroom session recordings.

For this section of the "Use" questions, please circle the best answer according to the Likert Scale: Strongly Agree=SA, Agree=A, Neither Agree Nor Disagree=NA/ND, Disagree=D, Strongly Disagree=SD

I foresee that having access to recorded classroom sessions will affect my classroom attendance.	SA	A	NA/ND	D	SD
I foresee that having access to recorded classroom sessions will affect the attendance of some of my classmates.	SA	A	NA/ND	D	SD

Comment Section:

If you have any comments on any of the questions, please include the question here and your comment.

Thank you for your time.

Appendix E. Follow-up Survey Instrument

Please Print your Name:

Date:

Continue on to the next page…

Perception Questions

The following questions use the Likert Scale: Strongly Agree=SA, Agree=A, Neither Agree Nor Disagree=NA/ND, Disagree=D, Strongly Disagree=SD

Note: If you have not had experience in the area in question, please enter your ***best guess*** of how you ***think*** you would act in that situation.

Perceived Classroom Interaction

In general, I feel comfortable speaking up in class when my peers are present.	SA	A	NA/ND	D	SD
In general, I feel comfortable speaking up in class when the instructor is present.	SA	A	NA/ND	D	SD
I feel comfortable sharing my research ideas with the class.	SA	A	NA/ND	D	SD
I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will not be publicized or broadcast in any way.	SA	A	NA/ND	D	SD
I feel comfortable speaking in class when a recorder is present, recording the class discussion, knowing that the recording will be made available over the Internet.	SA	A	NA/ND	D	SD
I feel comfortable sharing my research ideas with the class when a recorder is present knowing that it will be made available over the Internet.	SA	A	NA/ND	D	SD
I feel that what I say in class would be affected more if a recorder were present than if a recorder were not present.	SA	A	NA/ND	D	SD

Perceived Usefulness

Having access to recorded classroom sessions will allow me to learn more quickly.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will improve my grade performance.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will improve my effectiveness in learning the presented classroom session content.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will make the learning of the material presented easier.	SA	A	NA/ND	D	SD
Having access to recorded classroom sessions will be useful in my studies.	SA	A	NA/ND	D	SD

Perceived Ease of Use

The following questions use the Likert Scale: Strongly Agree=SA, Agree=A, Neither Agree Nor Disagree=NA/ND, Disagree=D, Strongly Disagree=SD

Note: If you have not had experience in the area in question, please enter your ***best guess*** of how you ***think*** you would act in that situation.

Learning to operate a computer or mp3 player to listen to podcasts would be easy for me.	SA	A	NA/ND	D	SD
I would find that I can get the podcast site to do what I want it to do.	SA	A	NA/ND	D	SD
I would find interaction with the podcast site to download files to be clear and understandable.	SA	A	NA/ND	D	SD
It would be easy for me to become skillful at retrieving podcasts from online.	SA	A	NA/ND	D	SD
I would find that the online podcast site would be easy to use.	SA	A	NA/ND	D	SD

Use of Digital Audio Communication Technology:

For this question, please check the best answer.

Making use of the podcasts:

- ☐ I have listened to at least one of the lecture recordings.
- ☐ I have not listened to any of the recordings, but intend to listen soon.
- ☐ I have not listened to any of the recordings and do not intend to listen.

Comment Section:

If you have any comments on any of the questions, please include the question here and your comment.

Thank you for your time.

Appendix F. Student Podcasting Instruction Sheet.

Finding and Listening to the podcasts for this class

Use Internet Explorer (recommended) or Safari to link to your class podcast site. (The sample snapshot shown here was taken in Safari. Internet Explorer will look similar to this.)

Go to:
http://elocker.emich.edu/ePodcast/podcasts/rss.php?channel=###
[where ### is the class channel number]

You will see your class' podcasts listed. (A sample is shown here)

Select the recording you wish to listen to by clicking on the link. If your volume is up, you should be able to hear the recording shortly after clicking on the link.

Appendix G: Human Subjects Approval Letter

EASTERN MICHIGAN UNIVERSITY

Education First

August 11, 2008

Zenia Bahoriski
7070 Pontiac Trail
South Lyon, MI 48178

Dear Zenia Bahorski:

The Human Subjects Institutional Review Board (IRB) of Eastern Michigan University has reviewed and approved as exempt research your proposal titled, "A Quasi-Experimental Study on Students' Perceptions and Intended Use of Digital Recording Technology in the College Technology Classroom." The IRB determined that the rights and welfare of the individual subjects involved in this research are carefully guarded. Additionally, the methods used to obtain informed consent are appropriate, and the individuals participating in your study are not at risk.

Exempt research does not require reporting of continuation one year after approval if the project continues. However, should the sample or procedures change as to have an impact on human subjects, then UHSRC should be notified by using the *Minor Modification to Research Protocol* or the *Request for Human Subjects Approval* form depending upon the scope of the changes (see the forms online).

On behalf of the Human Subjects Committee, I wish you success in conducting your research.

Sincerely,

Deb de Laski-Smith

Deb de Laski-Smith, Ph.D.
Interim Dean
Graduate School
Administrative Co-Chair
University Human Subjects Review Committee

Reference #: 080713

University Human Subjects Review Committee · Eastern Michigan University · 200 Boone Hall
Ypsilanti, Michigan 48197
Phone: 734.487.0042 Fax: 734.487.0050
E-mail: human.subjects@emich.edu
www.ord.emich.edu

Appendix H. SPSS Output – Demographic Data

Frequency Tables

Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	28	26.2	26.2	26.2
	2	13	12.1	12.1	38.3
	3	16	15.0	15.0	53.3
	4	13	12.1	12.1	65.4
	5	12	11.2	11.2	76.6
	6	25	23.4	23.4	100.0
	Total	107	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18	11	10.3	10.4	10.4
	19	16	15.0	15.1	25.5
	20	17	15.9	16.0	41.5
	21	17	15.9	16.0	57.5
	22	10	9.3	9.4	67.0
	23	7	6.5	6.6	73.6
	24	3	2.8	2.8	76.4
	26	7	6.5	6.6	83.0
	27	4	3.7	3.8	86.8
	28	3	2.8	2.8	89.6
	30	2	1.9	1.9	91.5
	32	1	.9	.9	92.5
	33	1	.9	.9	93.4
	34	2	1.9	1.9	95.3
	36	1	.9	.9	96.2
	38	1	.9	.9	97.2

	39	1	.9	.9	98.1
	42	1	.9	.9	99.1
	56	1	.9	.9	100.0
	Total	106	99.1	100.0	
Missing	System	1	.9		
Total		107	100.0		

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	41	38.3	38.3	38.3
	Male	66	61.7	61.7	100.0
	Total	107	100.0	100.0	

Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Freshman	15	14.0	14.0	14.0
	Sophomore	24	22.4	22.4	36.4
	Junior	30	28.0	28.0	64.5
	Senior	32	29.9	29.9	94.4
	Second Bachelor	3	2.8	2.8	97.2
	Nondegree	1	.9	.9	98.1
	PostBachTeaching	2	1.9	1.9	100.0
	Total	107	100.0	100.0	

Own mp3 player?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't Own MP3 Player	15	14.0	14.0	14.0
	Own MP3 Player	92	86.0	86.0	100.0
	Total	107	100.0	100.0	

Appendix I. Survey Questions and Responses

Word Processing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	84	78.5	78.5	78.5
	Agree	21	19.6	19.6	98.1
	Neither Agree nor Disagree	2	1.9	1.9	100.0
	Total	107	100.0	100.0	

Email

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	97	90.7	90.7	90.7
	Agree	10	9.3	9.3	100.0
	Total	107	100.0	100.0	

Attachments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	94	87.9	87.9	87.9
	Agree	12	11.2	11.2	99.1
	Disagree	1	.9	.9	100.0
	Total	107	100.0	100.0	

Surf Web

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	95	88.8	88.8	88.8
	Agree	12	11.2	11.2	100.0
	Total	107	100.0	100.0	

Refine Search

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	83	77.6	77.6	77.6
	Agree	24	22.4	22.4	100.0
	Total	107	100.0	100.0	

Download music from CD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	85	79.4	79.4	79.4
	Agree	15	14.0	14.0	93.5
	Neither Agree nor Disagree	2	1.9	1.9	95.3
	Disagree	4	3.7	3.7	99.1
	No Experience in this area	1	.9	.9	100.0
	Total	107	100.0	100.0	

Download music from Web

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	78	72.9	72.9	72.9
	Agree	20	18.7	18.7	91.6
	Neither Agree nor Disagree	5	4.7	4.7	96.3
	Disagree	1	.9	.9	97.2
	Strongly Disagree	1	.9	.9	98.1
	No Experience in this area	2	1.9	1.9	100.0
	Total	107	100.0	100.0	

Load music onto mp3 player

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	75	70.1	70.1	70.1
	Agree	17	15.9	15.9	86.0
	Neither Agree nor Disagree	6	5.6	5.6	91.6
	Disagree	4	3.7	3.7	95.3
	Strongly Disagree	1	.9	.9	96.3
	No Experience in this area	4	3.7	3.7	100.0
	Total	107	100.0	100.0	

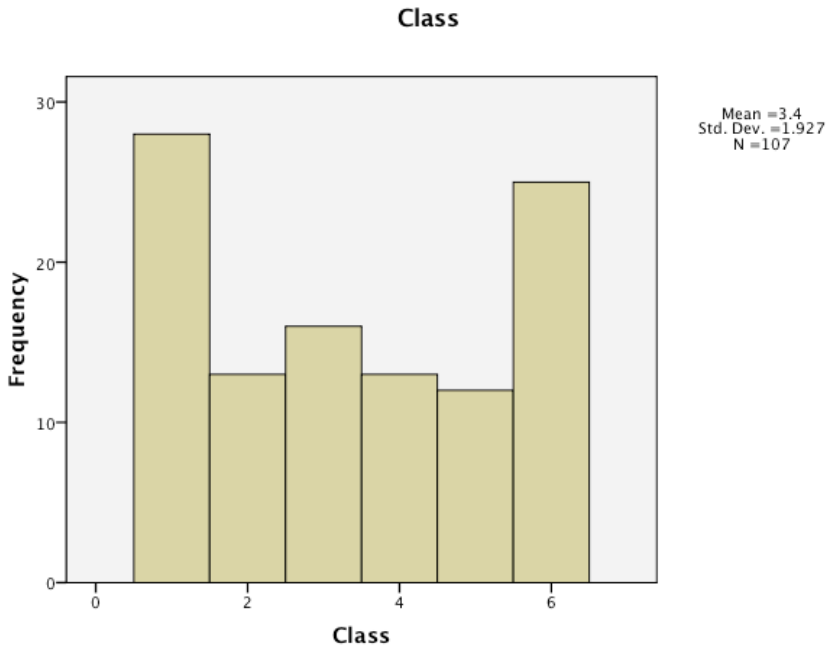
Connect to eLearning Environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	76	71.0	71.0	71.0
	Agree	21	19.6	19.6	90.7
	Neither Agree nor Disagree	5	4.7	4.7	95.3
	Disagree	2	1.9	1.9	97.2
	No Experience in this area	3	2.8	2.8	100.0
	Total	107	100.0	100.0	

Upload to eLearning Environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	52	48.6	48.6	48.6
	Agree	25	23.4	23.4	72.0
	Neither Agree nor Disagree	10	9.3	9.3	81.3
	Disagree	4	3.7	3.7	85.0
	No Experience in this area	16	15.0	15.0	100.0
	Total	107	100.0	100.0	

Histograms


Class
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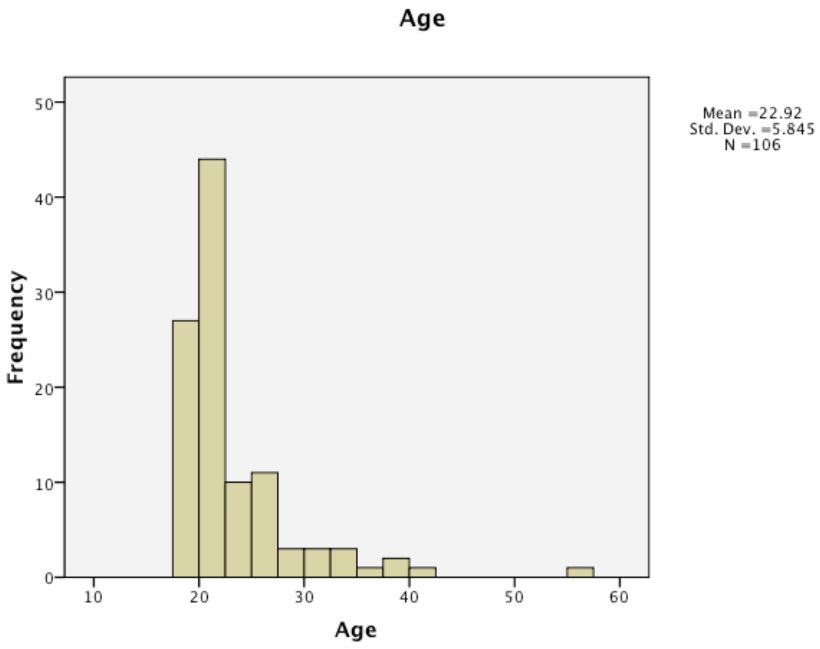
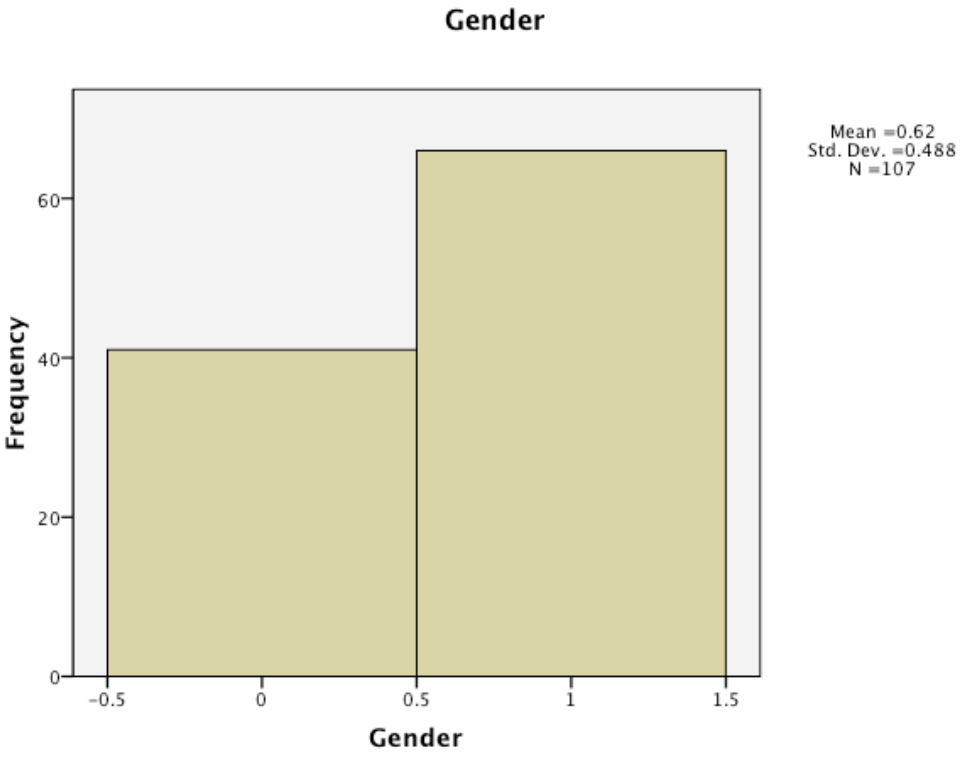
Std. Dev. =1.927
N =107
Frequency
Class


Age
Mean =22.92
Std. Dev. =5.845
N =106
Frequency
Age


Gender
Mean =0.62
Std. Dev. =0.488
N =107
Frequency
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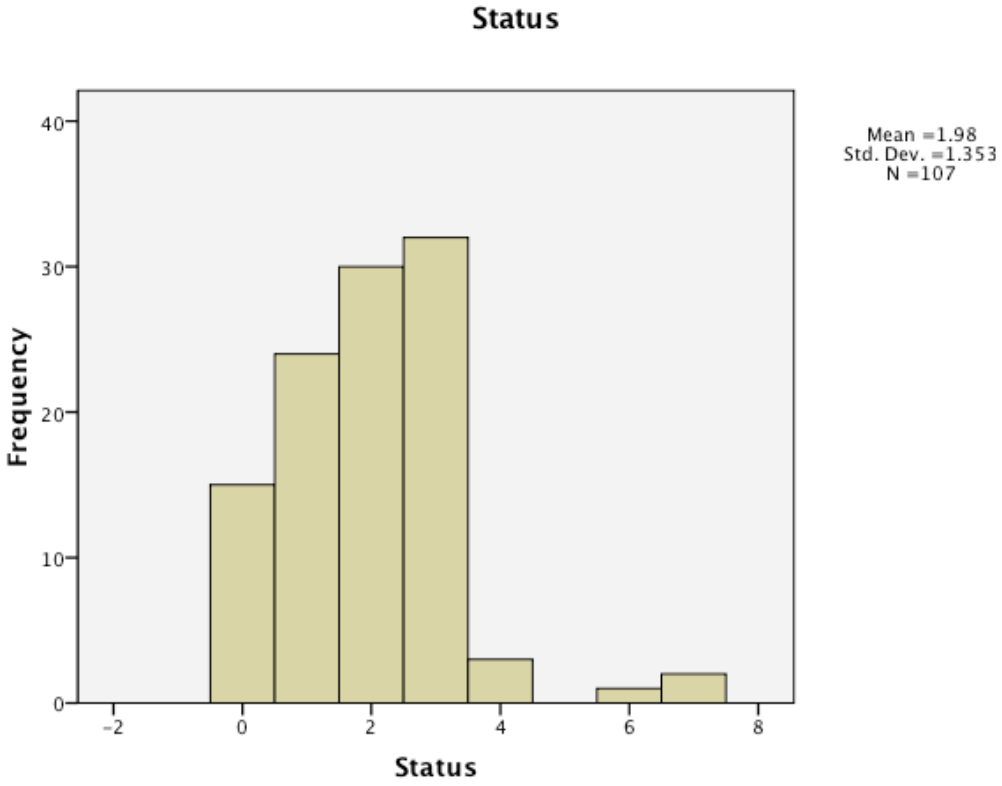
40
20
0
-0.5
0
0.5
1
1.5
Gender


Status
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Std. Dev. =1.353
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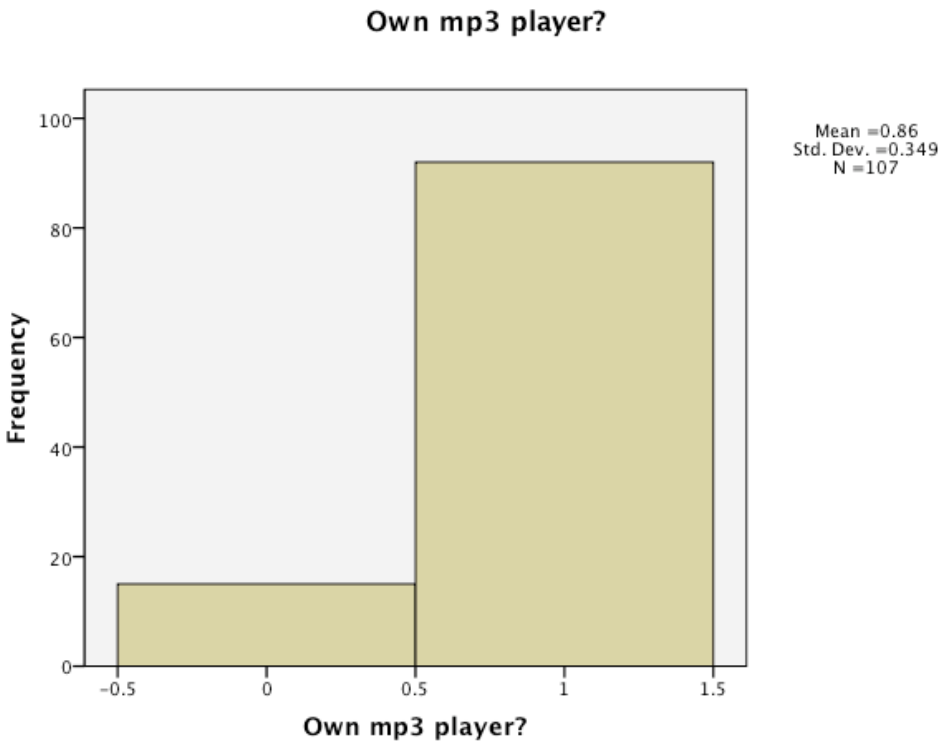
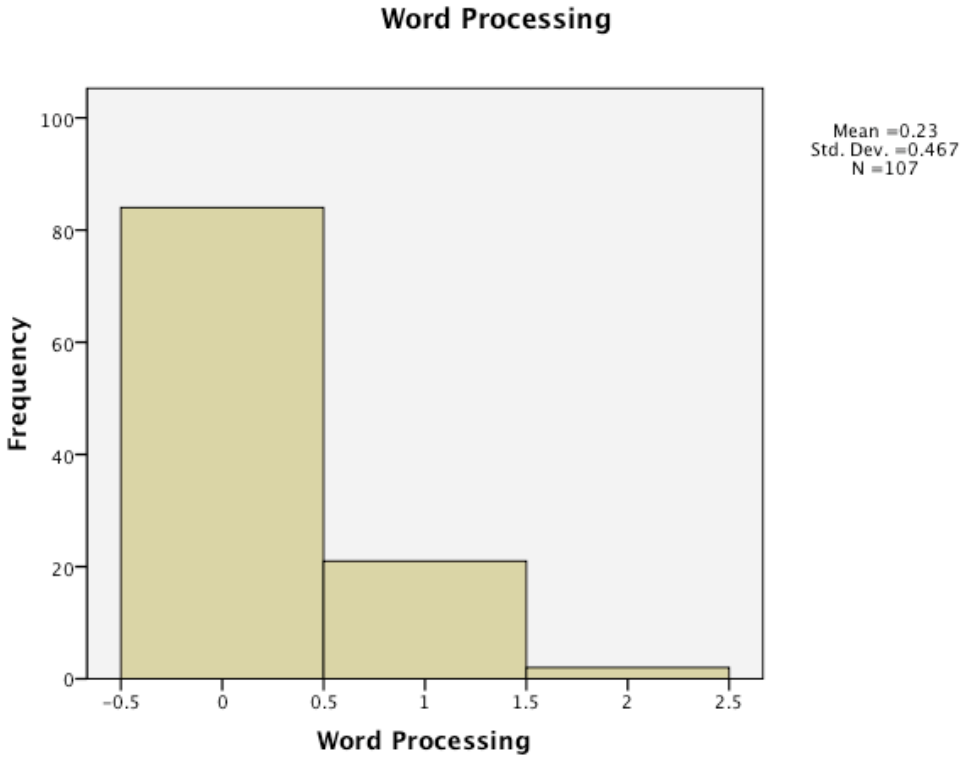
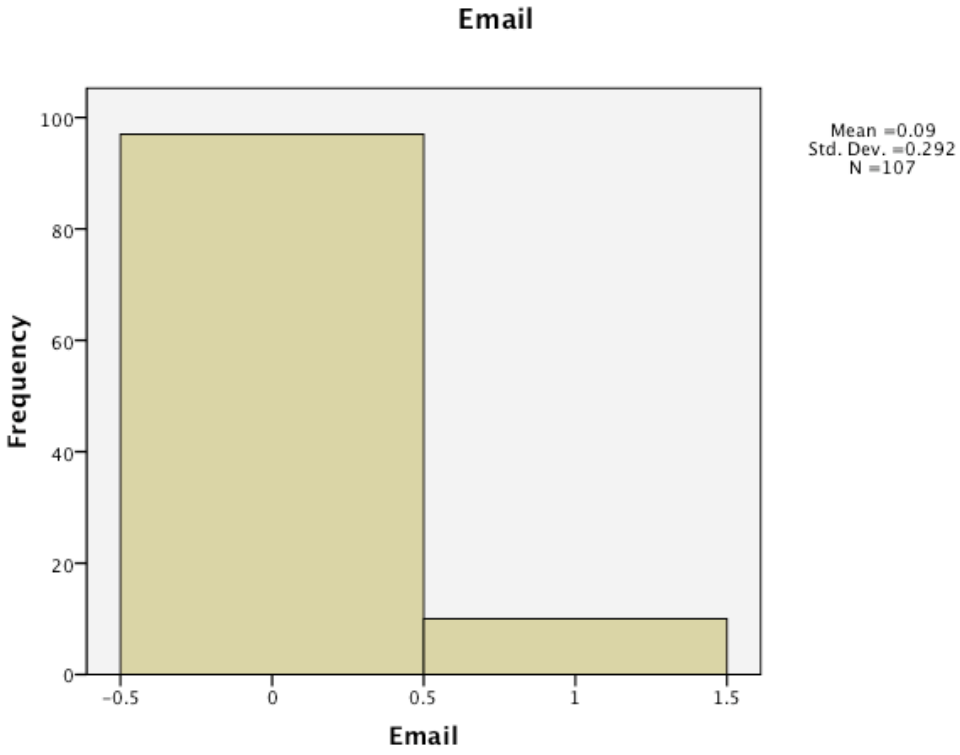
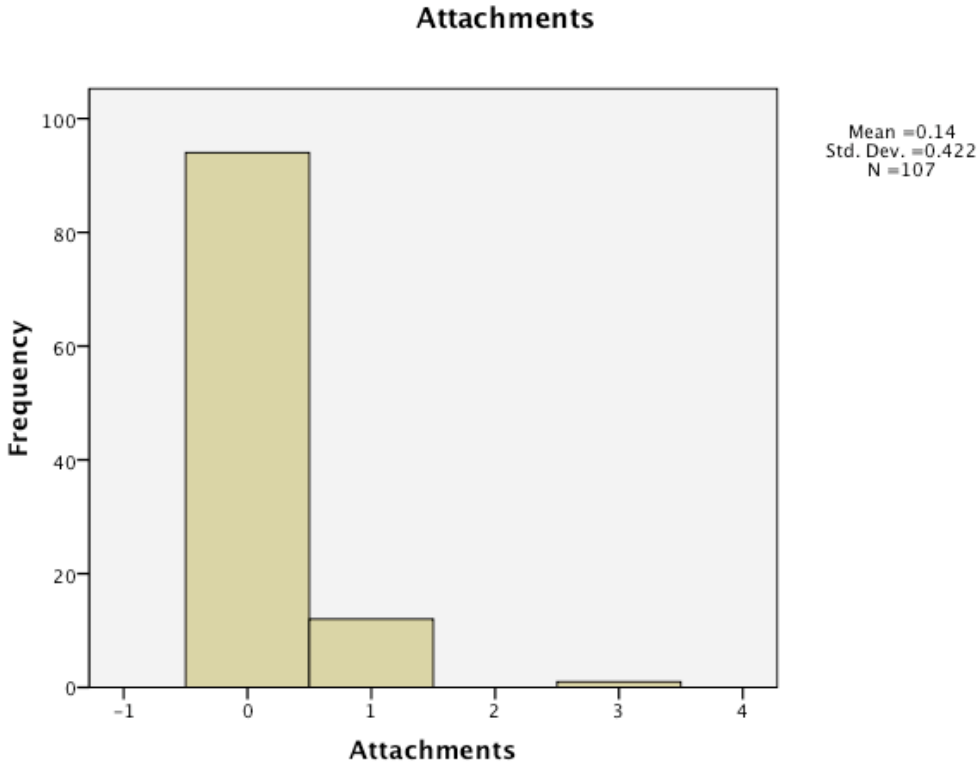
30
20
10
0
-2
0
2
4
6
8
Status


Own mp3 player?
Mean =0.86
Std. Dev. =0.349
N =107
Frequency
100
80
60
40
20
0
-0.5
0
0.5
1
1.5
Own mp3 player?


Word Processing
Mean =0.23
Std. Dev. =0.467
N =107
Frequency
100
80
60
40
20
0
-0.5
0
0.5
1
1.5
2
2.5
Word Processing


Email
Mean =0.09
Std. Dev. =0.292
N =107
Frequency
100
80
60
40
20
0
-0.5
0
0.5
1
1.5
Email


Attachments
Mean =0.14
Std. Dev. =0.422
N =107
Frequency
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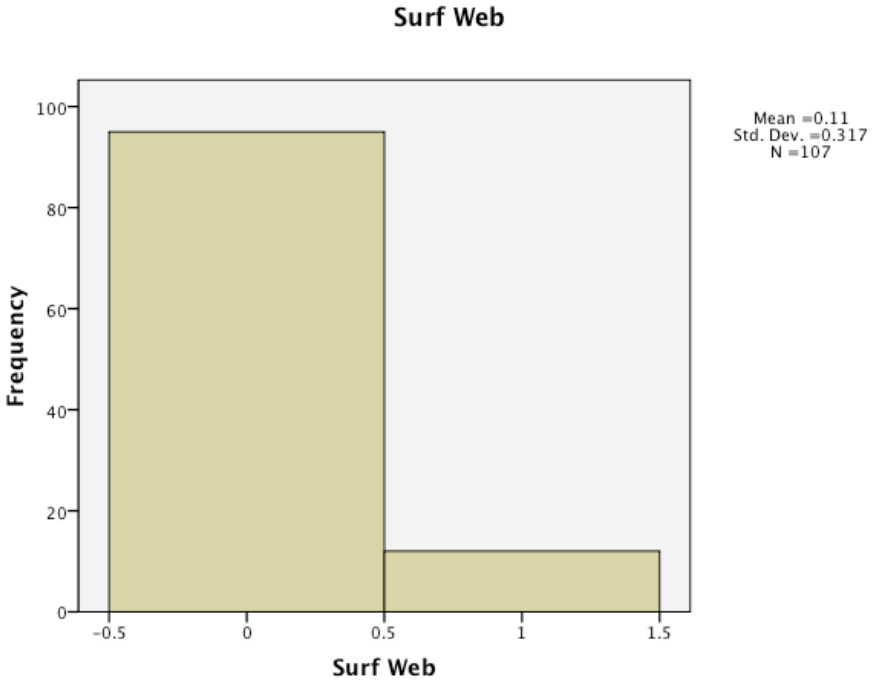
80
60
40
20
0
-1
0
1
2
3
4
Attachments


Surf Web
Mean =0.11
Std. Dev. =0.317
N =107
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100
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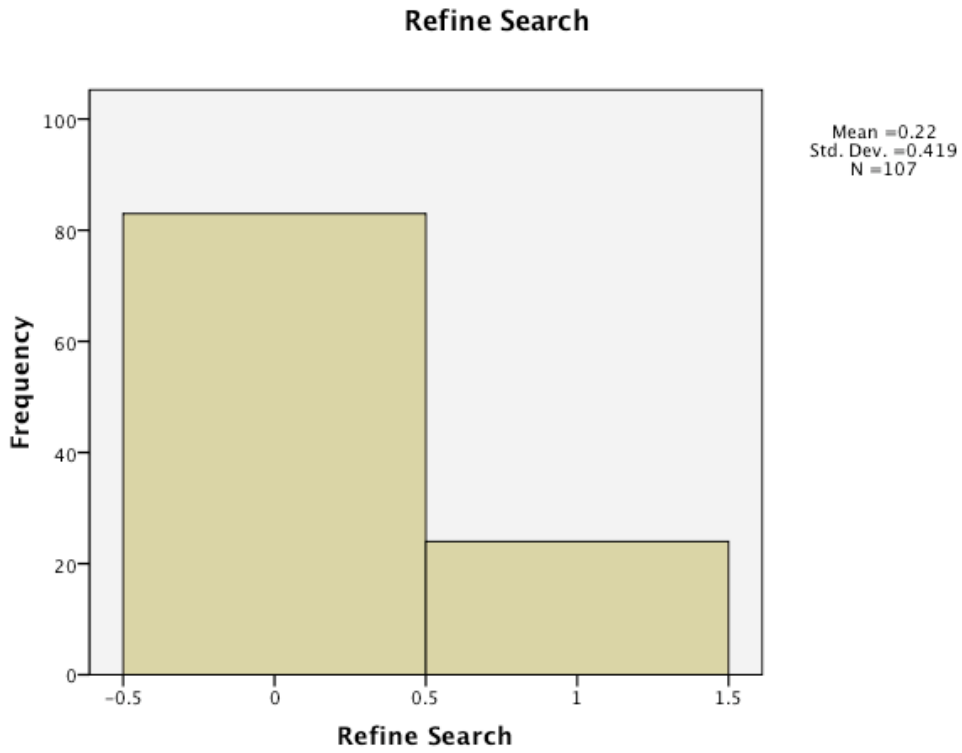
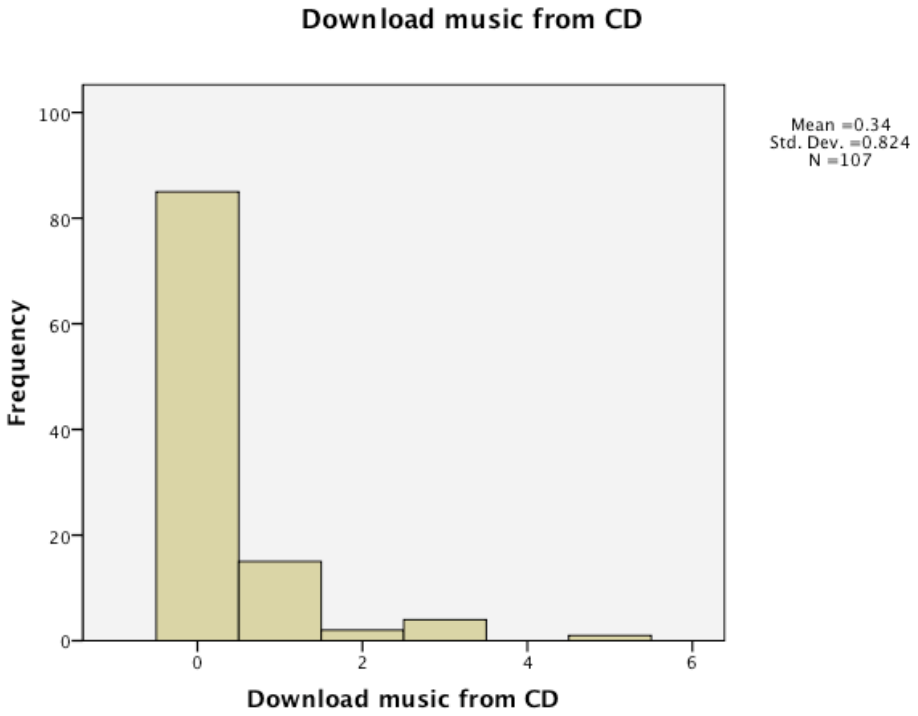
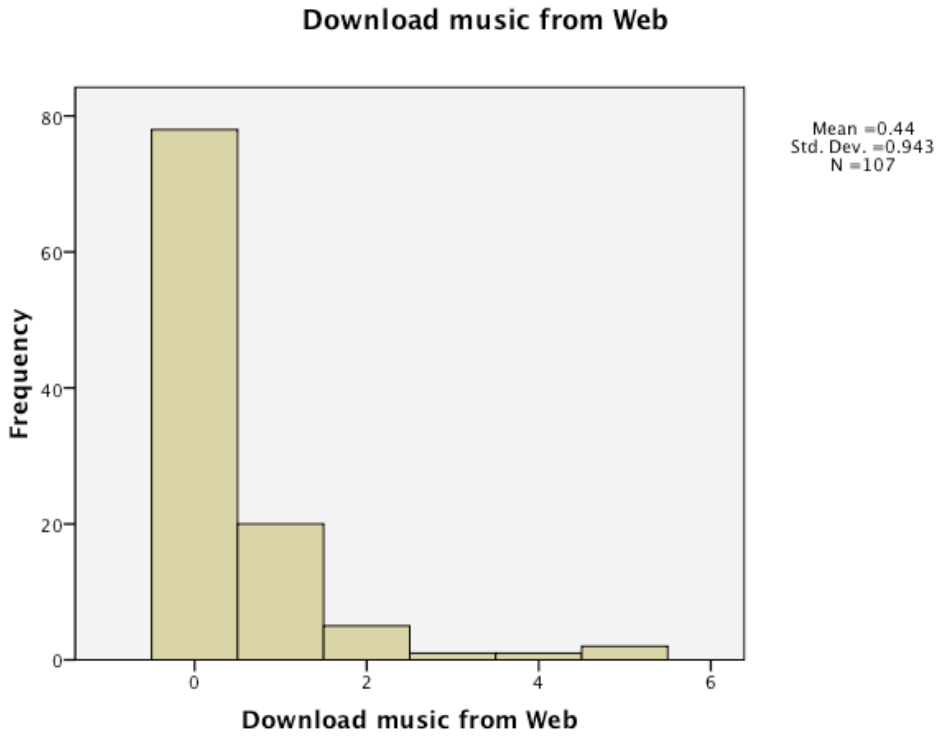
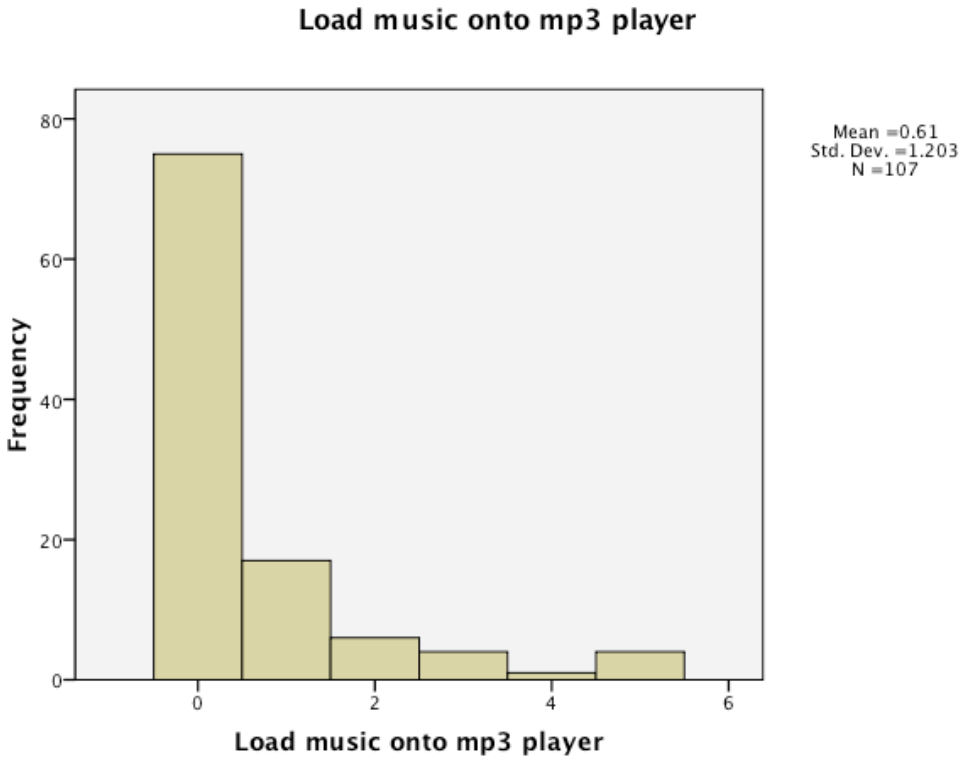
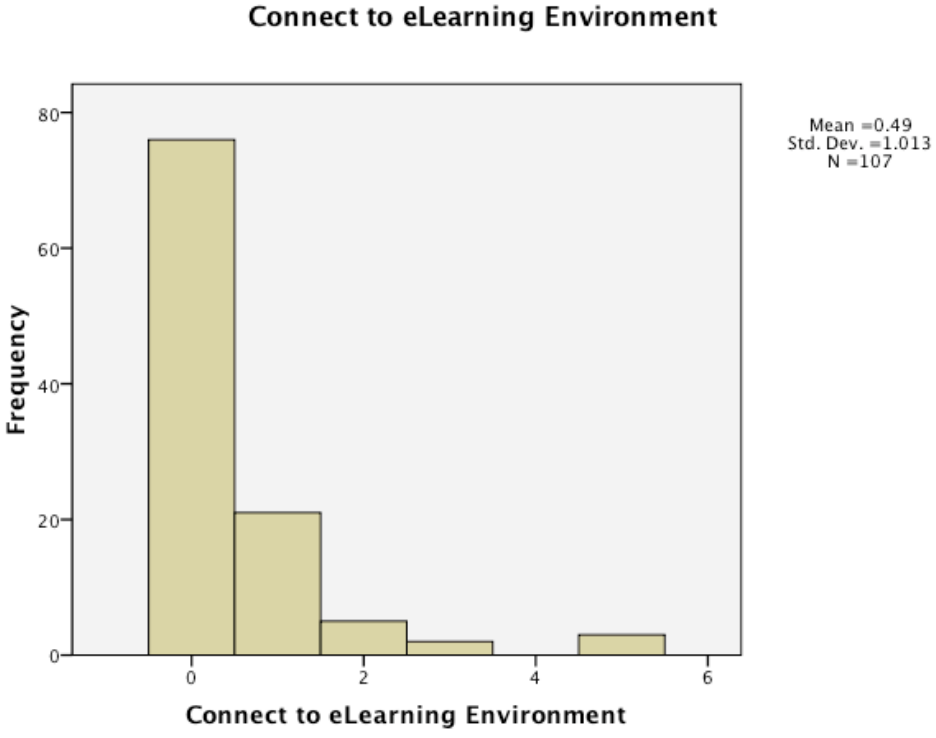
60
40
20
0
-0.5
0
0.5
1
1.5
Surf Web

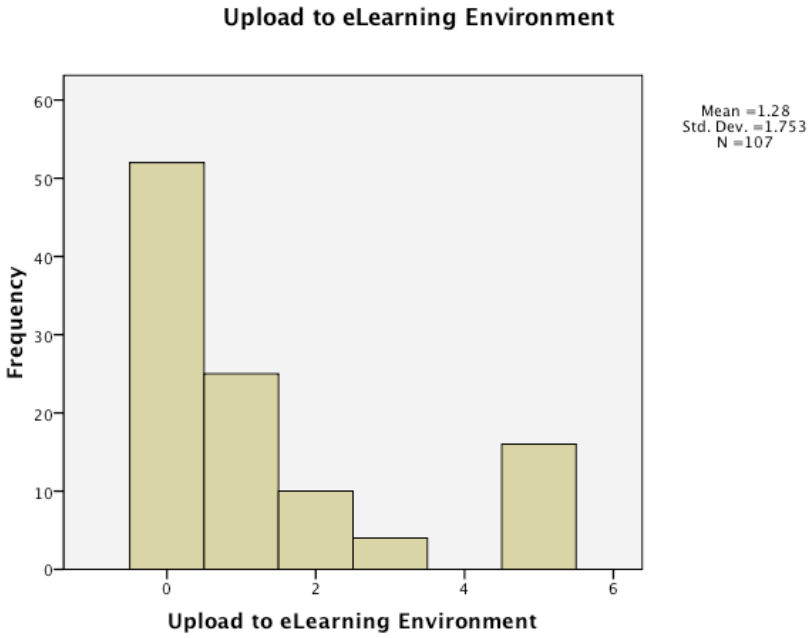

Refine Search
Mean =0.22
Std. Dev. =0.419
N =107
Frequency
100
80
60
40
20
0
-0.5
0
0.5
1
1.5
Refine Search


Download music from CD
Mean =0.34
Std. Dev. =0.824
N =107
Frequency
100
80
60
40
20
0
0
2
4
6
Download music from CD


Download music from Web
Mean =0.44
Std. Dev. =0.943
N =107
Frequency
80
60
40
20
0
0
2
4
6
Download music from Web


Load music onto mp3 player
Mean =0.61
Std. Dev. =1.203
N =107
Frequency
80
60
40
20
0
0
2
4
6
Load music onto mp3 player


Connect to eLearning Environment
Mean =0.49
Std. Dev. =1.013
N =107
Frequency
80
60
40
20
0
0
2
4
6
Connect to eLearning Environment


Upload to eLearning Environment
Mean =1.28
Std. Dev. =1.753
N =107
Frequency
60
50
40
30
20
10
0
0
2
4
6
Upload to eLearning Environment

Appendix J. SPSS Output – Equality of Group Comparisons

```
T-TEST GROUPS=Group(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Age_G1 Age_Group Gender_G1 Status_G1 OwnPlayer_G1
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Age	Control	38	22.53	4.712	.764
	Experimental	68	23.15	6.414	.778
Age Group	Control	38	1.79	1.212	.197
	Experimental	68	1.91	1.390	.169
Gender	Control	38	.61	.495	.080
	Experimental	69	.62	.488	.059
Status	Control	38	2.16	1.551	.252
	Experimental	69	1.88	1.231	.148
Own mp3 player?	Control	38	.84	.370	.060
	Experimental	69	.87	.339	.041

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Age	Equal variances assumed	.680	.412	-.523	104	.602	-.621	1.188	-2.977	1.735
	Equal variances not assumed			-.569	96.287	.571	-.621	1.091	-2.785	1.544
Age Group	Equal variances assumed	.130	.719	-.454	104	.651	-.122	.269	-.656	.412
	Equal variances not assumed			-.472	85.813	.638	-.122	.259	-.637	.392
Gender	Equal variances assumed	.125	.725	-.181	105	.857	-.018	.099	-.214	.179
	Equal variances not assumed			-.180	75.420	.858	-.018	.100	-.216	.180
Status	Equal variances assumed	1.107	.295	1.002	105	.319	.274	.273	-.268	.816
	Equal variances not assumed			.938	62.994	.352	.274	.292	-.310	.857
Own mp3 player?	Equal variances assumed	.592	.443	-.388	105	.699	-.027	.071	-.168	.113
	Equal variances not assumed			-.379	70.996	.706	-.027	.073	-.172	.117

```
---------------------- FACTOR ANALYSIS ----------------------

FACTOR
 /VARIABLES Self1WP_G1 Self2Email_G1 Self3Attach_G1 Self4Surf_G1 Self5RefineS_G1
 /MISSING LISTWISE
 /ANALYSIS Self1WP_G1 Self2Email_G1 Self3Attach_G1 Self4Surf_G1 Self5RefineS_G1
 /PRINT INITIAL EXTRACTION ROTATION
 /PLOT EIGEN
 /CRITERIA MINEIGEN(1) ITERATE(25)
 /EXTRACTION PC
 /CRITERIA ITERATE(25)
 /ROTATION VARIMAX
 /SAVE REG(ALL)
 /METHOD=CORRELATION.
```

Factor Analysis

Communalities

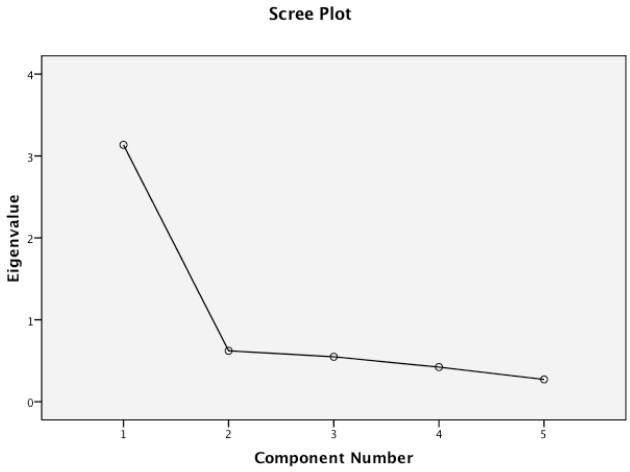
	Initial	Extraction
Word Processing	1.000	.571
Email	1.000	.701
Attachments	1.000	.563
Surf Web	1.000	.645
Refine Search	1.000	.656

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.137	62.730	62.730	3.137	62.730	62.730
2	.621	12.429	75.159			
3	.548	10.965	86.124			
4	.422	8.445	94.569			
5	.272	5.431	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
Word Processing	.756
Email	.837
Attachments	.750
Surf Web	.803
Refine Search	.810

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

```
DATASET ACTIVATE DataSet1.
DATASET CLOSE DataSet2.
FACTOR
  /VARIABLES Self6DownCD_G1 Self7DownWeb_G1 Self8LoadOnPl_G1
  /MISSING LISTWISE
  /ANALYSIS Self6DownCD_G1 Self7DownWeb_G1 Self8LoadOnPl_G1
  /PRINT INITIAL EXTRACTION ROTATION
  /PLOT EIGEN
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /SAVE REG(ALL)
  /METHOD=CORRELATION.
```

Factor Analysis

Communalities

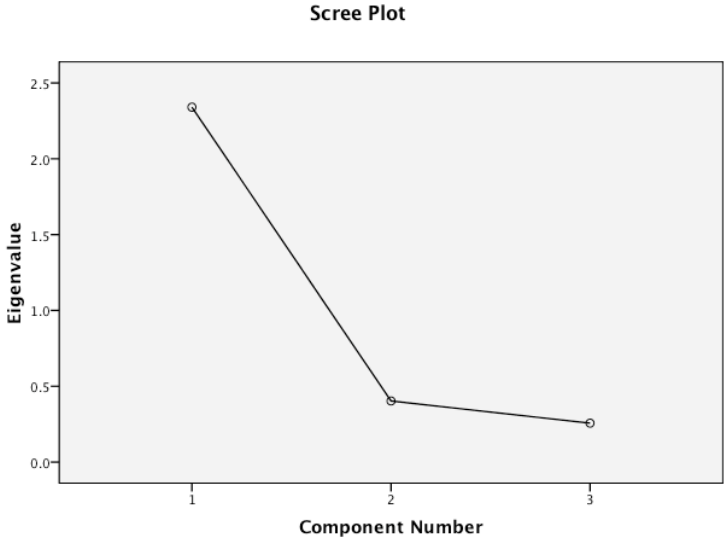
	Initial	Extraction
Download music from CD	1.000	.814
Download music from Web	1.000	.805
Load music onto mp3 player	1.000	.722

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.341	78.021	78.021	2.341	78.021	78.021
2	.403	13.422	91.443			
3	.257	8.557	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
Download music from CD	.902
Download music from Web	.897
Load music onto mp3 player	.850

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

```
FACTOR
  /VARIABLES Self9ConnEL_G1 Self10UploadEL_G1
  /MISSING LISTWISE
  /ANALYSIS Self9ConnEL_G1 Self10UploadEL_G1
  /PRINT INITIAL EXTRACTION ROTATION
  /PLOT EIGEN
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /SAVE REG(ALL)
  /METHOD=CORRELATION.
```

Factor Analysis

Communalities

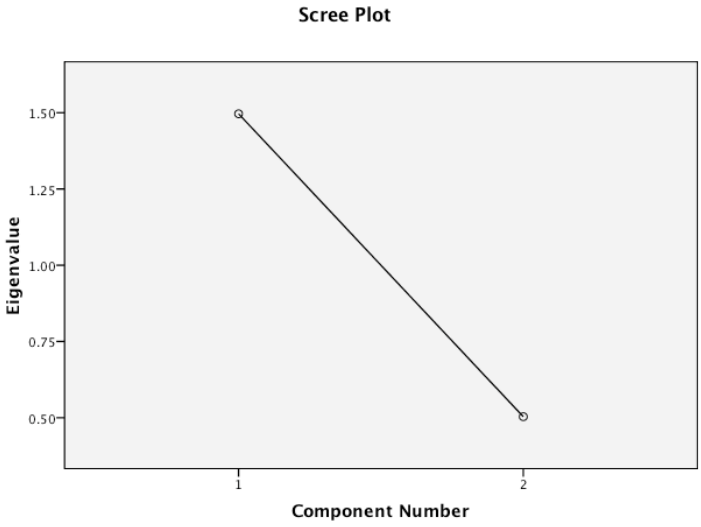
	Initial	Extraction
Connect to eLearning Environment	1.000	.748
Upload to eLearning Environment	1.000	.748

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.497	74.826	74.826	1.497	74.826	74.826
2	.503	25.174	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
Connect to eLearning Environment	.865
Upload to eLearning Environment	.865

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

```
T-TEST GROUPS=Group(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Age_Group Gender_G1 Status_G1 OwnPlayer_G1 Questions1to5 Questions6to8 Questions9to10
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Age Group	Control	38	1.79	1.212	.197
	Experimental	68	1.91	1.390	.169
Gender	Control	38	.61	.495	.080
	Experimental	69	.62	.488	.059
Status	Control	38	2.16	1.551	.252
	Experimental	69	1.88	1.231	.148
Own mp3 player?	Control	38	.84	.370	.060
	Experimental	69	.87	.339	.041
WP, Email, Web	Control	38	-.1908560	.83543792	.13552593
	Experimental	69	.1051091	1.07120818	.12895831
Downloading Music	Control	38	-.3565046	.45864520	.07440208
	Experimental	69	.1963359	1.15508735	.13905618
eLearning	Control	38	-.0253758	1.03966929	.16865663
	Experimental	69	.0139751	.98494776	.11857378

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Age Group	Equal variances assumed	.130	.719	-.454	104	.651	-.122	.269	-.656	.412
	Equal variances not assumed			-.472	85.813	.638	-.122	.259	-.637	.392
Gender	Equal variances assumed	.125	.725	-.181	105	.857	-.018	.099	-.214	.179
	Equal variances not assumed			-.180	75.420	.858	-.018	.100	-.216	.180
Status	Equal variances assumed	1.107	.295	1.002	105	.319	.274	.273	-.268	.816
	Equal variances not assumed			.938	62.994	.352	.274	.292	-.310	.857
Own mp3 player?	Equal variances assumed	.592	.443	-.388	105	.699	-.027	.071	-.168	.113
	Equal variances not assumed			-.379	70.996	.706	-.027	.073	-.172	.117
WP, Email, Web	Equal variances assumed	3.486	.065	-1.473	105	.144	-.29596513	.20090534	-.69432330	.10239304
	Equal variances not assumed			-1.582	92.896	.117	-.29596513	.18707625	-.66746695	.07553669
Downloading Music	Equal variances assumed	19.742	.000	-2.825	105	.006	-.55284054	.19566913	-.94081628	-.16486480
	Equal variances not assumed			-3.505	97.779	.001	-.55284054	.15770951	-.86581876	-.23986233
eLearning	Equal variances assumed	.047	.828	-.194	105	.847	-.03935089	.20293459	-.44173270	.36303092
	Equal variances not assumed			-.191	72.922	.849	-.03935089	.20616692	-.45024836	.37154658

```
ONEWAY Questions6to8 BY Age_Group
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /PLOT MEANS
  /MISSING ANALYSIS
  /POSTHOC=TUKEY SCHEFFE ALPHA(0.05).
```

Oneway

Descriptives

Downloading Music

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	61	-.1028473	.81173376	.10393186	-.3107420	.1050473	-.51915	3.00862
2	20	.2143822	1.12501187	.25156030	-.3121395	.7409040	-.51915	3.71651
3	14	-.2166022	.56011303	.14969650	-.5400018	.1067975	-.51915	1.06306
4	4	1.3617417	2.70928512	1.35464256	-2.9493355	5.6728190	-.51915	5.36046
5	5	-.3172491	.45146252	.20190018	-.8778139	.2433156	-.51915	.49035
7	2	.8384500	1.91993525	1.35759924	-1.6411484E1	18.0883838	-.51915	2.19605
Total	106	.0048976	1.00346040	.09746469	-.1883568	.1981521	-.51915	5.36046

Test of Homogeneity of Variances

Downloading Music

Levene Statistic	df1	df2	Sig.
5.687	5	100	.000

ANOVA

Downloading Music

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.545	5	2.309	2.452	.039
Within Groups	94.183	100	.942		
Total	105.728	105			

```
T-TEST GROUPS=Gender_G1(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Self6DownCD_G1 Self7DownWeb_G1 Self8LoadOnPl_G1
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Download music from CD	Female	41	.68	1.192	.186
	Male	66	.12	.329	.040
Download music from Web	Female	41	.88	1.327	.207
	Male	66	.17	.414	.051
Load music onto mp3 player	Female	41	1.07	1.421	.222
	Male	66	.32	.947	.117

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Download music from CD	Equal variances assumed	45.100	.000	3.621	105	.000	.562	.155	.254	.869
	Equal variances not assumed			2.947	43.809	.005	.562	.191	.178	.946
Download music from Web	Equal variances assumed	28.963	.000	4.059	105	.000	.711	.175	.364	1.059
	Equal variances not assumed			3.334	44.897	.002	.711	.213	.282	1.141
Load music onto mp3 player	Equal variances assumed	11.179	.001	3.299	105	.001	.755	.229	.301	1.209
	Equal variances not assumed			3.012	62.210	.004	.755	.251	.254	1.256

```
T-TEST GROUPS=Group(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Self6DownCD_G1 Self7DownWeb_G1 Self8LoadOnPl_G1
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Download music from CD	Control	38	.05	.226	.037
	Experimental	69	.49	.980	.118
Download music from Web	Control	38	.11	.311	.050
	Experimental	69	.62	1.113	.134
Load music onto mp3 player	Control	38	.32	.933	.151
	Experimental	69	.77	1.308	.157

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Download music from CD	Equal variances assumed	28.109	.000	-2.725	105	.008	-.440	.162	-.760	-.120
	Equal variances not assumed			-3.564	80.430	.001	-.440	.124	-.686	-.194
Download music from Web	Equal variances assumed	22.084	.000	-2.804	105	.006	-.518	.185	-.884	-.152
	Equal variances not assumed			-3.618	85.497	.001	-.518	.143	-.803	-.233
Load music onto mp3 player	Equal variances assumed	6.252	.014	-1.883	105	.062	-.452	.240	-.929	.024
	Equal variances not assumed			-2.071	97.971	.041	-.452	.218	-.886	-.019

Appendix K. SPSS Output – Analysis of Interaction Levels

```
T-TEST GROUPS=Group(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Questions11to13 Questions14to17
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Speaking up in class	Control	38	-.0383220	1.13589869	.18426710
	Experimental	69	.0211049	.92492945	.11134842
Speaking with Recorder Present	Control	38	.2353532	1.13480517	.18408971
	Experimental	69	-.1296148	.90006515	.10835511

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Speaking up in class	Equal variances assumed	1.889	.172	-.293	105	.770	-.05942684	.20288805	-.46171637	.34286269
	Equal variances not assumed			-.276	64.290	.783	-.05942684	.21529708	-.48949481	.37064113
Speaking with Recorder Present	Equal variances assumed	4.653	.033	1.826	105	.071	.36496799	.19982144	-.03124102	.76117700
	Equal variances not assumed			1.709	62.966	.092	.36496799	.21361145	-.06190493	.79184091

```
ONEWAY Questions11to13 Questions14to17 BY Class
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /PLOT MEANS
  /MISSING ANALYSIS
```

Oneway

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Speaking up in class	1	28	.1527859	1.00993276	.19085935	-.2388251	.5443969	-1.30467	2.65314
	2	13	-.4386070	.83742629	.23226026	-.9446586	.0674447	-1.30467	.83456
	3	16	.2755133	.89621273	.22405318	-.2020447	.7530714	-1.30467	1.78126
	4	13	.0903569	1.50282220	.41680789	-.8177895	.9985032	-1.30467	3.97241
	5	12	.2559180	.89876679	.25945163	-.3151312	.8269672	-1.30467	1.65452
	6	25	-.2891993	.78151350	.15630270	-.6117922	.0333936	-1.30467	1.27050
	Total	107	.0000000	1.00000000	.09667365	-.1916649	.1916649	-1.30467	3.97241
Speaking with Recorder Present	1	28	.0259030	.98407217	.18597216	-.3556803	.4074864	-1.36639	2.48564
	2	13	-.1338413	.99940535	.27718517	-.7377759	.4700933	-1.36639	1.61286
	3	16	-.2654346	.72879348	.18219837	-.6537812	.1229120	-1.36639	.64985
	4	13	.7502182	1.27141261	.35262641	-.0180887	1.5185252	-1.18594	2.48564
	5	12	.0775434	.98845265	.28534170	-.5504895	.7055762	-1.27616	2.66610
	6	25	-.2168701	.90855739	.18171148	-.5919042	.1581639	-1.36639	2.28972
	Total	107	.0000000	1.00000000	.09667365	-.1916649	.1916649	-1.36639	2.66610

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Speaking up in class	.784	5	101	.564
Speaking with Recorder Present	1.261	5	101	.287

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Speaking up in class	Between Groups	7.352	5	1.470	1.505	.195
	Within Groups	98.648	101	.977		
	Total	106.000	106			
Speaking with Recorder Present	Between Groups	9.944	5	1.989	2.091	.073
	Within Groups	96.056	101	.951		
	Total	106.000	106			

```
T-TEST GROUPS=Gender_G1(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Questions11to13 Questions14to17
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Speaking up in class	Female	41	.2254450	.97323298	.15199345
	Male	66	-.1400491	.99795446	.12283970
Speaking with Recorder Present	Female	41	.3020758	1.03674678	.16191265
	Male	66	-.1876532	.93595610	.11520823

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Speaking up in class	Equal variances assumed	.022	.881	1.859	105	.066	.36549409	.19658611	-.02429986	.75528804
	Equal variances not assumed			1.870	86.586	.065	.36549409	.19542672	-.02296384	.75395202
Speaking with Recorder Present	Equal variances assumed	2.126	.148	2.524	105	.013	.48972898	.19399539	.10507196	.87438599
	Equal variances not assumed			2.464	78.391	.016	.48972898	.19871749	.09414395	.88531400

```
ONEWAY Questions11to13 Questions14to17 BY ClusterAgeGroups
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /PLOT MEANS
  /MISSING ANALYSIS
```

Oneway

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Speaking up in class	18	11	.2998591	1.00164589	.30200760	-.3730558	.9727740	-1.30467	1.78126
	19	16	.0826426	.81376039	.20344010	-.3509797	.5162649	-1.30467	1.33387
	20	17	.3906269	1.07614799	.26100423	-.1626773	.9439311	-1.30467	1.76981
	21	17	-.2898456	.83142775	.20165085	-.7173263	.1376351	-1.30467	1.33387
	22-23	17	-.1443363	.76771842	.18619907	-.5390607	.2503881	-1.30467	1.33387
	24-29	17	-.1835437	1.29689507	.31454326	-.8503456	.4832583	-1.30467	3.97241
	30 and up	11	-.0704232	1.18324442	.35676162	-.8653376	.7244913	-1.30467	2.65314
	Total	106	-.0001377	1.00474960	.09758991	-.1936405	.1933650	-1.30467	3.97241
Speaking with Recorder Present	18	11	-.3473706	.75992753	.22912677	-.8578968	.1631557	-1.32128	.69497
	19	16	-.1321598	.78098146	.19524537	-.5483155	.2839958	-1.27616	1.61286
	20	17	.4850474	.89508222	.21708932	.0248386	.9452562	-.40338	2.66610
	21	17	-.2602322	.81856455	.19853107	-.6810993	.1606348	-1.36639	1.16060
	22-23	17	-.0361909	1.12107012	.27189944	-.6125920	.5402102	-1.36639	2.33484
	24-29	17	.0884757	1.27276021	.30868969	-.5659172	.7428686	-1.36639	2.48564
	30 and up	11	.0738536	1.19858035	.36138557	-.7313637	.8790708	-1.36639	2.28972
	Total	106	-.0038919	1.00393607	.09751089	-.1972380	.1894542	-1.36639	2.66610

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Speaking up in class	.628	6	99	.707
Speaking with Recorder Present	1.409	6	99	.219

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Speaking up in class	Between Groups	6.102	6	1.017	1.008	.425
	Within Groups	99.898	99	1.009		
	Total	106.000	105			
Speaking with Recorder Present	Between Groups	6.971	6	1.162	1.164	.332
	Within Groups	98.857	99	.999		
	Total	105.828	105			

```
T-TEST GROUPS=OwnPlayer_G1(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Questions11to13 Questions14to17
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Own mp3 player?	N	Mean	Std. Deviation	Std. Error Mean
Speaking up in class	Don't Own MP3 Player	15	-.0186877	1.11326662	.28744420
	Own MP3 Player	92	.0030469	.98696355	.10289806
Speaking with Recorder Present	Don't Own MP3 Player	15	-.1775888	.95098033	.24554206
	Own MP3 Player	92	.0289547	1.00978027	.10527687

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Speaking up in class	Equal variances assumed	.225	.636	-.078	105	.938	-.02173458	.27976807	-.57646299	.53299382
	Equal variances not assumed			-.071	17.773	.944	-.02173458	.30530670	-.66374761	.62027845
Speaking with Recorder Present	Equal variances assumed	.468	.495	-.740	105	.461	-.20654344	.27904907	-.75984620	.34675932
	Equal variances not assumed			-.773	19.519	.449	-.20654344	.26715936	-.76471010	.35162322

```
ONEWAY PCI_16RecRes_G1 BY PCI_13Share_G1
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /PLOT MEANS
  /MISSING ANALYSIS.
```

Oneway

Descriptives

Recorder present - put research ideas online

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Stongly Agree	27	.59	1.083	.209	.16	1.02	0	4
Agree	50	1.42	.971	.137	1.14	1.70	0	4
Neither Agree nor Disagree	22	2.00	.690	.147	1.69	2.31	1	4
Disagree	6	2.67	1.033	.422	1.58	3.75	1	4
Strongly Disagree	2	4.00	.000	.000	4.00	4.00	4	4
Total	107	1.45	1.151	.111	1.23	1.67	0	4

Descriptives

In class - sharing ideas

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Stongly Agree	23	.17	.388	.081	.01	.34	0	1
Agree	39	1.08	.532	.085	.90	1.25	0	3
Neither Agree nor Disagree	27	1.52	.753	.145	1.22	1.82	0	3
Disagree	10	1.70	1.059	.335	.94	2.46	0	3
Strongly Disagree	8	2.00	1.512	.535	.74	3.26	0	4
Total	107	1.12	.918	.089	.95	1.30	0	4

Test of Homogeneity of Variances

Recorder present - put research ideas online

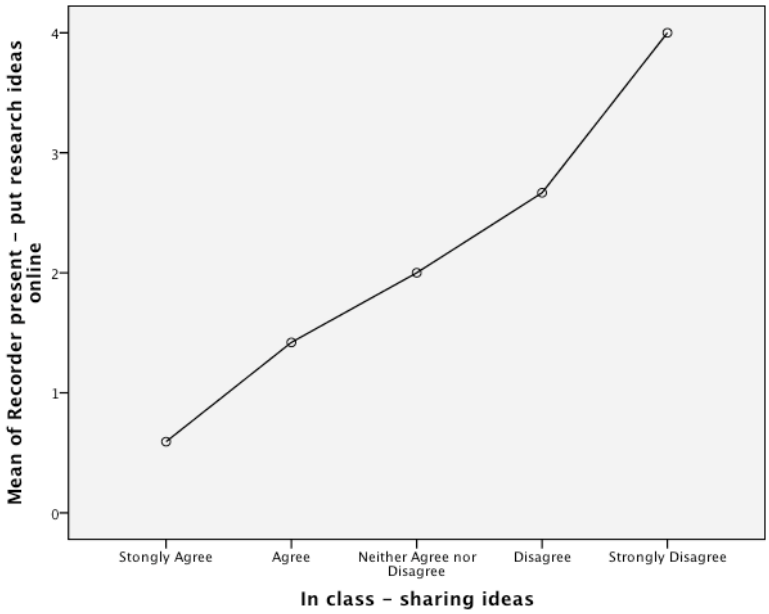
Levene Statistic	df1	df2	Sig.
2.670	4	102	.036

ANOVA

Recorder present - put research ideas online

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.435	4	12.109	13.420	.000
Within Groups	92.032	102	.902		
Total	140.467	106			

Means Plots


Mean of Recorder present – put research ideas online
4
3
2
1
0
Stongly Agree
Agree
Neither Agree nor Disagree
Disagree
Strongly Disagree
In class – sharing ideas

Appendix L. SPSS Output – Perceived Usefulness

```
T-TEST GROUPS=Group(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Questions18to22
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Perceived Usefulness	Control	38	-.2106625	1.04194782	.16902626
	Experimental	69	.1160170	.96417923	.11607354

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Perceived Usefulness	Equal variances assumed	.004	.951	-1.630	105	.106	-.32667957	.20045154	-.72413794	.07077880
	Equal variances not assumed			-1.593	71.476	.116	-.32667957	.20504376	-.73547798	.08211884

```
ONEWAY Questions18to22 BY ClusterAgeGroups
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /PLOT MEANS
  /MISSING ANALYSIS
```

Oneway

Descriptives

Perceived Usefulness

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
18	11	.2210140	.64566130	.19467421	-.2127471	.6547752	-1.28146	.99545
19	16	-.1510273	.87369433	.21842358	-.6165862	.3145315	-1.28146	1.26758
20	17	.2607418	1.10461600	.26790873	-.3071993	.8286830	-1.28146	2.29676
21	17	-.3262752	.96222396	.23337359	-.8210051	.1684547	-1.28146	2.03134
22-23	17	-.0701474	.76008454	.18434758	-.4609468	.3206520	-1.28146	1.26758
24-29	17	.1401092	1.31006178	.31773665	-.5334625	.8136808	-1.28146	3.81662
30 and up	11	.0850554	1.17999229	.35578106	-.7076742	.8777850	-1.28146	2.54210
Total	106	.0096756	.99970569	.09710000	-.1828558	.2022069	-1.28146	3.81662

Test of Homogeneity of Variances

Perceived Usefulness

Levene Statistic	df1	df2	Sig.
1.369	6	99	.234

ANOVA

Perceived Usefulness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.355	6	.726	.714	.639
Within Groups	100.583	99	1.016		
Total	104.938	105			

```
T-TEST GROUPS=Gender_G1(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=Questions18to22
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Perceived Usefulness	Female	41	.1382429	.90038140	.14061595
	Male	66	-.0858782	1.05467621	.12982167

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Perceived Usefulness	Equal variances assumed	1.475	.227	1.129	105	.262	.22412114	.19859497	-.16965601	.61789828
	Equal variances not assumed			1.171	94.845	.245	.22412114	.19138054	-.15582525	.60406753

```
CORRELATIONS
  /VARIABLES=PU_22Useful_G1 Use_23RankUse_G1
  /PRINT=TWOTAIL NOSIG
  /STATISTICS DESCRIPTIVES
  /MISSING=PAIRWISE.
```

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Useful	.87	.814	107
Rank Use	2.41	1.165	107

Correlations

		Useful	Rank Use
Useful	Pearson Correlation	1.000	-.600**
	Sig. (2-tailed)		.000
	N	107.000	107
Rank Use	Pearson Correlation	-.600**	1.000
	Sig. (2-tailed)	.000	
	N	107	107.000

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix M. SPSS Output – Survey II Response Data

```
FREQUENCIES VARIABLES=PCI_11Bpeers PCI_12Binst PCI_13Bshare PCI_14BnotBroad PCI_15BrecInt
PCI_16BrecRes PCI_17BrecAffect PU_18Blearn
  Qk PU_19BgrdPerf PU_20BimpEff PU_21BlearnEas PU_22Buseful PEU_23BlearnEas PEU_24BdoWhatWant
PEU_25BinteractionCU
   PEU_26BeasySkillful PEU_27BeasytoUse Use_28BusedPods
 /NTILES=4
 /NTILES=5
 /STATISTICS=VARIANCE MEAN
 /HISTOGRAM NORMAL
 /ORDER=ANALYSIS.
```

Frequencies

Statistics

		In class – peers present	In class – instructor present	In class – sharing ideas	Recorder present – not put online	Recorder present – put online	Recorder present – put research ideas online	Recorder affects what is said	Learn More Quickly	Improve Grade Performance	Improve Effectiveness in Learning	Make Learning Easier	Useful	Operation Easy to learn	Get podcast site to do what I want	Interaction clear and understandable	Easy to become skillful	Podcast site easy to use	Used Podcasts of class sessions
N	Valid	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
	Missing	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Mean		.98	.87	1.25	1.04	1.15	1.15	2.13	1.15	1.25	1.09	1.13	.94	.66	.87	.92	.68	.72	1.00
Variance		.634	.655	.919	.806	1.015	.900	1.309	.708	.766	.664	.771	.516	.575	.655	.763	.568	.553	.385
Percentiles	20	.00	.00	.80	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.80
	25	.00	.00	1.00	.00	.00	1.00	1.00	1.00	1.00	1.00	.00	.00	.00	.00	.00	.00	.00	1.00
	40	1.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	.00	1.00	1.00	.00	.00	1.00
	50	1.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	60	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	75	1.00	1.00	2.00	1.50	2.00	2.00	3.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	80	1.20	1.00	2.00	2.00	2.00	2.00	3.00	2.00	2.00	2.00	2.00	1.20	1.00	1.00	2.00	1.00	1.00	1.20

Frequency Table

In class – peers present

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	14	20.3	26.4	26.4
	Agree	29	42.0	54.7	81.1
	Neither Agree nor Disagree	7	10.1	13.2	94.3
	Disagree	3	4.3	5.7	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

In class – instructor present

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	18	26.1	34.0	34.0
	Agree	27	39.1	50.9	84.9
	Neither Agree nor Disagree	5	7.2	9.4	94.3
	Disagree	3	4.3	5.7	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

In class – sharing ideas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	10	14.5	18.9	18.9
	Agree	28	40.6	52.8	71.7
	Neither Agree nor Disagree	8	11.6	15.1	86.8
	Disagree	6	8.7	11.3	98.1
	Strongly Disagree	1	1.4	1.9	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Recorder present – not put online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	15	21.7	28.3	28.3
	Agree	25	36.2	47.2	75.5
	Neither Agree nor Disagree	10	14.5	18.9	94.3
	Disagree	2	2.9	3.8	98.1
	Strongly Disagree	1	1.4	1.9	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Recorder present – put online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	14	20.3	26.4	26.4
	Agree	24	34.8	45.3	71.7
	Neither Agree nor Disagree	10	14.5	18.9	90.6
	Disagree	3	4.3	5.7	96.2
	Strongly Disagree	2	2.9	3.8	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Recorder present – put research ideas online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	12	17.4	22.6	22.6
	Agree	27	39.1	50.9	73.6
	Neither Agree nor Disagree	10	14.5	18.9	92.5
	Disagree	2	2.9	3.8	96.2
	Strongly Disagree	2	2.9	3.8	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Recorder affects what is said

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	2	2.9	3.8	3.8
	Agree	18	26.1	34.0	37.7
	Neither Agree nor Disagree	11	15.9	20.8	58.5
	Disagree	15	21.7	28.3	86.8
	Strongly Disagree	7	10.1	13.2	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Learn More Quickly

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	12	17.4	22.6	22.6
	Agree	24	34.8	45.3	67.9
	Neither Agree nor Disagree	14	20.3	26.4	94.3
	Disagree	3	4.3	5.7	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Improve Grade Performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	11	15.9	20.8	20.8
	Agree	22	31.9	41.5	62.3
	Neither Agree nor Disagree	16	23.2	30.2	92.5
	Disagree	4	5.8	7.5	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Improve Effectiveness in Learning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	12	17.4	22.6	22.6
	Agree	27	39.1	50.9	73.6
	Neither Agree nor Disagree	11	15.9	20.8	94.3
	Disagree	3	4.3	5.7	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Make Learning Easier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	14	20.3	26.4	26.4
	Agree	21	30.4	39.6	66.0
	Neither Agree nor Disagree	15	21.7	28.3	94.3
	Disagree	3	4.3	5.7	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Useful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	14	20.3	26.4	26.4
	Agree	29	42.0	54.7	81.1
	Neither Agree nor Disagree	9	13.0	17.0	98.1
	Disagree	1	1.4	1.9	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Operation Easy to learn

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	25	36.2	47.2	47.2
	Agree	23	33.3	43.4	90.6
	Neither Agree nor Disagree	3	4.3	5.7	96.2
	Disagree	2	2.9	3.8	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Get podcast site to do what I want

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	18	26.1	34.0	34.0
	Agree	27	39.1	50.9	84.9
	Neither Agree nor Disagree	5	7.2	9.4	94.3
	Disagree	3	4.3	5.7	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Interaction clear and understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	19	27.5	35.8	35.8
	Agree	22	31.9	41.5	77.4
	Neither Agree or Disagree	9	13.0	17.0	94.3
	Disagree	3	4.3	5.7	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Easy to become skillful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	24	34.8	45.3	45.3
	Agree	24	34.8	45.3	90.6
	Neither Agree nor Disagree	3	4.3	5.7	96.2
	Disagree	2	2.9	3.8	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

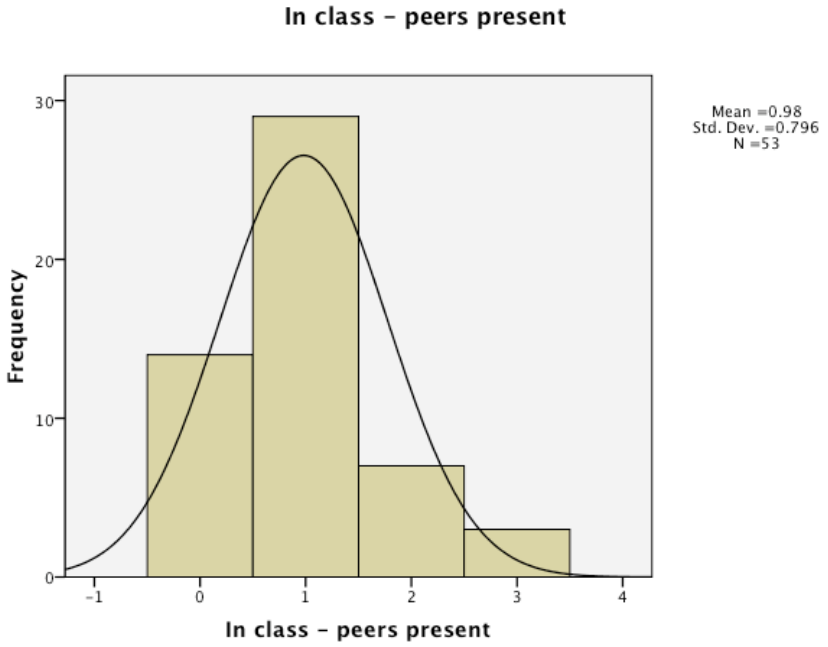
Podcast site easy to use

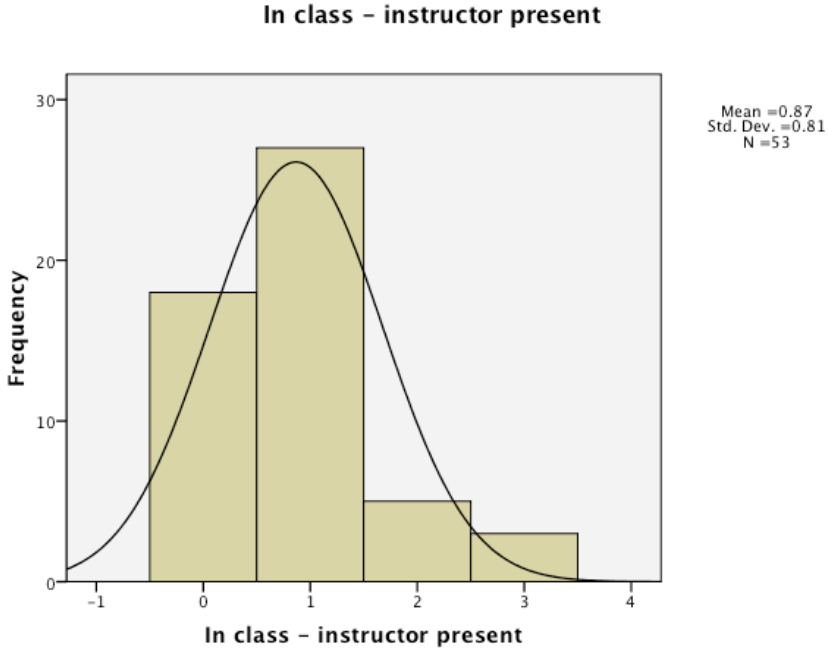
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stongly Agree	22	31.9	41.5	41.5
	Agree	26	37.7	49.1	90.6
	Neither Agree nor Disagree	3	4.3	5.7	96.2
	Disagree	2	2.9	3.8	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Used Podcasts of class sessions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Do not intend to listen	10	14.5	18.9	18.9
	Have not listened, but intend to	33	47.8	62.3	81.1
	Have listened	10	14.5	18.9	100.0
	Total	53	76.8	100.0	
Missing	System	16	23.2		
Total		69	100.0		

Histogram


In class - peers present
Mean =0.98
Std. Dev. =0.796
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
In class - peers present


In class - instructor present
Mean =0.87
Std. Dev. =0.81
N =53
Frequency
30
20
10
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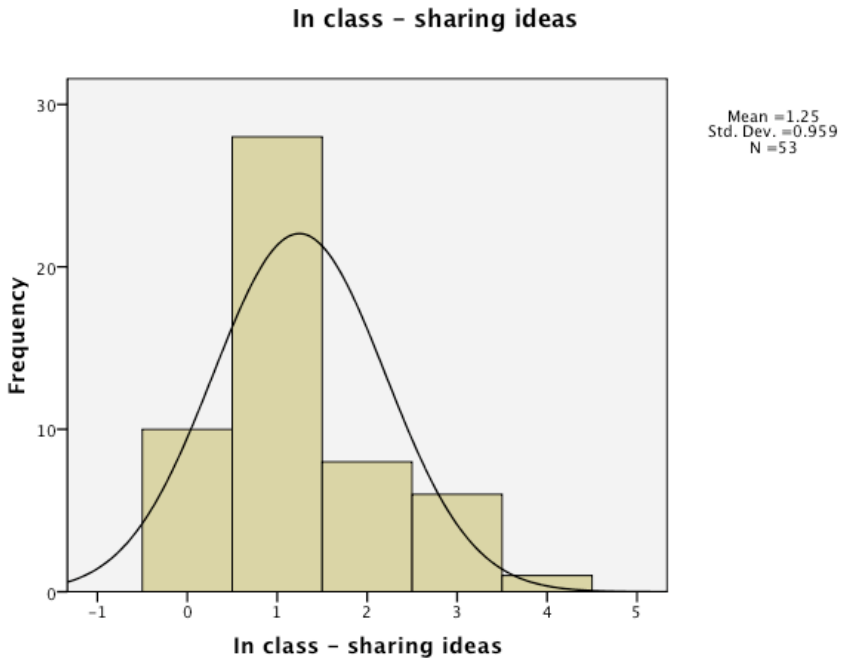
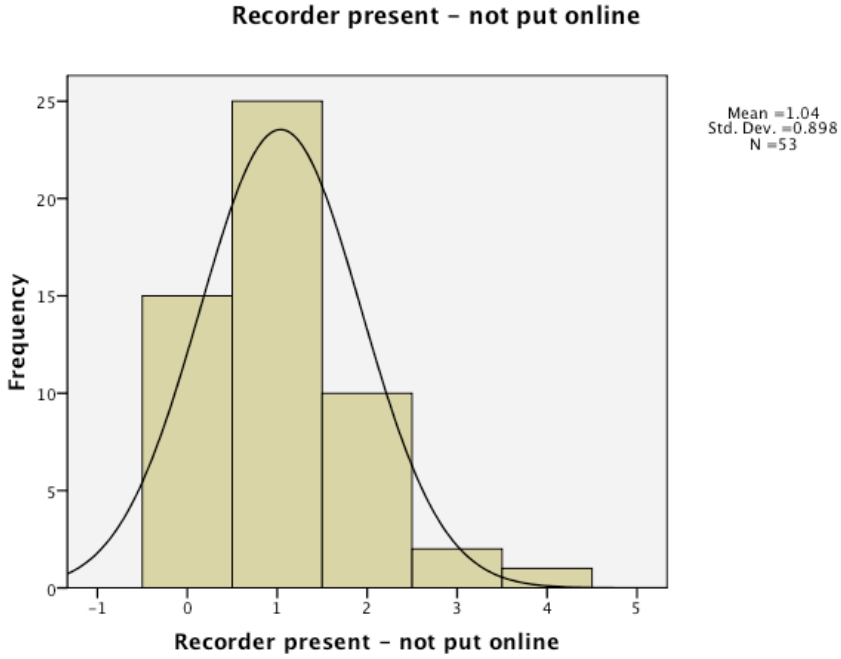
0
1
2
3
4
In class - instructor present


In class - sharing ideas
Mean =1.25
Std. Dev. =0.959
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
5
In class - sharing ideas


Recorder present - not put online
Mean =1.04
Std. Dev. =0.898
N =53
Frequency
25
20
15
10
5
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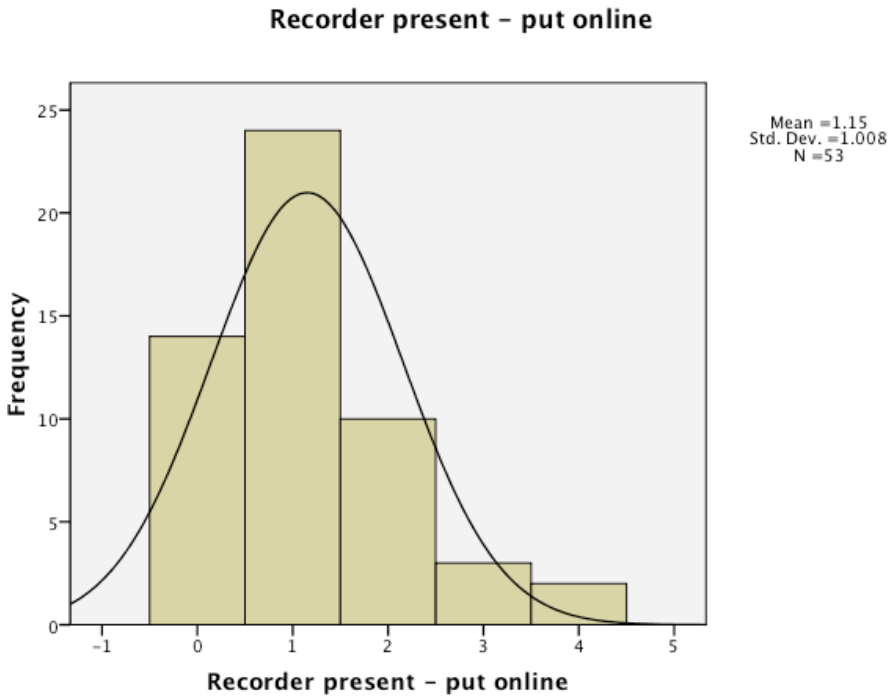
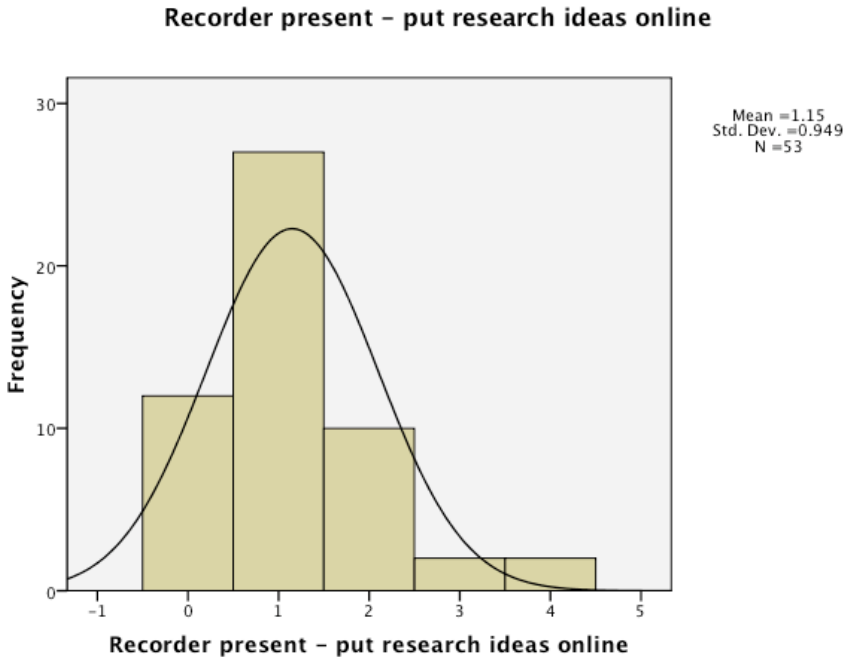
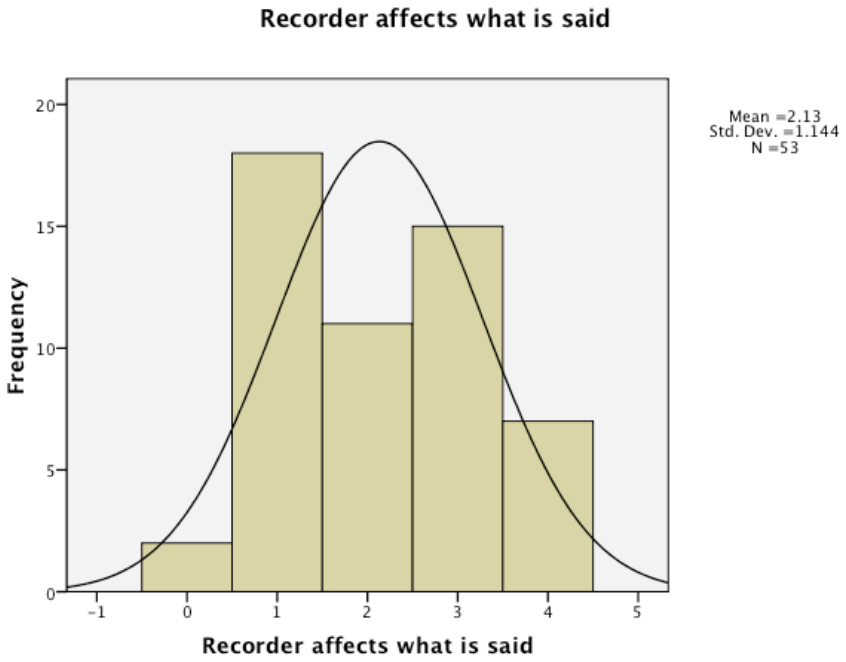
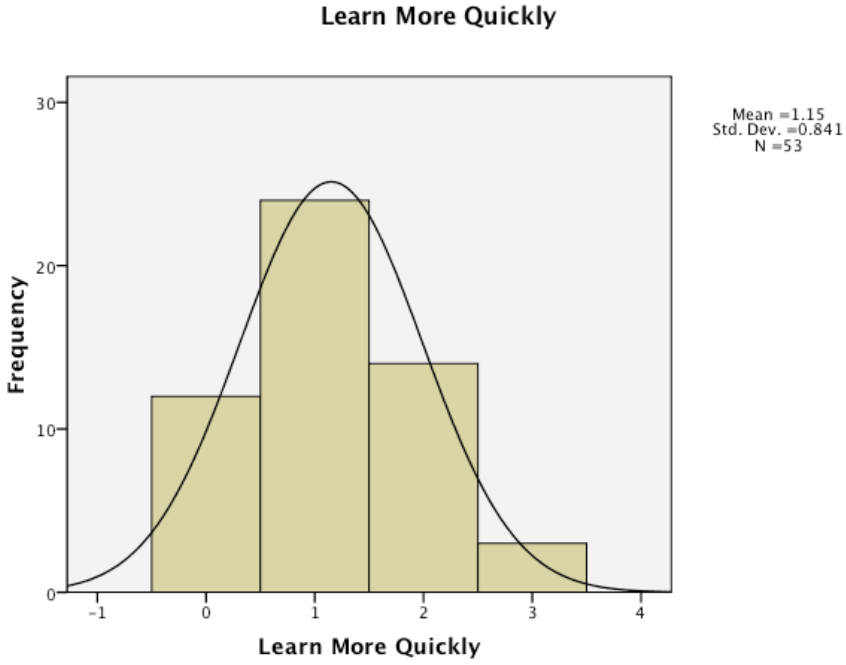
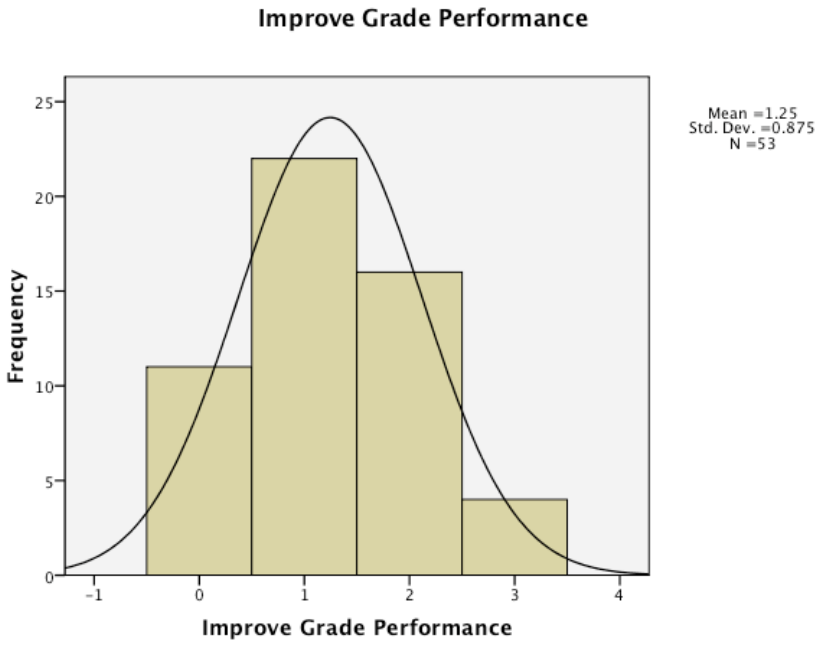
-1
0
1
2
3
4
5
Recorder present - not put online

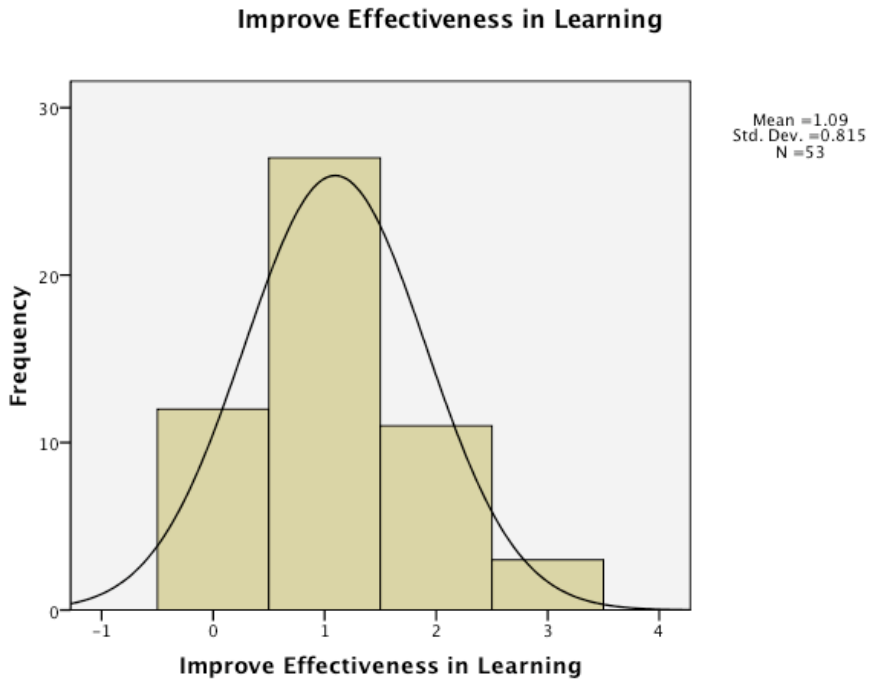

Recorder present - put online
Mean =1.15
Std. Dev. =1.008
N =53
Frequency
25
20
15
10
5
0
-1
0
1
2
3
4
5
Recorder present - put online

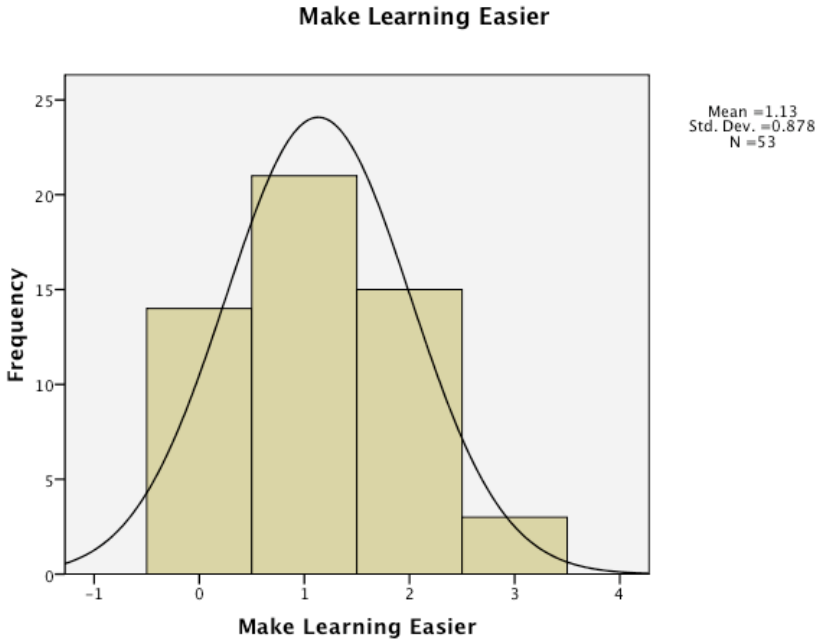

Recorder present - put research ideas online
Mean =1.15
Std. Dev. =0.949
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
5
Recorder present - put research ideas online

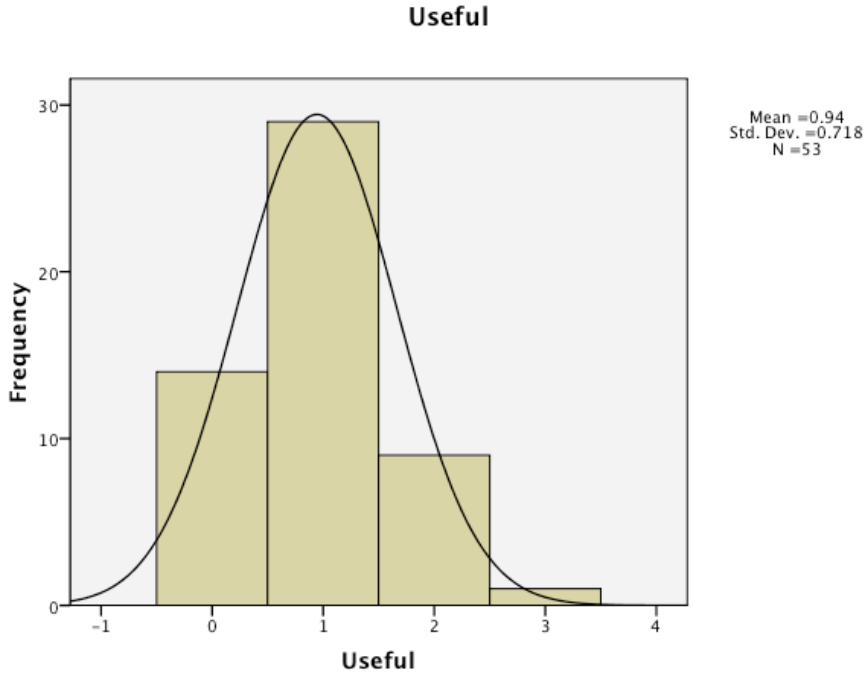

Recorder affects what is said
Mean =2.13
Std. Dev. =1.144
N =53
Frequency
20
15
10
5
0
-1
0
1
2
3
4
5
Recorder affects what is said

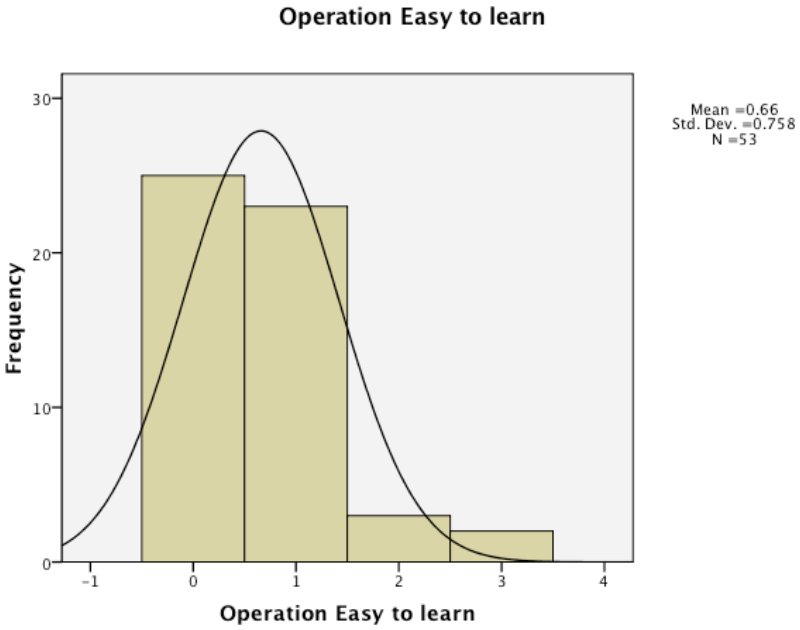

Learn More Quickly
Mean =1.15
Std. Dev. =0.841
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
Learn More Quickly


Improve Grade Performance
Mean =1.25
Std. Dev. =0.875
N =53
Frequency
25
20
15
10
5
0
-1
0
1
2
3
4
Improve Grade Performance

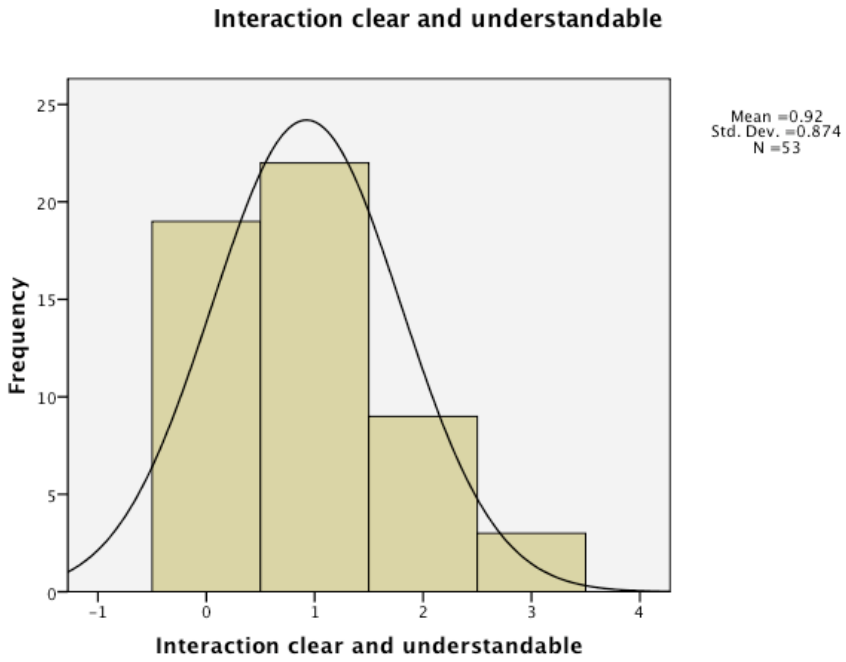

Improve Effectiveness in Learning
Mean =1.09
Std. Dev. =0.815
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
Improve Effectiveness in Learning

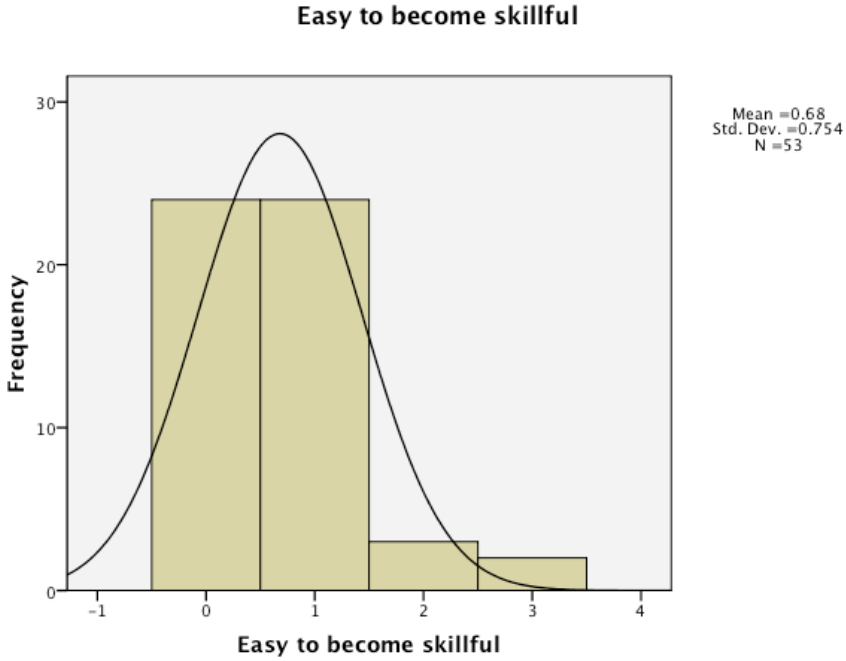

Make Learning Easier
Mean =1.13
Std. Dev. =0.878
N =53
Frequency
25
20
15
10
5
0
-1
0
1
2
3
4
Make Learning Easier

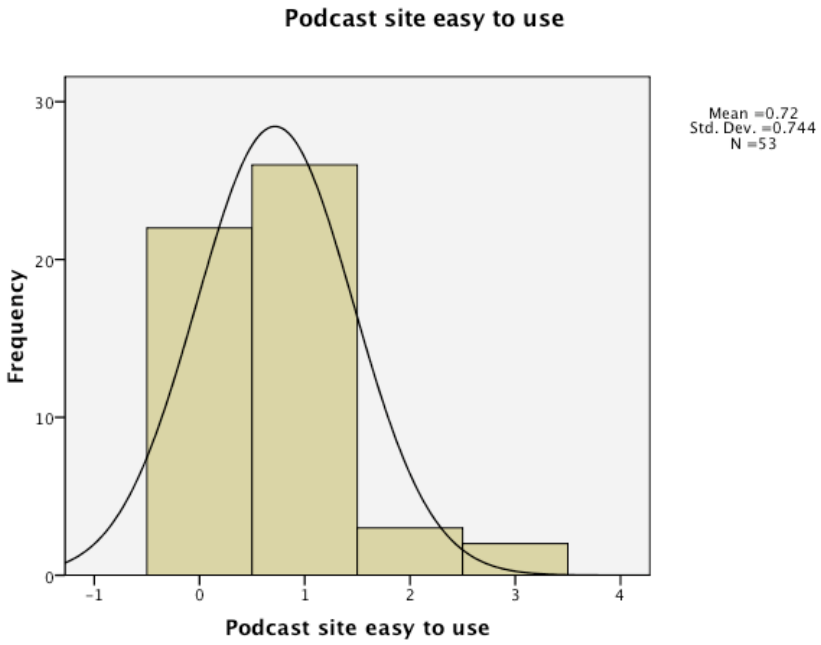

Useful
Mean =0.94
Std. Dev. =0.718
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
Useful

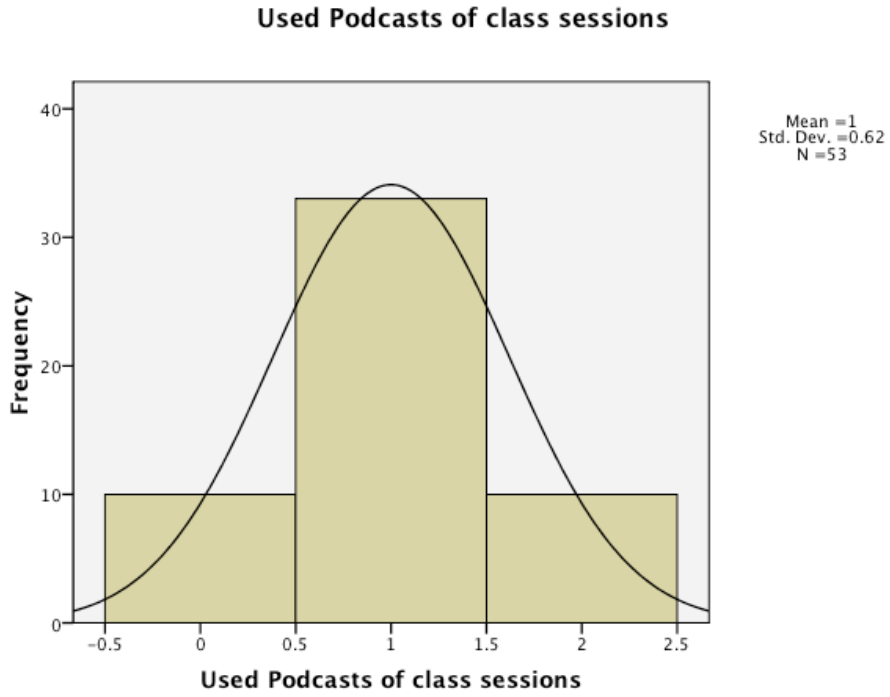

Operation Easy to learn
Mean =0.66
Std. Dev. =0.758
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
Operation Easy to learn


Get podcast site to do what I want
Mean =0.87
Std. Dev. =0.81
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
Get podcast site to do what I want


Interaction clear and understandable
Mean =0.92
Std. Dev. =0.874
N =53
Frequency
25
20
15
10
5
0
-1
0
1
2
3
4
Interaction clear and understandable


Easy to become skillful
Mean =0.68
Std. Dev. =0.754
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
Easy to become skillful


Podcast site easy to use
Mean =0.72
Std. Dev. =0.744
N =53
Frequency
30
20
10
0
-1
0
1
2
3
4
Podcast site easy to use


Used Podcasts of class sessions
Mean =1
Std. Dev. =0.62
N =53
Frequency
40
30
20
10
0
-0.5
0
0.5
1
1.5
2
2.5
Used Podcasts of class sessions

Appendix N. Paired Sample *T* Tests – Test for Changes in Classroom Interaction

```
T-TEST PAIRS=PCI_11Peers_G1 PCI_12Inst_G1 PCI_13Share_G1 PCI_14NotBroad_G1
PCI_15RecInt_G1 PCI_16RecRes_G1 PCI_17RecAffect_G1 PU_18L
earnQk_G1 PU_19GrdPerf_G1 PU_20ImpEff_G1 PU_21LearnEas_G1 PU_22Useful_G1 WITH
PCI_11Bpeers PCI_12Binst PCI_13Bshare
PCI_14BnotBroad PCI_15BrecInt PCI_16BrecRes PCI_17BrecAffect PU_18BlearnQk
PU_19BgrdPerf PU_20BimpEff PU_21BlearnEas PU_22Busefu
l (PAIRED)
/CRITERIA=CI(.9500)
/MISSING=ANALYSIS.
```

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	In class – peers present	1.11	53	.800	.110
	In class – peers present	.98	53	.796	.109
Pair 2	In class – instructor present	1.00	53	.707	.097
	In class – instructor present	.87	53	.810	.111
Pair 3	In class – sharing ideas	1.17	53	.826	.113
	In class – sharing ideas	1.25	53	.959	.132
Pair 4	Recorder present – not put online	1.17	53	.935	.128
	Recorder present – not put online	1.04	53	.898	.123
Pair 5	Recorder present – put online	1.30	53	.972	.134
	Recorder present – put online	1.15	53	1.008	.138
Pair 6	Recorder present – put research ideas online	1.26	53	.944	.130
	Recorder present – put research ideas online	1.15	53	.949	.130
Pair 7	Recorder affects what is said	2.13	53	1.093	.150
	Recorder affects what is	2.13	53	1.144	.157

		said			
	Pair 8	Learn More Quickly	1.08	53	.851	.117
		Learn More Quickly	1.15	53	.841	.116
	Pair 9	Improve Grade Performance	1.28	53	.907	.125
		Improve Grade Performance	1.25	53	.875	.120
	Pair 10	Improve Effectiveness in Learning	1.19	53	.878	.121
		Improve Effectiveness in Learning	1.09	53	.815	.112
	Pair 11	Make Learning Easier	1.09	53	.883	.121
		Make Learning Easier	1.13	53	.878	.121
	Pair 12	Useful	.92	53	.805	.111
		Useful	.94	53	.718	.099

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	In class – peers present & In class – peers present	53	.546	.000
Pair 2	In class – instructor present & In class – instructor present	53	.571	.000
Pair 3	In class – sharing ideas & In class – sharing ideas	53	.529	.000
Pair 4	Recorder present – not put online & Recorder present – not put online	53	.748	.000
Pair 5	Recorder present – put online & Recorder present – put online	53	.659	.000
Pair 6	Recorder present – put research ideas online &	53	.728	.000

	Recorder present – put research ideas online			
Pair 7	Recorder affects what is said & Recorder affects what is said	53	.663	.000
Pair 8	Learn More Quickly & Learn More Quickly	53	.655	.000
Pair 9	Improve Grade Performance & Improve Grade Performance	53	.565	.000
Pair 10	Improve Effectiveness in Learning & Improve Effectiveness in Learning	53	.512	.000
Pair 11	Make Learning Easier & Make Learning Easier	53	.778	.000
Pair 12	Useful & Useful	53	.791	.000

Paired Samples Test

Paired Samples Test									
		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	In class – peers present – In class – peers present	.132	.761	.104	-.078	.342	1.264	52	.212
Pair 2	In class – instructor present – In class – instructor present	.132	.708	.097	-.063	.327	1.358	52	.180
Pair 3	In class – sharing ideas – In class – sharing ideas	-.075	.874	.120	-.316	.165	-.629	52	.532
Pair 4	Recorder present – not put online – Recorder present – not put online	.132	.652	.089	-.048	.312	1.476	52	.146
Pair 5	Recorder present – put online – Recorder present – put online	.151	.818	.112	-.075	.376	1.343	52	.185
Pair 6	Recorder present – put research ideas	.113	.698	.096	-.079	.306	1.181	52	.243

	online - Recorder present - put research ideas online								
Pair 7	Recorder affects what is said - Recorder affects what is said	.000	.920	.126	-.254	.254	.000	52	1.000
Pair 8	Learn More Quickly - Learn More Quickly	-.075	.703	.097	-.269	.118	-.782	52	.438
Pair 9	Improve Grade Performance - Improve Grade Performance	.038	.831	.114	-.191	.267	.331	52	.742
Pair 10	Improve Effectiveness in Learning - Improve Effectiveness in Learning	.094	.838	.115	-.137	.325	.819	52	.416
Pair 11	Make Learning Easier - Make Learning Easier	-.038	.587	.081	-.200	.124	-.468	52	.642
Pair 12	Useful - Useful	-.019	.500	.069	-.157	.119	-.275	52	.784

Appendix O. SPSS Output - Analysis of Use by Gender

```
T-TEST GROUPS=Gender_G1(0 1)
 /MISSING=ANALYSIS
 /VARIABLES=Use_23RankUse_G1
 /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Rank Use	Female	41	2.27	1.096	.171
	Male	66	2.50	1.206	.148

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Rank Use	Equal variances assumed	1.843	.178	-1.000	105	.320	-.232	.232	-.691	.228
	Equal variances not assumed			-1.023	91.077	.309	-.232	.227	-.682	.218

```
T-TEST GROUPS=Gender_G1(0 1)
 /MISSING=ANALYSIS
 /VARIABLES=Use_28BUsedPods
 /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Used Podcasts of class sessions	Female	22	.91	.610	.130
	Male	31	1.06	.629	.113

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Used Podcasts of class sessions	Equal variances assumed	.005	.942	-.897	51	.374	-.155	.173	-.503	.192
	Equal variances not assumed			-.902	46.220	.372	-.155	.172	-.502	.191

Appendix P. SPSS Output – Analysis of Ease of Use by Age Group

```
FACTOR
  /VARIABLES PEU_23BlearnEas PEU_24BdoWhatWant PEU_25BinteractionCU PEU_26BeasySkillful
PEU_27BeasytoUse
  /MISSING LISTWISE
  /ANALYSIS PEU_23BlearnEas PEU_24BdoWhatWant PEU_25BinteractionCU PEU_26BeasySkillful
PEU_27BeasytoUse
  /PRINT INITIAL EXTRACTION ROTATION
  /PLOT EIGEN
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /SAVE REG(ALL)
  /METHOD=CORRELATION.
```

Factor Analysis

Communalities

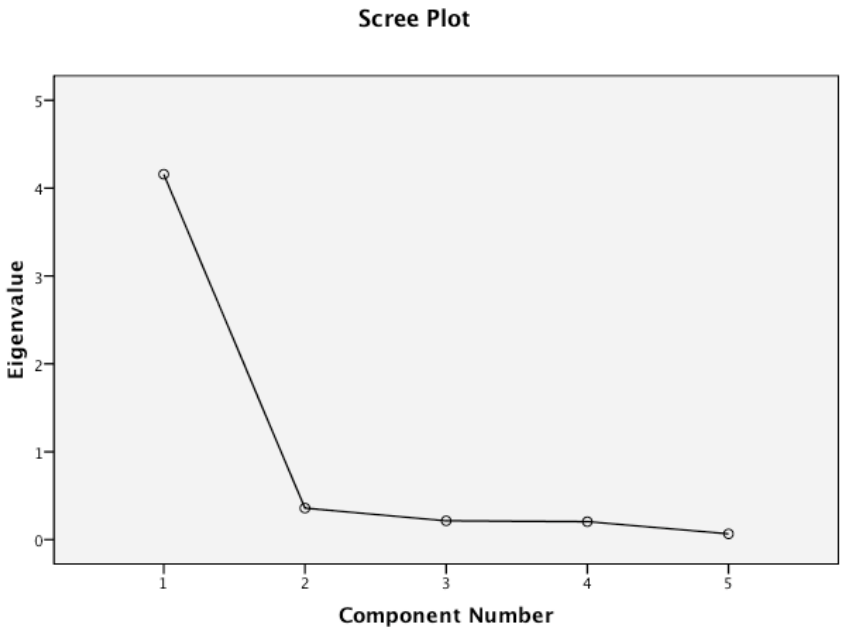
	Initial	Extraction
Operation Easy to learn	1.000	.722
Get podcast site to do what I want	1.000	.833
Interaction clear and understandable	1.000	.797
Easy to become skillful	1.000	.896
Podcast site easy to use	1.000	.910

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.157	83.148	83.148	4.157	83.148	83.148
2	.358	7.169	90.317			
3	.213	4.270	94.587			
4	.205	4.094	98.681			
5	.066	1.319	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
Operation Easy to learn	.850
Get podcast site to do what I want	.913
Interaction clear and understandable	.892
Easy to become skillful	.946
Podcast site easy to use	.954

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

```
ONEWAY FACEaseOfUse BY ClusterAgeGroups
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /PLOT MEANS
  /MISSING ANALYSIS
  /POSTHOC=TUKEY ALPHA(0.05).
```

Oneway

Descriptives

Ease of Use factor

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
18	6	-.0039693	.77619870	.31688179	-.8185398	.8106013	-1.06694	.87242
19	7	-.1945570	.90930372	.34368450	-1.0355226	.6464087	-1.06694	1.45761
20	9	-.2661441	.99281248	.33093749	-1.0292873	.4969992	-1.06694	1.72721
21	8	-.3039893	.83288604	.29446968	-1.0002995	.3923208	-1.06694	.84543
22-23	11	.3931040	1.07113981	.32296081	-.3264975	1.1127055	-.79733	3.12429
24-29	6	-.1446873	.79306663	.32376810	-.9769596	.6875851	-1.06694	.84697
30 and up	5	.7647690	1.51138169	.67591044	-1.1118593	2.6413972	-1.06694	3.12429
Total	52	.0205181	.99842767	.13845701	-.2574460	.2984821	-1.06694	3.12429

Test of Homogeneity of Variances

Ease of Use factor

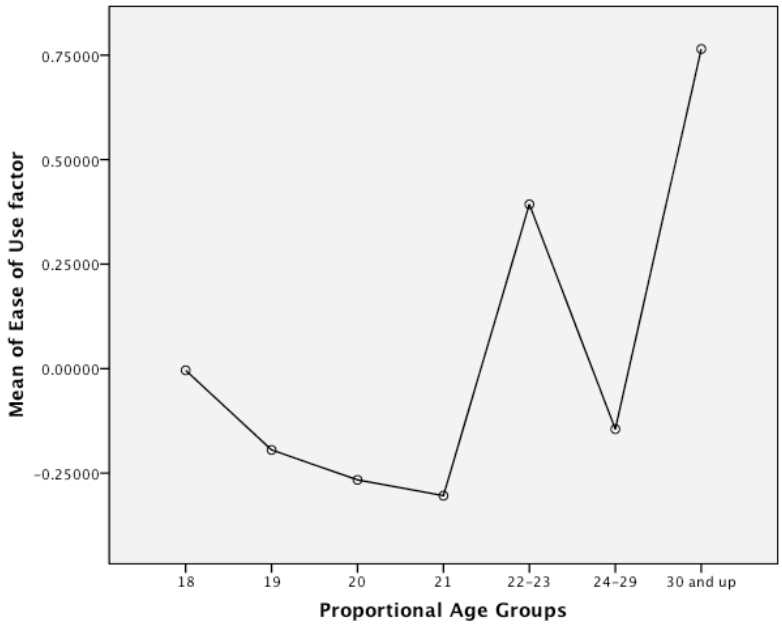
Levene Statistic	df1	df2	Sig.
.264	6	45	.951

ANOVA

Ease of Use factor

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.370	6	1.062	1.074	.392
Within Groups	44.470	45	.988		
Total	50.840	51			

Means Plots



Appendix Q. SPSS Output – Analysis of Ease of Use by Gender

```
T-TEST GROUPS=Gender_G1(0 1)
  /MISSING=ANALYSIS
  /VARIABLES=FACEaseOfUse
  /CRITERIA=CI(.9500).
```

T-Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Ease of Use factor	Female	22	.4987081	1.10325734	.23521526
	Male	31	-.3539219	.75464319	.13553792

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Ease of Use factor	Equal variances assumed	.204	.653	3.345	51	.002	.85263002	.25491551	.34086579	1.36439426
	Equal variances not assumed			3.141	34.591	.003	.85263002	.27147144	.30128086	1.40397919

Appendix R. SPSS Output – Ease of Perceived Usefulness and Use

```
CORRELATIONS
/VARIABLES=Use_28BUsedPods FACUsefulness
/PRINT=TWOTAIL NOSIG
/STATISTICS DESCRIPTIVES XPROD
/MISSING=PAIRWISE.
```

Correlations

Descriptive Statistics

Descriptive Statistics			
	Mean	Std. Deviation	N
Used Podcasts of class sessions	1.00	.620	53
Usefulness factor (B)	.0000000	1.00000000	53

Correlations

Correlations			
		Used Podcasts of class sessions	Usefulness factor (B)
Used Podcasts of class sessions	Pearson Correlation	1	
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	20.000	-21.176
	Covariance	.385	-.407
	N	53	53
Usefulness factor (B)	Pearson Correlation		1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	-21.176	52.000
	Covariance	-.407	1.000
	N	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix S. SPSS Output – Perceived Ease of Use and Use

```
CORRELATIONS
/VARIABLES=Use_28BUsedPods FACEaseOfUse
/PRINT=TWOTAIL NOSIG
/STATISTICS DESCRIPTIVES XPROD
/MISSING=PAIRWISE.
```

Correlations

Descriptive Statistics

Descriptive Statistics			
	Mean	Std. Deviation	N
Used Podcasts of class sessions	1.00	.620	53
Ease of Use factor (B)	.0000000	1.00000000	53

Correlations

Correlations			
		Used Podcasts of class sessions	Ease of Use factor (B)
Used Podcasts of class sessions	Pearson Correlation	1	
	Sig. (2-tailed)		.005
	Sum of Squares and Cross-products	20.000	-12.233
	Covariance	.385	-.235
	N	53	53
Ease of Use factor (B)	Pearson Correlation		1
	Sig. (2-tailed)	.005	
	Sum of Squares and Cross-products	-12.233	52.000
	Covariance	-.235	1.000
	N	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).