

Determining the Impact and Effectiveness of Different Teaching Strategies When
Incorporating the iPod into the Classroom

by

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ABSTRACT

The purpose of this study was to determine the impact and effectiveness of different teaching strategies when incorporating the iPod into the classroom as an educational resource. Furthermore, this study sought to explore relationships between students' iPod usage to the computer aptitude, Graduate Record Examination, Group Embedded Figures Test, and California Critical Thinking Disposition Inventory, and Instructor's Rank on Students. This study was conducted during the entire Spring 2007 semester. All participants were provided with a video iPod to use during the entire semester. A total of 62 participants were incorporated into this research study, which were each enrolled within one of the four selected treatment groups. The treatment groups were already established courses that the students self-selected to enroll within. Each treatment group received educational podcasts that were designed for their course throughout the semester. Different teaching strategies were used within each of the treatment groups in order to examine if there were variations when the iPod was implemented.

Researchers found that of the 62 participants 35 of the participants opted to not use the iPod as an educational resource. Findings for this study will enhance future research that chose to examine student's attitudes towards using technology advancements as an educational resource.

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CHAPTER I
INTRODUCTION

Background and Setting

The fast and furious increase in technology has led to what is now known as the digital age. The first computer was introduced during the nineteenth century that was built by Charles Babbage (Bitter & Pierson, 2002). In the 1970s, the adoption of the integrated circuit allowed computers to be produced at a relatively low cost which allowed individuals to own a personal computer similar to the ones that we use today (Computer, 2006). It was during this time period when Naisbitt (1982) urged people to "...understand this new information society and the changes it brings" (p.13) and that "...the restructuring of America from an industrial to an informational society will easily be as profound as the shift from an agrarian society to an industrial society" (p. 17). These computers have greatly improved since the nineteenth century.

Computers have become very common among the average person, and are classified as a must have item for college students of today, used both academically and socially. Naisbitt and Aburdene (1990) stated that "...computers will strengthen the power of individuals and weaken the power of the state" (p. 95) and that "...new technologies have changed the importance of scale and location and extended the power of the individuals" (p. 301).

Another device that is also commonly used by college students today is the cell phone. In 2000, a little over 30% of college students in the United States owned a cell phone, and by the fall of 2004 almost 90 % owned one of these devices (Mobile Usage,

2005). Additional resources for current college students are becoming readily more available, which include: web textbooks, open source software, e-books, etc. The iPod is one of the latest available digital devices. A diagram of a typical iPod can be seen in Figure 1.1.

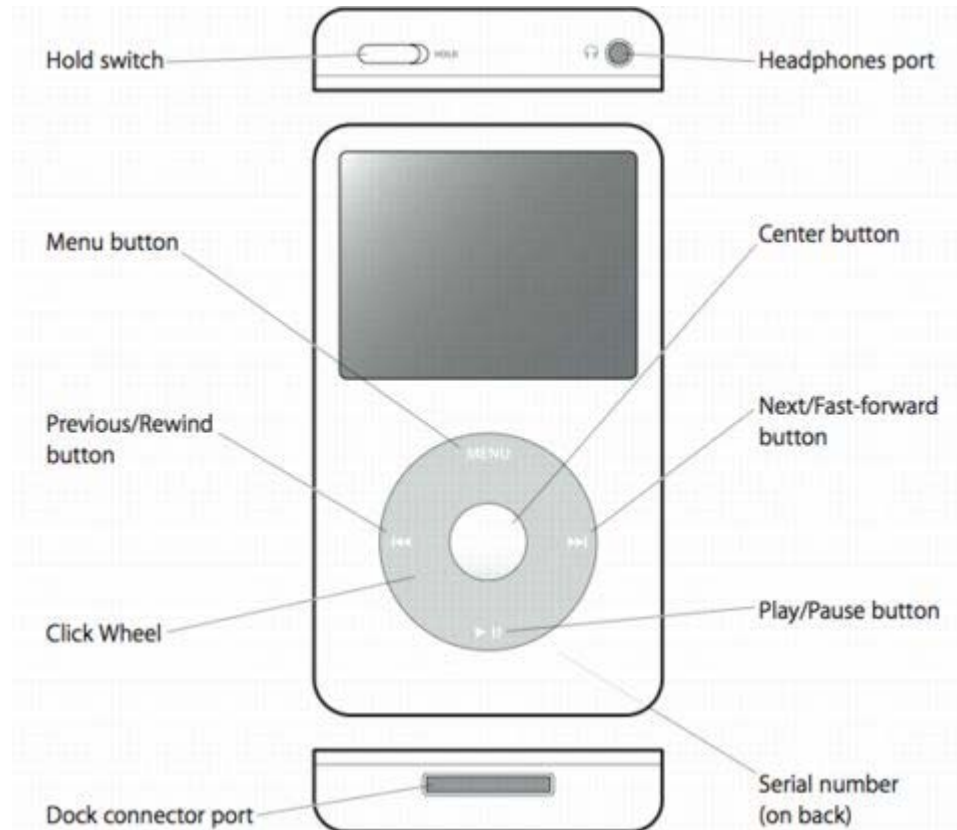


Figure 1.1. Parts of an iPod (Apple Computer, 2006).

An iPod is a hand-held device that allows information to be downloaded and received as an audio and occasionally visual file. This device is a brand of portable media player, designed and marketed by Apple Computers, which is currently the world's best-

selling digital audio player in the United States since October 2004 (iPod, 2006). Apple CEO reported total sales of over 42 million iPods, and 14 million in the first quarter of the fiscal 2006 year, meaning that 100 iPods were sold every minute during that quarter (Jobs, 2006). The sales of iPods have greatly increased since the 2002 fiscal year, when Apple Computers sold 381,000 iPods (Apple Computer, 2004).

The first iPod was released on October 23, 2001, as a Mac-compatible (device was only compatible with Macintosh brand computers) product with a 5 GB (gigabyte) drive, which put “1,000 songs in your pocket” (Jobs, 2001, p.2). A gigabyte is a measure of information storage available on a device. The second generation iPod was released by Apple in 2002. This design had two versions, one for Mac users and one for Windows users. This iPod could work with either system, but iTunes did not exist at this time period. Therefore, the Windows iPod came packaged with Musicmatch software. The first generations of iPods were able to connect to a user’s computer to update songs and recharge its battery through a FireWire (an electrical outlet) or it could be charged through a power adapter (iPod, 2006).

In 2003, the third generation of Apple iPods are released. This version featured a single CD with the Windows version of the iTunes and the Mac version of software. Apple has created and owns iTunes. This program was introduced in April 28, 2003. Additionally, the standard dock connector was also added during this generation period, which enabled users to use the FireWire option or the USB when making data transfers. A USB feature is used to connect an electronic device to a computer. A USB allows a

person to charge a device, download and/or upload data, and update the software on their digital device.

The fourth generation of the iPod made only small changes to the product, which included the click wheel feature. Also, the USB feature became more popular, and the manufactures began shipping iPods with these cords instead of the FireWire connections. These iPods can be battery powered for up to 14 hours. The 2005 version of the iPod contained audio, photo, and video functions, with all models containing a color screen, as opposed to the first generation grey screens (iPod, 2006). The 2005 version of the iPod, also called a video iPod is the version that will be incorporated as the resource for college students to use within this study.

Students were able to download power point lectures, stream video, and other classroom content and resources as a podcasts. Podcasts are the content that users are able to download from their computer and view on their iPod. iPod students are allowed to subscribe to specific podcasts related to one of their specific courses, and every time the digital device is plugged into the computer it automatically updates the available podcasts.

Technology continues to advance, and in reality is a never-ending journey. These technology advancements slowly play a role in each person's life, as they first enter into society as the latest technology advancement and it eventually becomes an item that society cannot live without. These digital devices allow college students to have greater access to resources and content material. The use of the iPod as an educational resource is considered a multimedia approach in the classroom, since material is presented to

students using both auditory and visual channels. The multimedia approach in the classroom has been found to enhance students learning as long as the text and visuals directly support each other (Slavin, 2006). Multimedia includes electronic material that can be integrated into classroom projects, which includes graphics, video animation, and sound. Duke University was one of the first universities to implement the iPod as a resource for their first year students beginning in 2004. However, there is very limited research that determines the satisfaction and effectiveness of student iPod use.

Statement of the Problem

The iPod is one of the latest digital devices that is currently being implemented into university classrooms. There is insufficient information regarding the satisfaction and effectiveness of students using the iPod in the classroom, compiled with the appropriate teaching strategies to use when incorporating this technology advancement in the classroom. Additionally, there is a lack of research establishing student computer proficiency and its impact towards their ability to use the iPod as a classroom resource.

Purpose, Hypotheses, and Objectives

The purpose of this research study was to determine the impact and effectiveness of different teaching strategies when incorporating the iPod into the classroom as an educational resource. Furthermore, this study sought to explore relationships between their iPod usage to the computer aptitude, Graduate Record Examination, Group

Embedded Figures Test, and California Critical Thinking Disposition Inventory, and Instructor's Rank on Students.

The researcher has established the following null hypothesis:

Ho = There is no relationship between students' iPod usage and their computer aptitude, Graduate Record Examination, Group Embedded Figures Test, California Critical Thinking Disposition Inventory, and instructor's rank on the students.

In order to identify these factors, the following objectives were formulated:

1. Determine demographics of iPod users.
2. Describe the magnitude of iPod usage within each teaching strategy.
3. Determine the relationship between student's iPod usage as a course resource to their computer aptitude test score by treatment group.
4. Determine the relationship between students' iPod usage to each of the instrumentations incorporated into this study, which included: Group Embedded Figures Test, California Critical Thinking Disposition Inventory, Graduate Record Exam, and instructor's rank on the students.
5. Determine students' attitudes and opinions of using the iPod.

Definitions of Terms

The following terms were defined in order to provide clarity of meaning, specifically for the purpose of this study:

Cognition – The students' performance in the specified class that the iPod is incorporated. In other words, the way the human mind process information and then applies this knowledge. Zanden, Crandell, and Crandell (2000) referred to it as the act or process of knowing.

Computer Aptitude Tests – Also called a computer skills test. A tool used to determine a persons' proficiency of a specific skill, which for this study would be computers skills. The test used for this study was offered by *ExpertRating*, a web-based instrument.

Computer Proficiency – A person's self-efficacy and their ability to perform certain computer tasks as measured by a computer aptitude test.

Distance Education Students – Students not found in the traditional classroom setting and live a distance from campus (Distance education, 2006).

Doc-at-a-Distance – An Ed.D. program established in the fall 2000 semester for students working towards a Doctoral degree in Agricultural Education degree. This program is classified as distance education, and is provided by both Texas Tech and Texas A&M Universities. It is also referred to as D@D.

Educational Materials – Resourceful items that supplement reading materials, additional information, and the actual lecture.

FireWire – An electrical plug that is used in order to operate a devise or for recharging purposes.

Gigabyte – One billion bytes. A byte is a measure of information storage. Most commonly referred to as GB.

iPod – This device is a brand of portable media players, which is designed and marketed by Apple Computers (iPod, 2006). It is one of the latest advancements that is a, hand-held device which allows users to download and receive audio and visual features, called podcasts.

iTunes – Software that allows iPod users to upload music, photos, and videos onto their iPod.

Learning Styles – How individuals prefer to sort and process information that they receive (Cano, Garton, & Raven, 1992a).

Local Students – Students that live in the vicinity of the university that is providing the course that the student is enrolled. These specific students choose to take the course as a distance education student.

Mac-Compatible – A device that is designed to only be collaborative with a Macintosh computer.

PC – Short-term phrase that stands for personal computer. Referring to a person's primary computing device.

Podcasts – Technology development that distributes multimedia files over the Internet. Users of this content material are able to connect their iPod player to the computer and then download the provided educational materials (McFedries, 2005).

USB – Feature used to connect an electronic device to a computer. Allows the digital device to be charged, download and/or upload data, and update software that is available.

Streamed Lecture – A delivery method that is viewed similarly as a television or a radio.

Teaching Strategy – The approach the teacher uses to incorporate the educational resource into the classroom. There are three different teaching methods observed in this study.

Traditional Students – Students commonly found in university classroom settings, also called residential students.

Limitations of the Study

The following limitations of this study need to be taken into consideration when generalizing the results to other populations.

1. The doctoral distance education students that were used for this study are students at both Texas A&M and Texas Tech Universities. These students reside and take part in the course from across the United States and Canada. Additionally, two students enrolled in AGED 7100 are distance students, with one student located in Missouri and the other located in South Texas. There are also four additional students enrolled in AGED 7100 that are classified as local students. The remaining population consists of students enrolled in one of the three selected courses, and they attended class on the Texas Tech campus. It would be unwise to extend the results of this research towards school environments that are not similar to the settings incorporated into this study.

2. All courses that were observed within this research process are graduate level courses in the College of Agriculture Sciences and Natural Resources.

Therefore, extending the results to other content areas goes beyond the scope of this study.

Basic Assumptions

This study was conducted in three different courses which are administrated by Texas Tech University. Each of these courses incorporated the iPod into their curriculum during the spring semester of 2007. The goal was to determine the impact and effectiveness of different teaching strategies when incorporating the iPod as an educational resource in the classroom. Each course used a different teaching strategy so that the researchers could establish which teaching strategy was the most efficient when incorporating the iPod into the classroom. The first course was Methods of Technology Change course, a Doc-at-a-Distance course accompanied by three traditional students. This course provided available content, which composed of the entire lecture streamed. A streamed lecture is a delivery method that is similar to the media forms of watching television and listening to the radio and is different from viewing a DVD or cassette. The second course was graduate seminar, composed of traditional, local, and distance students. This course required students to view the podcasts. The third course was assessing program effectiveness with only traditional students enrolled in this course. These podcasts took the place of readings before each class, and were suggested to students to be viewed. Students took several instrumentations that were correlated to this

overall iPod usage. The iPods used for this study were funded by the International Center for Food Industry Excellence at Texas Tech University.

Significance of the Problem

This study determined the impact and effectiveness of different teaching strategies used when incorporating the iPod as an educational resource into the classroom. This study was designed as a foundation study for future implementation of technology advancements within classrooms. This allowed future instructors to meet the wants and needs of the students at the maximum level possible when they are designing and implementing their course content material. Overall, this study measured how students viewed modern technology when it is applied to the classroom.

Results within this study provide an understanding of students iPod usage compared to their scores on the computer aptitude, Graduate Record Examination, Group Embedded Figures Test, and California Critical Thinking Disposition Inventory. Additionally, the teaching method implemented into each of the selected three courses and the overall usage of the iPod was determined.

There has been limited research conducted on iPod usage in the classroom as an educational resource. During the first years of using the iPod, Duke University established advantages and disadvantages. This current study investigated student attitudes, beliefs, technology skills, critical thinking, intelligence, and learning style. These variables were correlated to the students' actual usage of the iPod accompanied with the teaching strategy.

Summary

The use of the iPod is on the rise in education. It is important, as educators, to establish the most appropriate delivery method of educational materials. It is also important that educators stay abreast of the latest digital devices, as technology advancements.

Naisbitt describes the future as a picture puzzle in his latest book titled: *Mind Set!* (2006).

The future is a collection of possibilities, directions, events, twists and turns, advances, and surprises. As time passes, everything finds its place and together all pieces form a new picture of the world. In a projection of the future, we have to anticipate where the pieces will go, and the better we understand the connections, the more accurate the picture will be. (p. 43)

The purpose of this research study is to determine the impact and effectiveness of different teaching strategies while incorporating in the iPod as an educational resource into the classroom.

CHAPTER II
REVIEW OF LITERATURE

Introduction

The purpose of this research study was to determine the impact and effectiveness of different teaching strategies when incorporating the iPod into the classroom as an educational resource. Furthermore, this study sought to explore relationships between their iPod usage to the computer aptitude, Graduate Record Examination, Group Embedded Figures Test, and California Critical Thinking Disposition Inventory, and Instructor's Rank on Students. This review of literature was written in order to identify the bodies of research and knowledge which were appropriate to this study and established appropriate themes of significance through summarization. This review emphasized the theoretical foundation for this research study. Articles reviewed within this literature review identified factors that could influence the effectiveness of technology in education, specifically the use of an iPod.

The Council for Higher Education Accreditation (2003) stated that "...student learning has been the central concern of higher education from the beginning" (p. 1). Learning has been classified as a complex process. However the teacher is not the sole variable when determining if learning was effective among the students. Learning at the university level was described by the Council for Higher

Education Accreditation (2003) as:

How much a student learns is frequently as dependent upon how much he or she invests in the process as on the conditions for learning created by institutions and programs. . . . Learning itself is [also] about mutual expectations. Faculty expect learners to come to learning situations prepared and committed to learn. Learners, in turn, expect faculty to create effective learning opportunities that hold them to appropriate standards and that help them attain these standards. (p. 1)

Foundational Theory

Cue Summation

Cue summation states that redundant information simultaneously presented through audio and visual channels will result in greater efficiency in learning, as opposed to the same information being presented in only one audio or visual channel (Cushman, 1973). Cushman defined a channel as the sensory vehicle through which information is received by an individual. Eyes receive information in the visual channel, and the ears are the receivers of the aural channel. These channels receive different modes as well, either being verbal or non-verbal. Both of these modes are also labeled as digital and iconic according to Knowlton (1966), see Table 2.1. Digital refers to a verbal representation of the object, which can be spoken or printed. An example of digital mode of communication includes, the printed word “dog” and the spoken word “dog”. The iconic mode refers to the same object. An example of an iconic mode would include a visual picture of a dog, or using the audio sound, which would be a dog actually barking. Both of these examples represent the same object being “dog”. This process is also referred to

as cognition. Computer aided materials in a classroom setting have been found to be more efficient if they are adapted to an individual's cognitive style (Cheney, 1980).

Table 2.1

Classification of Channels and Modes

		Channels	
		Audio	Visual
Modes	Digital	Spoken word "dog"	Printed word "dog"
	Iconic	Sound of dog barking	Picture of a dog

Several studies have been conducted to test the theories behind cue summation, and resulted in a wide range of outcomes. Severin (1967b) determined that multiple channel communications appear to be superior to single-channel communications when relevant cues are summated across channels. Findahl (1971), Reese (1983), and Drew and Grimes (1987) discovered that redundant audio and video presentations were superior when producing recall and understanding information from a single-channel. Calvert, Hudson, Watkins and Wright (1982) established that students learned more through the verbal content that was supported by video and is understood, as opposed to using the same video being supported through abstract audio. Additionally, Nugent (1982) determined that an increase in performance could be achieved using a combination of audio and images. However, he also determined that when combining audio and text, no difference was established. Yang (1993) stated that multimedia seldom uses unrelated

cues, therefore using the multiple channel approach should lead to students improvement in learning. Brashears, Frazee, Lawver, and Baker (2005) established that knowledge, retention, and satisfaction all increased with the use of multiple cues, but knowledge did reach a point of diminishing returns. This occurred when there was an over abundance of cues. Additionally, these researchers discovered that students in the cue summation treatment group reported significantly higher satisfaction scores than the students in the control group.

As measured by the Group Embedded Figures Test, there are two types of learning styles, independent and dependent, research has shown that they both are positively academically impacted by computer aided materials in the classroom. MacGregor, Shapiro, and Niemiec (1988) discovered though that dependent students benefited the greatest from the computer aided materials. These materials provided the students with cognitive structure and consistency that they lacked in the past. Further research was produced by Morrison and Frick (1994) on independent and dependent learners towards multimedia instruction in the classroom. They found that dependent learners benefited from including sound within their multimedia modules. Independent learners found the modules were more exciting to use than traditional lectures. Independent/dependent learners are discussed in much greater depth later in this chapter.

True cue summation occurs when cues are presented in different channels and modes. Learners are able to incorporate the sound of a dog barking (audio, iconic) and the printed word “dog” (digital, visual). Severin (1968) concluded that true cue summation would lead to significantly more learning than single channel or redundant

cues within the same channel. Redundancy refers to providing cues within the same channel or mode.

Some researchers have concluded that cue summation distracts from learning, instead of improving the learning environment. Severin (1967a) stated that some educators use multiple channels without fully understanding the possible interference that could exist among them. Cushman (1973) also added that cues that are provided through the same mode but through a different channel can also be effective at promoting student learning. This occurs when additional cues provide something extra, including emotion or fluctuation in a voice that is added to the printed words. Cue summation is the underlying theory that is applied to external stimulus within the information processing system that is discussed later in this chapter.

Supporting Theories

Edgar Dale's Cone of Learning

The Cone of Learning, created by Edgar Dale (1969), is a system used to determine how much information students obtain from different teaching methods (Figure 2.1). This diagram illustrates the complexity of methods of internalizing information and their subsequent effectiveness. When students progress down the triangle, learning begins to transform from a passive activity to an active venture for the student, meaning that students tend to commit more information to long-term memory.

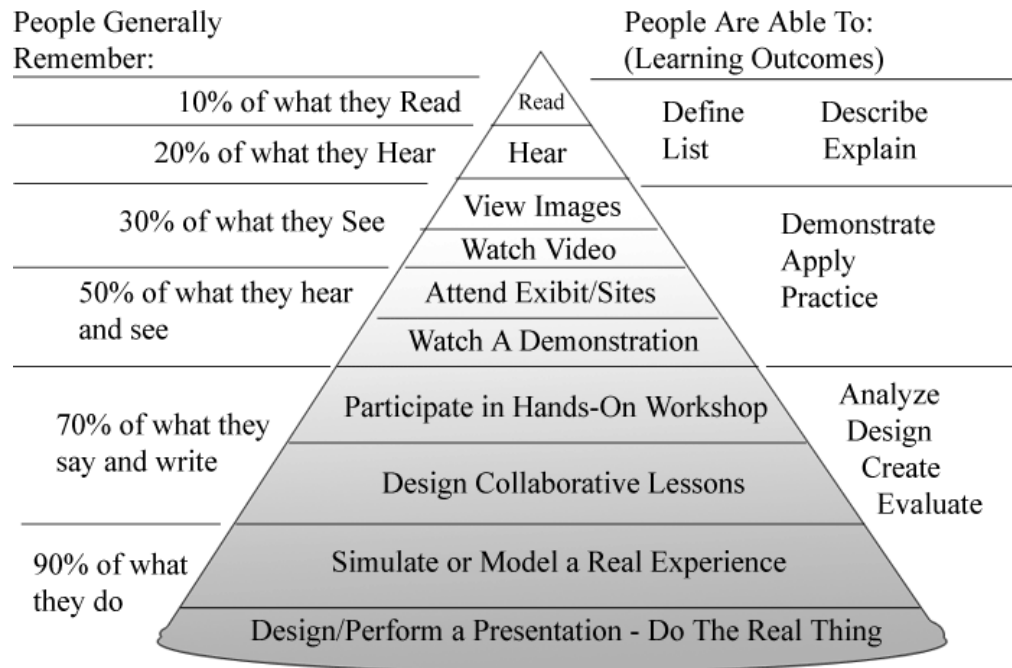


Figure 2.1. Cone of Learning (Edgar Dale, 1969; cited in Pastore, 2003).

After two weeks of “Verbally Receiving” information students tend to remember 10% of what they read and 20% of what they hear (Dale, 1969). The next category is the “Visual Receiving” category. Students at this level retain 20% of what they hear. Students in the next category retain information from both visual displays, as well as hearing audio. From this model, researchers would assume that iPod users would remember 50% of what they see and hear. Additional research has shown that students which are actively involved in self-driven learning projects learn more and remember more information longer, versus students that are passively sitting and listening (Newman & Scurry, 2001).

However, McKeachie and Svinicki (2006) stated that some students could be

resentful towards the implementation of technology and taking the initiative towards learning, because they are comfortable learning in a passive and responsive setting. Finally, the consideration of which technology to use that aligns with the students, course content, and teaching style needs to be taken into consideration (McKeachie & Svinicki, 2006).

The Information Processing System

The more repetitious information is presented to students, the more likely chunks of information will be transmitted to a student's long-term memory. Cognitive theory focuses on how the human memory system acquires, transforms, compacts, elaborates, encodes, retrieves, and uses information. This is known as the information processing system. The model for this theory divides the memory system into three main storage structures: sensory, short-term, and long-term memory (Figure 2.2). The first stage of the information-processing theory is the sensory memory, which is where information is received and held for a very short period of time. This type of memory receives large amounts of information from each of our senses (sight, hearing, touch, smell, and taste) and this information is held no more than a couple of seconds (Slavin, 2006). An example of this is the letter "A", which is recognized as the actual letter of the alphabet, instead of a group of lines.

Information then travels to the short-term memory and will remain active for 15-20 seconds without rehearsal (Klatzky, 1980). This stage of memory is also called working memory, because when subjects stop thinking about an item it disappears from

our short-term memory. Working memory simply means the mind is operating on information, organizes it for storage, discards it, or connects it to other information (Slavin, 2006). Short-term memory is very limited in terms of storage. It has room for approximately seven chunks of information, plus or minus two, depending on the individual (Miller, 1956). Therefore, information must be coded during this stage and transferred to long-term.

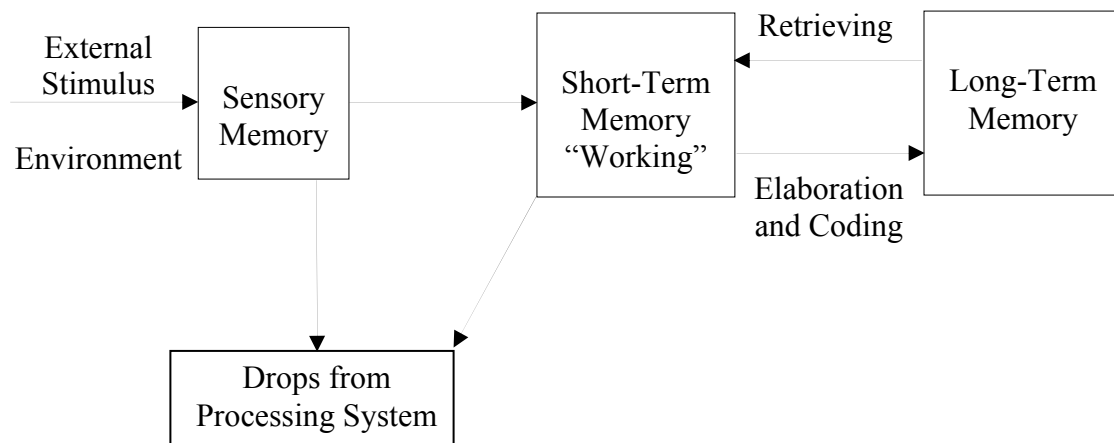


Figure 2.2. A Model of the Information Processing System.

Long-term memory stores information for long periods of time. Many theorists believe that we may never forget information that is placed into this memory stage, but we might simply lose the ability to find the information that we are searching for within our long-term memory (Slavin, 2006). It is important for educators to embed as much information as possible into their students' long-term memory. This is the final stage of the information-processing theory.

Independent Variable

Technology used by College Students

A survey was conducted during the 2004-2005 academic school year at Central Michigan University which determined the digital devices current college students were using and how they were used. Students enrolled within two College of Business Administration courses participated in the survey. This research concluded that students' motivation behind purchasing digital devices was due to the available features and for convenience. Over 90% of the students surveyed were 18-to-23 years old. The most "extensively" used technology advancement by the surveyed students was a cell phone that contained basic calling features (Switzer & Csapo, 2005). The Blackberry was the least common digital device owned by the surveyed college students. A majority (81.9%) of the students did not own an iPod.

Students were asked if a digital device was required for a particular class, would this impact their decision in taking a particular course? A majority of the students (69%) said "no", the required digital device would not impact their consideration of taking a course (Switzer & Csapo, 2005). The same study also concluded that handheld digital devices in the classrooms allowed institutions to provide equal access of technology to all students. This study indicated the technology increased students' motivation for learning. Additionally, these digital devices are still providing an effective tool that encourages teamwork and sharing of information among students (Switzer & Csapo, 2005).

The iPod is a digital device that is currently being integrated into some university classrooms. "The best teachers and researchers should be thinking about how to design

courses in which technology enriches teaching rather than substitutes for it,” the Boyer Commission (1998) reported.

Dependent Variables

Effectiveness of Multimedia in Education

A dependent variable is simply defined as a variable of interest or an outcome to a study. “Integrating technology into the educational process is becoming a major thrust for most colleges and universities” (McKeachie & Svinicki, 2006, p. 229). McKeachie and Svinicki stated that instructional technology can be incorporated into the classroom and used as an effective tool within the following functions: a) providing new opportunities for enhancing student learning that otherwise would be impossible or very difficult; b) addressing specific learning goals more effectively; c) taking advantage of the rich information now available online; and d) preparing student for life in a wired world. “The use of instructional technology is more likely to be effective and appropriate if it is integrated into a careful planning process that taken into account the various factors involved in teaching and learning” (McKeachie & Svinicki, 2006, p. 231). Russell (1999) stated that technology used to provide information in the classroom does not significantly affect student learning outcomes. Kozma (1994) argued that we have not thoroughly used and examined the specific functions of individual technologies, or explored and compared their effectiveness within instruction. “We cannot expect to find that technologies make a difference until we exploit the unique capabilities of the medium” (McKeachie & Svinicki, 2006, p. 249). Ehrmann (1995) and Kozma (1994) stated that

useful research on teaching with technology should incorporate questions that are directed towards exploring the best teaching and learning strategies, and how the technology is best supported.

McKeachie and Svinicki (2006) stated that from a system approach, the students, the instructors, course content, and technology tools need to be addressed when incorporating technology into the classroom. Course content is important to consider when the idea arises to implement technology into the classroom because the discipline that is being taught and the goals that are established for the course will effect this decision. Next, the instructor needs to identify their own skill and confidence level towards the use of technology while still incorporating in their own view of teaching and learning. “Using technology to teach without adequate preparation and time commitment could have a negative impact on your teaching and student learning” (McKeachie & Svinicki, 2006, p. 235). Once a teacher decides to incorporate technology into their classroom it is important for the student to be brought into this process. Teachers need to analyze students’ previous experience and current access to technology, and the variety of learning styles that will be brought into the course. Several instructors report that “...students’ comfort and experience with technology seem to increase each year” (McKeachie & Svinicki, 2006, p. 236).

The multimedia approach in the classroom has been found to enhance students’ learning as long as the text and visuals directly supported each other. Multimedia includes electronic material that can be integrated into classroom projects, which includes graphics, video animation, and sound (Slavin, 2006). Hall (1996), Mackensie and Jansen

(1998), and Solomon (1994) have looked at the substantial costs of producing multimedia content. They have concluded that when incorporating multimedia into the educational process there becomes significant commitment to financial, personnel, and time resources.

Researchers have concluded that multimedia in the classroom produced improvement towards students' attitude, teamwork, and enthusiasm (Perry, Wilkinson, & Perry, 1998; Peterson & Orde, 1995; and Wise & Groom, 1996). Childress (1995) determined that when learning a task that requires visualization, motion, and trajectory students benefited from an animation that contained those qualities. Bagett (1979) conducted a test on students immediately after viewing or hearing a story on their ability to summarize the facts. He determined that there was no significant difference that existed at this time. However, a difference was detected whenever the students were retested one week later. This indicated that video was more effective than audio when the variable of time was introduced into the equation. Kuzma (1991) concluded that most studies that compared video, audio, and audio with video discovered that the third condition (audio with video) produced an increase in recall ability. Additionally, Miller (1995) concluded that off-campus graduates found videotapes to be useful in learning.

Carabello (1985) has opposing conclusions when compared to the previous ones. He found no differences when showing students text, text and pictures, and text and animations when explaining the anatomy of the heart. Additionally, McGregor, Frazee, Baker, Drueckhammer, and Lawver (2003) found no significant difference between

treatment and control when comparing animations to still pictures in an agriculture power and machinery classroom.

Technology Effectiveness in Distance Education

Technology advancements have also had an impact towards distance education. “Distance education presents one of the most challenging and satisfying forms of teaching” (McKeachie & Svinicki, 2006, p. 288). McKeachie and Svinicki refer distance teaching to an extended act of imagination. This extended act of imagination has increased in recent years. Institutions have discovered that producing online classes is costly and few staff members actually have the expertise and time to devote to these technology advancements to produce these courses. Some instructors fear that the adoption of the new, high paced technology will eventually lead to fewer jobs, specifically teaching (McKeachie & Svinicki, 2006).

Distance education allows students to take courses from other intuitions. Russell (1998) stated that distance delivery is not by itself a contributing variable of achievement regardless of the media or technology used.

Distance education has undergone many changes throughout recent years. The first distance education courses were known as correspondence courses. In these courses the instructor and the student would communicate the course material through the mail. Today, some of the current distance education courses are taught by using interactive videoconferencing. These courses are expensive and complicated to distribute to every student. Furthermore, WebCT, and Blackboard courses allow students to engage in more

interactive settings, but these methods are not well adapted for one-on-one use. WebCT and Blackboard are known communication technology channels for students and instructors of courses.

Distance education courses allow place-bound individuals who want to learn about a particular subject a chance to take these desired courses. Dile and Mezack (1991) stated that “non-traditional” students tend to out-perform traditional students, with age and experience serving as contributing factors. Threlkeld and Brozoska (1993) described successful distant learners as mature, highly motivated, flexible, and self-disciplined. Jurasek (1993) found that distant education students have a significantly greater positive attitude than other students. Additionally, she found no significant difference in the average grades earned by students at the different locations. Coggins (1988) discovered that students entering a course with higher levels of education were more likely to complete the course.

Further research also found that distance education students do withdraw from courses at a greater rate than traditional students. Garland (1993) discovered that time is often cited to be the reason for withdrawing from the courses. Other reasons people withdraw include: lack of prerequisite knowledge of the course content, lack of support from family and peers, procrastination, poor tutor feedback, weak goal commitment, and fear of failure.

Fulford and Zhang (1993); Garrison (1990); Ritchie and Newby (1989) all have concluded that student-to-student and student-to-instructor interaction is positively correlated with learner satisfaction. The instructors of distance education benefited from

this distance type of teaching method due to the ease of editing and the multiple usage of the presentations. They felt that the down side of this teaching method was the amount of time needed to prepare these lectures and the need for technical expertise. Students engaged in these courses found advantages in the virtual tours, lectures could be revisited more than once, and the lectures can be taken remotely from the presenter. The disadvantages that the students faced through these courses included: weak structure and the need for more equipment. Future distance education could be produced as a podcast, which would allow students to view the educational materials on an iPod. This would allow students that are enrolled in these courses to have even more flexibility than before.

In a study conducted by Dr. Tim Murphy, titled *An Evaluation of a Distance Education Course Design for General Soils at Texas A&M*, compared distance, local, and traditional students. This study determined that students performed equally well regardless of the location or delivery method used for the course. Additionally, there was no significant differences in learner satisfaction between students collected with the instructor and the distance learners.

Students that participated in this course were asked to identify the most valuable aspects of the course and provide suggestions for improvement. Traditional students found that taking the lab along with the class was extremely helpful and believed the lab should be required for everyone. It was noted that students enrolled in this course as a traditional students were given the option of participating in lab sections. It was determined that enrollment in the laboratory sections failed to contribute significantly to the achievement of students in these sections.

Local students were attendants that lived in the area where the course was being offered, but chose to take the class online instead. These students said, “The video lectures worked well with my schedule, and watching the lectures on video – the videotape can replay missed info.” The only suggestion provided by the local students was: “I would not recommend the video section to someone who has a hard time studying on their own.” The third section of students observed through this study included the distance students. One student in this category said, “I recorded copies of the tapes so I could watch them over and over. I never would’ve understood the material by watching it once in the classroom.” One suggestion was to provide more communication with other students. This was not a problem among the local or traditional students, because they had a greater opportunity to interact through face-to-face communication. One way to solve this would be to mandate a videoconferencing section for both the local and distant students to attend, and offer an online discussion that is available for all groups.

The level of satisfaction for the students was determined by using a five-point Likert scale. The results indicated a significant difference between the distant and the other two sections (local and traditional). The distant education students rated the course a 3.74, traditional students rated it a 4.49, and local students a 4.54.

Extraneous Variable - Teaching Strategies

“It is the teacher’s responsibility to create the conditions in which understanding is possible, and the student’s responsibility to take advantage of that” (Laurillard, 2002, p. 1). Laurillard (2002) states that teaching strategies need to address the following three

aspects of the content within the students' learning experience: conceptions of the topic, representational skills, and epistemological development. The authors also addresses how each teaching strategy needs to assist the students in the process of learning, which included: apprehending the structure of academic discourse, interpreting forms of representation, acting on descriptions of the world, using feedback, and reflection on the goals. The above teaching points combined with the teaching strategy "...are the principal empirical basis for generating a teaching strategy" (Laurillard, 2002, p. 63).

Laurillard (2002) stated that when incorporating a teaching strategy into a curriculum the primary focal point needs to be the learning objectives that have already been established for that course. An analysis of what the student learned through this process is also vital so the teacher is able to know if the objectives were reached. The author also notes that it is important to address the students' learning needs. There is an insufficient amount of research on effective teaching strategies due to the fact that there are so many variables that can possible effect the outcome.

The use of technology in the classroom as a teaching tool has been an evolving concept. Some forms of media used in the past include the audiocassettes, television, video, and digital versatile disc (DVD). The common aspect that all of these technology enhanced teaching strategies share among one another is they are non-interactive. This is a feature in the educational system that Socrates recognized as a failing aspect and he emphasized the conversational framework into the classroom (Laurillard, 2002).

The requirements of the Conversational Framework suggest that if the narrative presentational media are to move beyond the limits of the solemnly silent, uninterrogatable text to meet the demands of the learning process, then they have to structure the narrative to engage the learner in reflecting and articulating at the discursive level, and in playing some vicarious part in adapting and acting at the experiential level (Laurillard, 2002, p. 92).

When implementing the non-interactive teaching strategy into a course it is important to explain to the students what they are meant to learn, and they need to develop a sense of when they have achieved what is expected (Laurillard, 2002). An educator that addresses these points will be attending to the missing non-interactive aspect, but there will still remain a lack of interactive availability.

The audiocassette was the first medium implemented into the classroom. Laurillard (2002) stated that when using this type of medium, students had difficulties browsing and using the index features. Additionally, this form of medium takes advantage of only the auditory channel only, and provides the student with nothing for them to focus visually on. “This is a highly efficient medium in terms of material covered” (Laurillard, 2002, p. 98). However, if the material is being learned, this method is less efficient. “Unless the material is unchallenging, it requires a considerable feat of memory to sustain an understanding of the full meaning until it can be reflected upon and tied into other activities at a later stage” (Laurillard, 2002, p. 98).

The television was the next form of medium incorporated into the classroom. This form of medium “...provides a vicarious experience through dynamic sound and vision, and uses a number of technical devices to manipulate that experience” (Laurillard, 2002, p. 99). Laurillard (2002) does also note that television should not be seen as a primary

way of transmitting information. “It is not controllable, so the viewer is too easily swamped with information” (Laurillard, 2002, p. 100).

Another form of medium that has been used in the past and present for educational purposes is the recorded video. The primary contrast between television and video is that video is adaptive by the student (Laurillard, 2002). The video method allows the student to be self-paced (provides greater learner control), which allows the student to have a great enhancement of the content since they are able to implement in reflection time on what they are learning.

The DVD medium contains similar pedagogical properties to a videocassette, except it offers easier access to the content. This provides an even greater degree of learner control. However, one property that gives it an additional advantage over videocassette and television is it can be delivered through a PC. PC stands for personal computer, and refers to each person’s primary computing device. In this very specific mode there is possibility of student interactivity (Laurillard, 2002).

Most studies that compared video, audio, and a combination of these mediums discovered that there was an increase in the students recall ability (Kuzma, 1991). Regardless of the medium that is incorporated into the classroom, when “...students approach each new learning session in their course, they need to be oriented towards the ideas or skills they are about to encounter” (Laurillard, 2002, p. 200).

Study Related to the Independent and Dependent Variables

Research Regarding Effectiveness of iPod Usage in the Classroom

In August 2004, Duke University distributed 1,600 20GB Apple iPods and microphone attachments to first-year entering students (Carlson, 2004). It was noted that Duke decided to provide students with these devices because the university lagged behind in technology. These iPods were purchased specifically for educational purposes.

According to the article titled *Duke University iPod First Year Final Evaluation Report*, a total of 15 fall courses (628 students) and approximately 33 spring courses (600 students) incorporated the iPod into their courses. The main courses that took advantage of this digital device were foreign languages and music. Social sciences and humanities also found the technology helpful in teaching course content.

Duke found that the most commonly used feature on the iPod was the recording feature (60%). This feature allowed instructors and students to record and share verbal feedback. Other features that first-year students used included the music database and the hard drive for storage. Seventy-five percent of these students' reported using the iPod for at least one feature for a class or for independent studying.

The overall benefits from this process included the reduction of physical materials and less lab/library hours. Disadvantages discovered through this process were included challenges in integrating many systems for content storage, access, sharing, and distribution, as well as a lack of prior education on iPod functions among students and faculty. Students found an advantage of being able to multitask while studying. One

student at Duke said they used their iPod to read through key points within their notes and to listen back through the lectures.

When incorporating the iPod into the course faculty used the iPod instead of analog tape recorders or other digital recorders. Courses that were audio-intensive reported that the digital device increased the frequency and depth of student interaction. Faculty members used different formats and styles when incorporating this technology advancement into the classroom. Formats that were convenient and portable during this first-year process included .wav and .mp3. Some faculty used iTunes, allowing individual tracks to be customized for students.

Methods

Swanson (1988) stated that understanding why a person accepts or rejects computer technology has proven to be one of the most challenging issues within information systems research. Additionally, Mitroff and Mason (1983), and March (1987) determined that identifying the appropriate functional and interface characteristics to be included in end-user systems has proven to be more challenging and subtle than expected. The theory of reasoned action (TRA) was "...designed to explain virtually any human behavior". From this theory Davis (1986) developed the technology acceptance model (TAM), which is specifically designed to explain computer usage behavior. The purpose of incorporating TAM theory is to establish a relationship between the impact of external factors on internal beliefs, attitudes and intentions (Figure 2.3).

There are two beliefs stressed within the TAM theory, perceived usefulness and ease of use. Perceived usefulness pertains to an individual’s belief that the use of the system will increase performance. Perceived ease of use is focused towards the system being effortless for the individual when used. Both of these beliefs directly impact the individual’s attitude towards usage, and perceived usefulness also effects the behavioral intention to use the system. Attitude towards usage effects an individuals behavioral intention to use the technology, which establishes a persons actual use of the system. The researchers for this study opted to use several tests in order to develop greater understanding of the students actual iPod usage.

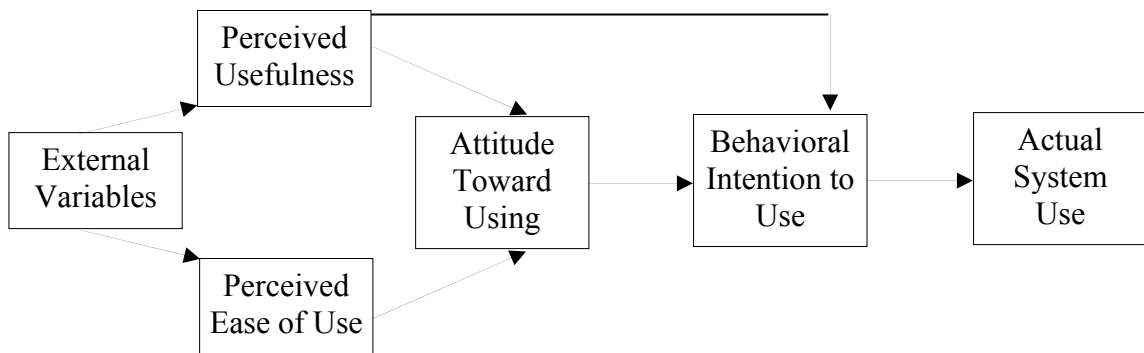


Figure 2.3. Technology Acceptance Model.

California Critical Thinking Disposition Inventory

According to 1990 Dephi consensus report:

The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit.

Facione and Facione (1992c) stated that there is a core set of cognitive skills when a person is engaged in critical thinking, including: analysis, interpretation, inference, explanation, evaluation, and self-regulation. The California Critical Thinking Disposition Inventory (CCTDI) purpose is to measure a person's disposition towards critical thinking. The CCTDI analyzes seven different areas. The first is truth-seeking. Facione and Facione (1992c) said that people that are truth-seekers are "...eager to seek the truth, courageous about asking questions, and honest and objective about pursuing inquiry even if the findings do not support one's interest" (p.2). Open-mindedness concentrates on how respectful and sensitive a person is towards another's opinions and views. "The analyticity scale targets the disposition of being alert to potentially problematic situations" (Facione & Facione, 1992c, p.3). Being organized, orderly, focused, and diligent are all identities of a persons' systematicity. "The ct (critical thinking) self-confidence refers to level of trust one places in one's own reasoning processes" (Facione & Facione, 1992c, p.3). The fifth area of CCTDI is inquisitiveness, which is a measure of a person's intellectual curiosity. Finally there is maturity, which "...targets how disposed a person is to make reflective judgments" (Facione & Facione, 1992c, p.3).

Computer Aptitude Tests

Evans and Simkin (1989) concluded that the cognitive process is an important factor in determining the prediction of people's computer proficiency. It was also noted that the emergence of cognitive styles was also a statistically significant factor. Additionally, they stated that students with the same background and education will have different computer aptitudes. Evans suggested that educational treatment, which would be computer training, may be important. Some cognitive psychologists argue though that computer proficiency is more directed towards a specific group of people, instead of prior training or experience (Mayer, Dyck, & Vilberg, 1986; Webb, 1984). Evans and Simkin (1989) noted that there is not a single set of variables (demographic, behavioral, cognitive, or problem solving) that dominate other traits as being the best predictor of students' computer proficiency. Instead researchers suggested that several of the factors from the selected four areas may be useful in predicting students' computer aptitude scores. Additionally, Compeau and Higgins (1995) conducted a test to determine computer self-efficacy, which is one's own belief to perform a certain behavior. The researchers concluded that a person's computer self-efficacy had a significant influence on individuals' outcome of using the computer.

Graduate Record Examination (GRE) – General Test

The Graduate Record Examinations (GRE) was established in 1966 (Guide to the Use of Scores, 2006). This test is administrated computer-based and is offered in the U.S., Canada, and many other countries. This examination is used in order to determine

the cognitive abilities of prospective graduate students. There are three different areas measured within the GRE. The verbal section measures the students "...ability to analyze and evaluate written material and synthesize information obtained from it, to analyze relationships among components parts of sentences, and to recognize relationships between words and concepts" (Guide to the Use of Scores, 2006, p. 4). The analytical section evaluates a person's mathematical abilities and understanding through reasoning and problem solving. In this section the GRE establishes a balance among arithmetic, algebra, geometry, and data analysis (Guide to the Use of Scores, 2006). The analytical writing section evaluates a person's critical thinking and analytical writing skills. This section assesses "...the ability to articulate and support complex ideas, analyze an argument, and sustain a focused and coherent discussion" (Guide to the Use of Scores, 2006, p. 4).

The verbal and quantitative sections are adapted to each test taker. The selection of questions is tailored towards the test takers ability level in each of the measurements. The system selects the test takers questions through a process, which analyzes the statistics of the previously answered questions. There is a required variety of questions that each test taker must complete, along with appropriate coverage of the content (Guide to the Use of Scores, 2006).

Group Embedded Figures Test (GEFT)

The Group Embedded Figures Test (GEFT) is a modified version of the Embedded Figures Test (EFT). "The subject's task on each trial is to locate a previously

seen simple figure within a larger complex figure which has been so organized as to obscure or embedded the sought-after simple figure” (Witkin, Oltman, Raskin, & Karp, 2002, p. 1). The original version of this test was developed by Herman A. Witkins twenty years ago. This test was designed to be used on subjects from ten years of age and up (Witkin, Oltman, Raskin, & Karp, 2002). The EFT is a modification of the work first done by Gottschaldt. The test screens for a person field-dependence dimension.

“The most widely described cognitive styles (of learning) within agriculture education are field dependence and field independence” (Talbert, Vaughn, Croom, & Lee, 2007, p. 226). Field-dependent learners tend to see a pattern as a whole instead of separating out the individual elements. These specific learners tend to learn best within social type situations that involve interactions. Additionally, field-dependent learners prefer the teacher to provide the instruction through a structured and organized manner (Talbert, Vaughn, Croom, & Lee, 2007).

The field-independent learners can see individual elements of a pattern. Students that are field-independent learners tend to be more analytical and prefer to work individually. Field-independent learners prefer to incorporate in their own structure and organization when learning (Talbert, Vaughn, Croom, & Lee, 2007).

Witkin, Moore, Goodenough, and Cox (1977) stated that field-dependent students:

“...favor educational-vocational areas in which others in a central feature and in which the subject matter of the discipline features human content, and the tendency of the field-independent students, on the other hand, to favor areas that are more solitary in their requirements are more abstract in their substantive content” (p.13).

Witkin et al. (1977) further stated that:

“ Field-dependent students are more likely to have difficulty learning information that requires them to establish their own mediation styles, and they will need more explicit instruction in problem solving strategies” (p.25).

The GEFT was designed to be administrated to a broad age range. The current GEFT is very closely related to the original EFT with 17 of the 18 complex figures that were directly taken from first test. The GEFT was created by Philip K. Oltman, Evelyn Raskin, and Herman A. Witkin. This test was designed specifically to provide a group test, because the EFT is often impractical when large numbers of subjects are being tested.

The GEFT was first created from 32 originated questions. Twenty-four of these questions were from the original EFT test form and eight were established from the Gottschaldt test. The 32 items were arranged within two parallel forms, each containing 16 items. A correlation coefficient was established for each of the 16 items. After this was completed one item was discarded because it presented serious scoring problems. Additionally, two items were deleted. One of the two items was replaced with another item that was apart of the original pool. This was done in order to establish a more efficient distribution of item difficulty. These 18 remaining items were divided into two equivalent forms, which would permit estimation of reliability coefficients (Witkin, Oltman, Raskin, & Karp, 2002). The five minute time limit was implemented into both sections two and three based on the pre-test “...for our college samples, this time limit permitted a portion of subjects to attempt every item and also yielded a normal-appearing

frequency distribution with a wide range of test scores” (Witkin, Oltman, Raskin, & Karp, 2002, p. 20).

Summary

Students who participated in this study completed the computer aptitude test, the Group Embedded Figures Test, and the California Critical Thinking Disposition Inventory. Each instructor of the four selected courses also ranked the students performance in the course. The researcher collected the students GPA after the completion of the iPod semester and their Graduate Record Examination score. All of these results were correlated towards the students overall iPod usage as an educational resource, see Figure 2.4 to review the conceptual framework for this study. The participants in this study had the opportunity to use an iPod as an educational resource that incorporated this technology advancement into their curriculum. Therefore, the students’ attitudes and opinions on the use of the iPod was also determined.

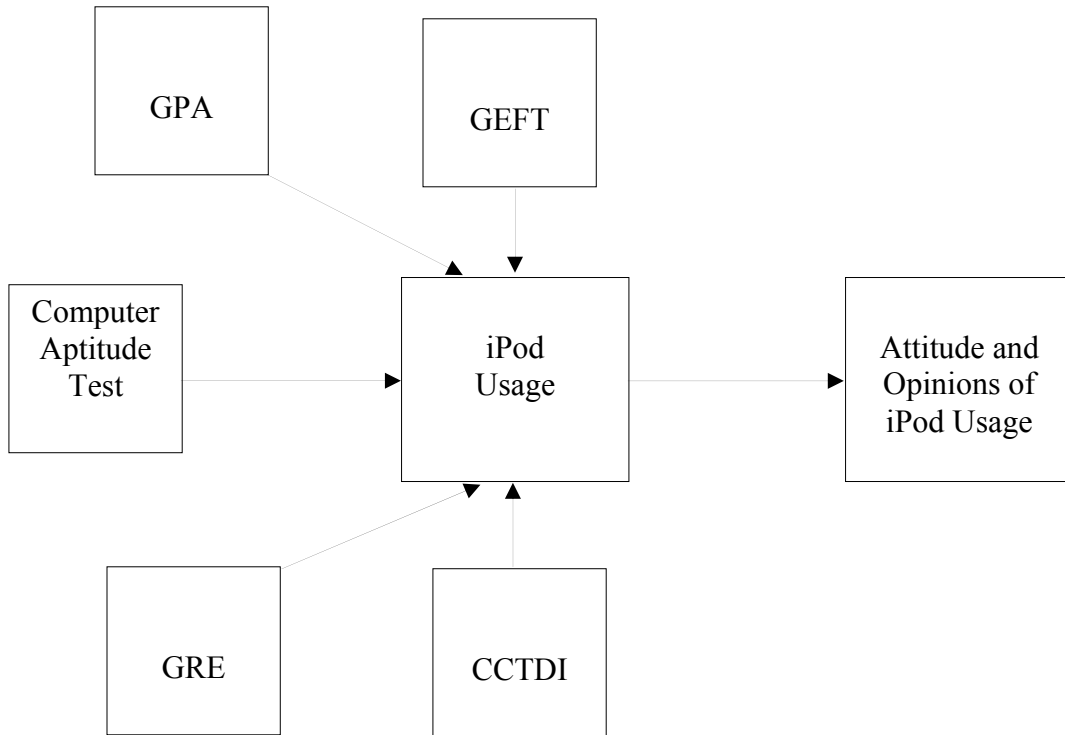


Figure 2.4. A Model of Conceptual Framework.

CHAPTER III
METHODOLOGY

Introduction

The purpose of this study was to determine the impact and effectiveness of different teaching strategies when incorporating the iPod into the classroom as an educational resource. This study took place at Texas Tech University, which is located in the Panhandle of Texas. Texas Tech University contains degree programs for undergraduate and graduate levels, for both traditional and non-traditional students. Additionally, the Doc-at-a-Distance students' were involved within this study, which are non-traditional doctoral students. Doc-at-a-Distance is a program that was developed by both Texas Tech and Texas A&M Universities. This program was established in 2000 with 20 students enrolled. In 2004, 14 more students joined the program, and in August of 2006, 19 students entered into the program (Joint Ed.D. in Agricultural Education, 2006). These Doc-at-a-Distance students participated within this study from their home site where they took the iPod enabled course. Traditional students' instruments were completed for this study during scheduled class time in order to decrease the threat of external validity, as well as to decrease the internal threat of mortality. Distance students were all monitored through web conferencing for the Group Embedded Figures Test, and the additional tests were completed on their own time.

This study took place within the Department of Agricultural Education and Communications in the College of Agricultural Sciences and Natural Resources. This

college is one of the original colleges on the university's campus which opened in 1925. A majority of the students that attend this college are from the West Texas area. The college is among the 30 largest programs of Agricultural Sciences and Natural Resources within the United States, offering an average class size of 29 students, and a faculty to student ratio of 13-to-1 (CASNR About the College, 2006). There are six different departments within this college, consisting of: Agricultural and Applied Economics, Animal and Food Sciences, Agricultural Education and Communications, Landscape Architecture, Plant and Soil Science, Natural Resources Management, and International Textile Center. There are a total of 14 bachelor's degrees, 20 master's degrees, and 8 doctoral degrees that can be obtained through this college (CASNR Facts & Statistics, 2006).

Researchers selected four courses to participants within this study. The four selected courses for this study consisted of a range of students, including traditional, local, and distance, as well as masters and doctoral students. Data for this study was collected in the Spring of 2007.

Research Design

This research study is a quantitative, quasi-experimental, non-equivalent design. Campbell and Stanley (1963) stated that "we regard the design as controlling the main effects of history, maturation, testing, and instrumentation" (p. 48). However, this study does not control all of these threats that were stated by Campbell and Stanley. Students within this study were selected through a non-random process. Each student self-selected

to enroll in one-of-the-four selected courses. All students received a treatment and no control groups were established. All students (100%) within this study completed all instrumentations that were implemented into this study. Mortality as a threat was controlled.

The students self-selected to enroll into the courses. The treatment groups were determined by the researchers. Campbell and Stanley (1963) stated that groups constitute naturally assembled collectives, such as classrooms. Therefore, regression was not a threat to this study, due to the non-selection process of the students. This study does offer more of a real world balance of a typically clinical design study since the students were self-selected. Additionally, this self-selected method creates more of a natural setting for the students, which allows the results to be more generalizable (Campbell and Stanley, 1963).

The treatment groups consisted of four groups including the following courses: ACOM 5307, AGED 5312, and AGED 7100 distance and traditional based. These courses will be described in further detail in the Population and Sample section. Data collection commenced at the beginning of the spring 2007 semester, when the students' received their iPods. The initial instrument, the computer aptitude test, was completed by the students during the first week of the semester. Students that never used the iPod as an educational resource were still encouraged to complete all instrumentations.

Population and Sample

The population for this study consisted of students enrolled in ACOM 5307, AGED 5312, and AGED 7100 distance and traditional based, established within the Department of Agricultural Education and Communications under the College of Agricultural Sciences and Natural Resources at Texas Tech University. These four courses are a representative of graduate courses in the department. A majority of the student participants were agriculture majors, which creates some possible discrepancies between the accessible and the target population. Additionally, a majority of the students had established a degree program within the Department of Agricultural Education and Communications.

The first treatment group that ACOM 5307, formally known as Methods of Technology Change. This course contained 19 distance students and three on-campus, traditional students. The teaching strategy for this course was to have the iPod resources available for the students. The resources for this course consisted of each lecture recorded in real time. These lectures were recorded with a digital video camera, and the audio was later synced with the PowerPoint slides within the Microsoft Presenter program.

AGED 5312, Assessing Program Effectiveness was the second treatment group. This course had a total of 21 students enrolled in it. All of the students enrolled in this course were masters level, on-campus students. The podcasts designed for this course were created with a specific purpose of supplementing prior readings before each class session. These podcasts were created in the program Camtasia, and consisted of

PowerPoint slides with accompanied audio. There were a total of six podcasts for this treatment group.

The third treatment group was AGED 7100 traditional based, Graduate Seminar. There were a total of 13 traditional, master level students enrolled in this course. The fourth treatment group was AGED 7100 distance based. There were a total of six students enrolled in this course. Four of the students were considered local students, with three of them being classified as doctoral students. The other two students were considered to be distance students, and both were classified as masters level students. One distance student resided in Missouri and the other in South Texas. Podcasts provided in this course were required for the students to view. This course met during its scheduled class time for half of the semester. However, the lectures each week were posted for the students to download and view. Distance students would attend class via satellite once a month and local students only received course content through the podcasts. Students enrolled in this course took weekly quizzes on each of these lectures. These lectures were produced using the Avid program. Students that viewed this course's podcasts would see alterations between a view of the presenter and the PowerPoint slide. There were a total of 12 podcasts produced for this course.

Instrumentation

Establishing validity and reliability are important aspects when implementing an instrument. Fraenkel and Wallen (2006) stated that the most important item to consider when preparing an instrument for your study is validity. Validity has been defined by

researchers as “appropriate, meaningfulness, and usefulness of the specific inferences made from test scores” (Fraenkel & Wallen, 2006). Validity determines if the instrument actually measures what it intends to measure. The computer aptitude tests measured the students’ prior knowledge of computers. The Group Embedded Figures Test allowed researchers to determine if each student was either a field-independent or field-dependent learner. The California Critical Thinking Disposition Inventory established the depth of each students’ critical thinking skills. The researcher-designed instrument that was given at the end of the semester determined the students’ usage of the iPod, prior technology experience, attitude and beliefs towards the iPod, and demographics.

Reliability on the instruments was also established within this study. Reliability is “how much measurement error is present in the scores yielded by the test” (Gall, Borg, & Gall, 1996, p. 254). In other words reliability is how consistent the scores obtained are for each individual, and from one individual to the other. The way the researchers established the reliability for this study is discussed in further depth later in this section.

California Critical Thinking Disposition Inventory

Students were given the California Critical Thinking Disposition Inventory (CCTDI) at the end of the semester. Facione and Facione (1992c) stated that the CCTDI is intended to analyze a person’s disposition towards critical thinking. Students were allotted adequate time to complete this instrument. Students answered a total of 75 questions on a 6-point Likert type scale. Data from this instrument was categorized by

seven categories: truth-seeking, open-mindedness, analyticity, systematicity, CT (critical thinking) self-confidence, inquisitiveness, and maturity.

The Cronbach's alpha for the overall test was 0.91. Each of the seven categories also received a reliability score, truth-seeking with 0.71 ($M = 0.42$), open-minded with 0.73 ($M = 0.41$), analyticity with 0.72 ($M = 0.39$), systematicity with 0.74 ($M = 0.46$), self-confidence with 0.78 ($M = 0.53$), inquisitiveness with 0.80 ($M = 0.50$), and maturity with 0.75 ($M = 0.47$).

Each of the category scales had a range score of 10-to-60. Facione and Facione (1992c) explain that a positive cut score on the CCTDI for each category is 40, and 50 is the suggested target score. If a person scores above 50 within a category they are considered strong within that dispositional aspect. A score that falls below 40 is considered weak. Scores between 30-to-40 express that the individual possess different feelings within this category. Students that score below 30 within a category are negatively disposed within that critical thinking dispositional aspect. "Any individual score below 30 should be considered a significant weakness" (Facione and Facione, 1992c, p. 13).

Facione and Facione (1992c) stated that:

"It should not be presumed that an individual who scores well on any given CCTDI scale can be predicted to have strong scores across all seven CCTDI scales. Individuals frequently show significant strength on several of the individual scales and significant weakness on several other scales" (p. 13).

The students overall critical thinking score was provided through this testing process. The range was 70-to-420. Students who achieved a score of 350 or more

indicated a broad strength in the disposition toward critical thinking. “An overall score of less than 280 could be used as a cut-off indicator of overall deficiency in the disposition toward CT (critical thinking)” (Facione and Facione 1992c, p. 13). Scores that are between 210-to-280 indicate that the participants possess different feelings towards critical thinking. Overall scores that fall below a total of 210 indicate to researchers a significant opposition towards critical thinking.

Computer Aptitude Test

The initial test given to each student was the computer aptitude test. McKeachie and Svinicki (2006) state that it is important to assume that not all students have had the same exposure and access to the implemented course technology. “You can conduct a brief survey at the beginning of the semester to find out where your students stand” (McKeachie & Svinicki, 2006, p. 237). The computer aptitude test that the researchers opted to use for this study was used for similar purposes. This test as defined by Compeau and Higgins (1995) determines computer self-efficacy which is one’s own belief to perform a certain behavior.

The web-based computer aptitude skills test offered by *ExpertRating*, an ISO 9001-2000 certified company. This test is certified which is the only information that was obtainable in regards to validity and reliability of the test. This company offers online certification and training to individuals and companies in over 60 countries. The test that was used is located at the following web address: expertrating.com/Computer-Skills-test.asp. Data from this instrument determined each student’s skill level on the computer

within the following subcategories: (1) computer hardware, (2) computer settings, (3) computer software, (4) computer terminology, (5) e-mail, (6) Internet, (7) keyboard usage, (8) networking, (9) Windows, as well as their overall computer aptitude test score. The highest possible score that a participant could achieve on this score was 100.

Graduate Record Examination (GRE) – General Test

The Graduate Record Examination (GRE), the General Test, is used in higher academic settings to serve as a moderate predictor for graduate students' first-year grade point average (Guide to the Use of Scores, 2006). Each participant's GRE score was collected from university records. Both the verbal and quantitative sections of the test were used, because these sections are intended to contain a reliability of a minimum of 0.90 and above. Both sections were added together in order to establish each student's overall score.

Reliability for this test was established from July 1, 2002 to June 30, 2005 test scores. There were a total of 1,245,878 test takers within the verbal section. This section is reported on a scale of 200-800, with 10-point increments. This section obtained a mean score of 467, with a standard deviation of 118. There were a total of 1,245,182 test takers within the quantitative section. This section of the test is also reported on a scale of 200-800, with 10-point increments. This section established a mean score of 591, with a standard deviation of 148 (Guide to the Use of Scores, 2006). Combining the two sections the average total score would then be 1058.

The GRE separates test takers by intended graduate majors allowing administration to compare means and standard deviations for individuals in the same field of concentration. A total of 10,018 individuals completed the verbal section and listed agriculture as their intended graduate major. The mean for these students in this section was 458, with a standard deviation of 99. The other agriculture section, quantitative, had a total of 10,017. On the quantitative section, the test takers within this concentration area obtained a 592 with a standard deviation of 119 (Guide to the Use of Scores, 2006).

Group Embedded Figures Test (GEFT)

There are three sections within the Group Embedded Figures Test (GEFT). The first section is not included in the student's score. "Experience has indicated that college subjects rarely make errors on the first section" (Witkin, Oltman, Raskin, & Karp, 2002, p. 20). The participants are given two minutes to complete this section. Then they are allotted five minutes for each section two and three.

Preliminary norms that are currently available are based on findings for men and women college students within an eastern liberal arts college. "Men performed slightly but significantly better than women" (Witkin, Oltman, Raskin, & Karp, 2002, p. 21). There were a total of 155 men that took part in this study, which obtained a mean score of 12.00 (SD = 4.10). A total of 242 women participated within this study and obtained a mean score of 10.80 (SD = 4.20). Since the GEFT is considered a speed test the reliability is established by correlating the second section 9-items to the third section 9-items scores. Kepner and Neimark (1984) stated that the GEFT is a reliable measure that

follows test-retest data form. A reliability estimate was established of 0.82 for both males ($N = 80$) and females ($N = 97$). “These reliability estimates compare favorably with those of the EFT (Embedded Figures Test)” (Witkin, Oltman, Raskin, & Karp, 2002, p. 21).

Students that scored between a 7-to-18 on the GEFT are classified as field-independent learners. A student that scores an 18 is considered to be an extreme field-independent learner. Students that score between 0-to-6 are classified as field-dependent learners. Extreme field-dependent learners obtain a 0 on the GEFT.

Instructor Questionnaire

Each instructor of the four iPod courses was provided with a one page questionnaire for each of the students enrolled in the course after each of the iPod implemented courses were completed that semester. The primary researcher informed the instructors to rank each student while comparing them to all of the other students that were enrolled in the course that semester. There were a total of five questions used to describe the students performance in the course. The questions included: punctuality, commitment, performance, attitude, and professionalism. Each of the questions were answered on a 10-point Likert type scale, with 1 = being the worst within that characteristic and 10 = being the best within that characteristic. This instrument can be seen in Appendix D. Face validity was determined on this instrument by the researchers. Reliability was not established due to limited time prior to distribution of the instruments. This instrumentation was therefore classified as a post-hoc.

Researcher-Developed Attitude and Opinion Instrument

In order to measure student attitude, prior usage with technology, and iPod usage, the researcher created an instrument to be completed by the participants in each treatment group (Appendix B). The pilot test was conducted during the fall 2006 semester. There were three different treatment groups, a total of 69 students, were used for this. Researchers were able to establish measurement error and edit unclear questions found within the instrument.

Section A collected data on the participants use of the iPod. This section contained 21 questions regarding usage of the iPod for educational purposes throughout the semester, including: (a) how often did you download podcasts, (b) how many podcasts did you listen to, and (c) how important was the iPod as an educational resource. Additionally, questions on how students used the iPod outside of the course were also included.

Section B was for non-iPod users, which included all students that chose not to use the iPod. This section contained three questions to determine if the students attempted to use the iPod and challenges they encountered.

Section C established the students' attitudes and opinions towards the use of the iPod in the course. This section contained 19 statements using a 6-point Likert type scale. The Likert-type scale consisted of: 1 = very strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, and 6 = very strongly agree. There were five different areas that were examined within this section of the instrument, including: accessibility, perceptions of faculty enjoyment, technology and learning preferences,

satisfaction, and use of technology in the classroom. A Cronbach's alpha of 0.91 was determined within the pilot test.

Section D pertained to the student's past and current technology usage. There were a total of 20 questions in this section. This section was broken-down into three sub-sections which helped researchers establish how students have used technology in the past, and how they currently use it for both educational and non-educational purposes. The sub-sections that the researchers used within this section include: computer use, Internet use, and iPod use.

The final section of the instrument was composed of demographic questions. This section helped researchers establish a greater understanding of the participants. Basic demographics were obtained from this section, including: gender, age, ethnicity, financial status, and student classification.

There were nine additional 10-point Likert questions located in sections A, B, and D. Cronbach's alpha of 0.59 was established for these questions. Researchers reworded these questions in order to increase the reliability. A panel of experts in the Department of Agricultural Education and Communications determined the content and face validity of this instrument.

Data Collection

This study occurred during the Spring 2007 semester. Researchers felt that the incentive for the students' to participant within this study was allowing them to use an iPod for the entire semester. The study was approved by the Institutional Review Board

for the Protection of Human Subjects at Texas Tech University (Appendix A). The students enrolled in ACOM 5307, AGED 5312, and AGED 7100 distance and traditional all met with the researcher within one of the first class meetings in their classroom. During the first initial visit the students were given an iPod and provided with a link to the computer aptitude test. They were also informed during this time that responses to the instruments and their usage of the iPod would not impact their grade in the course. They were asked to conduct themselves in a normal manner in order for researchers to yield true results. The researcher collected the scores on the computer aptitude test during the first weeks of classes.

During the first initial meeting, the researcher taught the students how to use the iPod, how to import the podcasts into their library, and how to upload the podcast from their library to their iPod. Students were informed if the podcasts for their course were going to be required, available, or suggested educational content. They were also informed of contact information in case of possible technical problems that they might encounter. The researcher provided the students with podcasts for their course throughout the entire semester. The number of podcast and when they were uploaded onto the provided site for the students varied for each course, due to the course content and the instructor's attitude towards the use of technology in the classroom. The actual podcast style also varied, which included: streamed lectures, how to do tutorials, PowerPoints with audio, and presentations that alternated between a talking head of the presenter and the PowerPoint slides.

At the end of the semester several instruments were administrated and collected. Packets that contained all of the instruments for the Doc-at-a-Distance students were mailed on April 12, 2007. The packets included the GEFT test located inside a smaller envelope that stated "Do Not Open" on it; the California Critical Thinking Disposition Inventory and scantron; the researcher-designed instrument; an iPod usage answer sheet (for students to personally mark their iPod usage); and a self addressed stamped return envelope to the primary researcher; and a letter with instructions pertaining to the instruments (Appendix C). These students brought their packets of information with them to class, ACOM 5307, on April 18, 2007. During this time the researcher timed the GEFT and then instructed the students to complete the other instruments and mail them back to the primary researcher. This is a possible threat to this study as students were instructed to return their packets of completed information to the researcher by May 15, 2007. However, the researcher did not receive all information from the students until June 25, 2007. A history threat occurs when there is a longer time between measurements. The traditional students enrolled in this course also completed the GEFT at this time, and one of the local students enrolled in AGED 7100 took part in this testing procedure.

Both AGED 7100 courses completed all instruments (GEFT, CCTDI, and the researcher-designed iPod instrument) on April 25, 2007, during the scheduled class time. Students also turned in their iPods. The two distance students enrolled in this course each received packets of instruments that were also mailed on April 12, 2007. These students participated within the testing procedures during this class period. The distance students

were then asked to mail back all the instruments to the primary researcher, along with their provided iPod.

On May 1, 2007 AGED 5312 completed all of the instruments (GEFT, CCTDI, and the researcher-designed iPod instrument), during the scheduled class time. Three of the local students that were enrolled in AGED 7100 also took part in the testing procedures at this time. All students also returned their iPods to the researcher at this time.

Each instructor for the three selected iPod courses were provided with a questionnaire to fill out pertaining to each student enrolled in the course (Appendix D). The instructors were given the instruments on May 3, 2007 and they were all returned within two weeks after being distributed.

Once all of the iPods were collected, the primary researcher observed each and every iPod to determine how each student used the iPod for educational purposes and for other reasons. The researcher viewed which podcasts for the course were downloaded, if any, and if the podcasts was even viewed. The researcher was able to determine if a podcasts were viewed by observing if a blue dot was present next to the podcasts name within the list of available podcasts on the student's iPod. The researcher reported a 0 = podcast not present; 1 = podcast downloaded but not viewed; 2 = podcast downloaded and viewed. If a blue dot was present the researcher marked the podcasts as being downloaded but not viewed. Additionally, the primary researcher observed further uses of the iPod, which included: (a) number of songs, (b) number of videos, (c) number of photos, (d) and the total number of GB filled.

There were additional scores that the primary researcher obtained on each of the students. Each student's GPA after the completion of the semester that this study was obtained which allowed the iPod implemented course to be incorporated into their GPA score. The researcher also obtained the student's GRE score that was used when applying for Texas Tech University. If more than one score was recorded for a student than the highest total score was the one that was used.

All of the instruments that were collected were also graded and entered at this time. The researcher hand graded the Group Embedded Figures Test. The researcher-designed instrument and the instructor's student rank were coded and entered into an Excel spreadsheet. The California Critical Thinking Disposition Inventory scantrons were mailed to the testing company. These tests were graded and results were mailed back to the researcher. The data collected for each of these instruments, as well as with the computer aptitude tests, GRE score, GPA, and student's iPod usage were all imported into SPSS.

Analysis of Data

Participants completed the computer aptitude test through the Internet provided site. They marked their responses on the researcher-designed instrument and the Group Embedded Figures Test, and their responses were marked on scantrons that the Insight Assessment had provided for the California Critical Thinking Disposition Inventory instrument. Each instructor for each treatment group also completed a paper instrument that pertained to each student within the treatment group. Data from these instruments

was collected and entered into a Microsoft Excel® spread sheet. The data was then imported into SPSS for Windows (Version 13). All data was analyzed and evaluated using the statistical software program, SPSS/PC. Numerical values were given for each of the variables on the researcher-designed instrument.

Demographic information was calculated using interval variables, mean, standard deviation, and range. This was used to calculate: current age, age when the students first used a computer, and age of when the students first used the Internet. Frequencies were calculated on the categorical variables. Categorical variables included: ethnicity, gender, academic standing, students additional uses of the Internet, students prior purchase of technology advancements, podcast availability, students downloading habits, and students iPod viewing habits.

Additionally, all “yes” and “no” questions and Likert type items that were collected on the researcher-developed instrument were evaluated using frequencies.

Pearson product-moment correlations were conducted on students’ iPod usage to their computer aptitude, Group Embedded Figures Test, California Critical Thinking Test, and the instructor’s rank on the students.

Summary

This study occurred during the Spring of 2007 semester which is when the three courses implemented the use of the iPod as an educational resource for the students. Students were provided with iPods to use the entire semester during the one of the first class meetings. The students completed the computer aptitude test within the first half of

the semester, which allowed researchers to observe the students current standing towards technology usage. Students were provided with educational resources throughout the entire semester, which varied based on the course they were enrolled in. At the end of the semester a majority of the students returned their provided iPod to the researcher, and all of the students completed the three instruments incorporated into this study. Students GPA, GRE score, and instructor's student rank were also gathered. All data was coded and stored in an SPSS database for analysis in order to answer the research questions in this study.

CHAPTER IV
FINDINGS AND RESULTS

Appropriate statistics were calculated in order for researchers to establish findings on the student iPod participants as a whole and to view each treatment group which included: ACOM 5307, AGED 5312, and AGED 7100 as both traditional and distance based. There were a total of 22 students in ACOM 5307 (35.5%), 21 students in AGED 5307 (33.9%), 13 students enrolled in AGED 7100 traditional setting (21%), and six (9.7%) students were classified as distance students enrolled in the AGED 7100 course. Therefore there were a total of 62 participants within this study.

Results Related to Objective One

1. Determine demographics of iPod users.

The first demographic characteristic that was established was age. The age range of the students ranged 30 years, with the youngest student being 22 and the oldest being 52. Students that participated within this study average age was 30 ($SD = 8.23$), see Table 4.1. ACOM 5307 contained the highest mean for age, which was 36.18 ($SD = 7.49$). The treatment group that contained the lowest mean for age, 24 ($SD = 1.51$), was AGED 7100 traditional based.

Table 4.1

Age of Student iPod Participants (N = 62)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>
ACOM 5307	22	36.18	7.49
AGED 7100 (distance)	6	30.00	4.94
AGED 5312	21	27.48	8.02
AGED 7100 (traditional)	12	23.54	1.51
Overall	61	29.98	8.23

The next set of demographic characteristics that the researchers established included students ethnicity, gender, and academic standing. The majority of the students were Caucasian ($n = 54$), see Table 4.2. Thirty-two of the students were reported as male, leaving 48.4% of the students being female. The majority of the students were master level students (64.5%), with the remaining 22 students being doctoral level graduate students. The treatment groups that contained the most doctoral level graduate students were ACOM 5307 ($n = 17$) and AGED 7100 distance based ($n = 3$).

Table 4.2

*Frequency of Overall Student iPod Participants' Ethnicity, Gender, and Academic**Standing (N = 62)*

Demographic	Frequency (<i>f</i>)	Percent (%)	Mode
Ethnicity			Caucasian
Caucasian	54	87.1	
Hispanic	3	4.8	
African-American	3	4.8	
Native-American	2	3.2	
Gender			Male
Male	32	51.6	
Female	30	48.4	
Academic Standing			Master Level
Master Level	40	64.5	
Doctoral Level	22	35.5	

The ACOM 5307 ($n = 22$) treatment group ethnicity demographic was predominately Caucasian ($n = 17$), see Table 4.3. There were also three students that reported they were African-American, one student was Hispanic, and one student's ethnicity was Native-American. Several of the students were male ($n = 14$), and 19 students reported that their academic standing was doctoral level.

Table 4.3

Frequency of ACOM 5307 Student iPod Participants' Ethnicity, Gender, and Academic

Standing (n = 22)

Demographic	Frequency (<i>f</i>)	Percent (%)	Mode
Ethnicity			Caucasian
Caucasian	17	77.3	
African-American	3	13.6	
Hispanic	1	4.5	
Native-American	1	4.5	
Gender			Male
Male	14	63.6	
Female	8	36.4	
Academic Standing			Doctoral Level
Doctoral Level	19	86.4	
Master Level	3	13.6	

Twenty of the students in the treatment group AGED 5312 ($n = 20$) reported their ethnicity as Caucasian, see Table 4.4. The remaining one student indicated that their ethnicity was Hispanic. Most of the student were female ($f = 13$), and all (100%) of the students stated that their academic standing was master level within this treatment group.

Table 4.4

Frequency of AGED 5312 Student iPod Participants' Ethnicity, Gender, and Academic

Standing (n = 21)

Demographic	Frequency (<i>f</i>)	Percent (%)	Mode
Ethnicity			Caucasian
Caucasian	20	95.2	
Hispanic	1	4.8	
African-American	0	0	
Native-American	0	0	
Gender			Female
Female	13	61.9	
Male	8	38.1	
Academic Standing			Master Level
Master Level	21	100	
Doctoral Level	0	0	

In the AGED 7100 traditional based ($n = 13$) treatment group 12 of the students indicated that their ethnicity was Caucasian, see Table 4.5. The remaining one student reported their ethnicity as Native-American. Seven of the students were female, leaving six students to be male. All students (100%) reported their academic standing as master level.

Table 4.5

*Frequency of AGED 7100 Traditional Based Student iPod Participants' Ethnicity,**Gender, and Academic Standing (n = 13)*

Demographic	Frequency (<i>f</i>)	Percent (%)	Mode
Ethnicity			Caucasian
Caucasian	12	92.3%	
Native-American	1	7.7%	
African-American	0	0%	
Hispanic	0	0%	
Gender			Female
Female	7	53.8%	
Male	6	46.2%	
Academic Standing			Master Level
Master Level	13	100%	
Doctoral Level	0	0%	

Five of the students in the treatment group AGED 7100 distance based ($n = 6$) stated that their ethnicity was Caucasian, see Table 4.6. The remaining one student replied that their ethnicity was considered to be Hispanic. Majority of the students were male ($n = 4$). One-half ($n = 3$) of the students enrolled in this treatment group reported that their academic standing was master level ($n = 3$).

Table 4.6

Frequency of AGED 7100 Distance Based Student iPod Participants' Ethnicity, Gender, and Academic Standing (n = 6)

Demographic	Frequency (<i>f</i>)	Percent (%)	Mode
Ethnicity			Caucasian
Caucasian	5	83.3%	
Hispanic	1	1.7%	
African-American	0	0%	
Native-American	0	0%	
Gender			Male
Male	4	66.7%	
Female	2	33.3%	
Academic Standing			---
Master Level	3	50%	
Doctoral Level	3	50%	

Majority ($n = 42$) of the student iPod participants ($N = 62$) reported that they personally paid for 75-to-100% of their college tuition, see Table 4.7. Eighteen of the students indicated that they either personally paid for 0-to-24% or 75-to-100% of their college tuition. All students enrolled in the treatment group AGED 7100 ($n = 6$) distance based reported paying for 75-to-100% of their college tuition. AGED 5312 students ($n = 21$) contained the most students ($f = 4$) that stated they personally paid for 0-to-24% of their college tuition.

Table 4.7

Percent Students Personally Pay for College (N = 62)

Treatment Group	<i>n</i>	100-75%	74-50%	49-25%	0-24%
ACOM 5307	22	19	1	0	2
AGED 5312	21	11	6	0	4
AGED 7100 (distance)	6	6	0	0	0
AGED 7100 (traditional)	13	6	2	2	3
Total	62	42	9	2	9

Majority, 54 ($n = 59$), of the students enrolled in the iPod implemented courses were enrolled into these treatment groups as it was required for their major, see Table 4.8. With two students being in ACOM 5307 and AGED 7100 traditional based, and one AGED 5312 student reported that the course was not required for their major. Overall, students reported that the iPod implemented courses level of difficulty on a 10-point Likert type scale (1 = not difficult and 10 = very difficult) was a 6.02 ($SD = 1.91$), see Table 4.5. AGED 5312 was ranked as the most difficult course with a mean of 7.80 ($SD = 1.24$). The least difficult course was AGED 7100 traditionally based with a mean score of 4.92 ($SD = 1.76$).

Table 4.8

Difficulty of iPod Implemented Course (n = 61)

Treatment Group	<i>n</i>	Mean	Standard Deviation
AGED 5312	22	7.80	1.24
ACOM 5307	20	5.32	1.43
AGED 7100 (distance)	13	5.00	1.67
AGED 7100 (traditional)	6	4.92	1.75
Overall	61	6.02	1.91

Note: 1 = not difficult and 10 = very difficult

The student iPod participants study habits were established. Students within this study on average reported that they study 7.20 ($SD = 8.02$) hours weekly for a traditional course ($n = 27$), see Table 4.9. The range for the number of hours that a student spends studying for a traditional course was 2-to-40 hours.

Students ($n = 26$) also reported the number of hours they study weekly for a technology based course. The range for this variable remained the same as traditional based, however, the mean dropped to a 6.79 ($SD = 8.35$). ACOM 5307 and AGED 5312 reported the greatest number of hours for studying both in traditionally and technology based courses.

Table 4.9

Number of Hours iPod Student Participants Study Weekly Within Traditional and

Technology Based Courses

Treatment Group	Study Hours in Traditional Course		Study Hours in Technology Course	
	Mean	SD	Mean	SD
ACOM 5307	8.86	7.22	9.21	7.89
AGED 5312	8.85	11.45	8.89	11.99
AGED 7100 (dist)	5.60	3.13	3.40	1.14
AGED 7100 (trad)	3.20	0.84	3.00	0.71
Overall	7.20	8.02	6.79	8.35

Determining the students' prior usage of technology was also reported in order to establish a greater understanding of the demographics of the students that were studied. Students ($N = 62$) average age, to their best memory, of when they first used the computer on average was 12 years old ($SD = 6.93$), with a range of 4-to-44. ACOM 5307 ($n = 22$) obtained the highest average age of when they first used a computer with a mean of 14.78 ($SD = 8.20$), and a range of 4-to-44, see Table 4.10. The treatment group that accumulated the lowest average age as to when they first ever used a computer was

AGED 7100 traditional based ($n = 13$). This treatment group obtained an average age of 7.92 ($SD = 3.12$), with a range of 4-to-15.

Table 4.10

Age Student iPod Participants First Used a Computer (N = 62)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>	Range
ACOM 5307	22	14.77	8.20	4-44
AGED 7100 (distance)	6	12.67	2.66	8-16
AGED 5312	21	11.67	7.00	4-34
AGED 7100 (traditional)	13	7.92	3.12	4-15
Overall	62	12.08	6.93	4-44

Additionally, 60 ($N = 62$) of the students reported that they owned a computer. Fifty of these students reported that they owned a PC, while two students recorded that they had both a PC and a Macintosh. The two students that indicated that they did not have a computer did report though that they did have regular access to one.

Sixty students reported using the computer for educational purposes. Students also indicated how valuable the computer was when being used for educational purposes based on a 10-point Likert scale (1 = not important and 10 = very important). The researchers calculated a mean score of 9.35, with a standard deviation of 1.52 of how important the computer was to the student participants.

Fifty-three ($N = 62$) of the students reported that they had completed an instructional computer course (course that teaches students proficiently how to use Word, Excel, etc). Majority of the students (96.4%) indicated that the computer course

that they had completed was at a university. Six of the students that reported they had never completed a computer course were enrolled in ACOM 5307, and the remaining three were in AGED 5312. According to the students had completed a computer course 31% of the students reported that the last computer course they had taken was completed nine or more months ago, 26% of students said they took a computer course within 3-to-5 semester ago, 19% of students stated they were currently enrolled or had been enrolled in a computer course within the past two semesters, and 15% of students had taken a computer course within 6-to-8 months ago. Seventy-four percent of the students reported that they had received an “A” in their most recently completed computer course. Two students reported that they had received a “D”.

The Internet was another technology aspect that the researchers opted to observe. All participants (100%) reported that they use the Internet, and the also all indicated that they use the Internet for educational purposes. The Internet obtained a slightly higher mean ($M = 9.56$, $SD = 0.64$) of importance for educational purposes than computers did. This was also based on a 10-point Likert type scale (1 = not important and 10 = very important. Broadband was the most popular choice of Internet connection that students ($n = 61$) reported using when being used for education purposes, with three students stating that they use dial-up.

The average age among the student iPod participants of when they first used the Internet was 17.94 ($SD = 7.81$), with a range of 9-to-35, see Table 4.11. ACOM 5307 contained the highest age of first Internet users with 22.36 ($SD = 8.35$). The treatment

group that reported the youngest age of first using the Internet was AGED 7100 traditional based, with a mean of 12.77 ($SD = 2.20$).

Table 4.11

Age of Student iPod Participants When They First Used the Internet (N = 62)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>	Range
ACOM 5307	22	22.36	8.35	13-44
AGED 7100 (distance)	6	18.67	5.96	11-26
AGED 5312	21	16.29	7.70	9-38
AGED 7100 (traditional)	13	12.77	2.20	9-16
Overall	62	17.94	7.81	9-44

Note: ^a $n = 22$, ^b $n = 6$, ^c $n = 21$, ^d $n = 13$

Other than for educational purposes, researchers also established the student iPod participants ($N = 62$) additional uses of the Internet, and how often they took part in these practices. The most common activity that students use the Internet for daily was to email ($n = 58$), see Table 4.12. Two other very common activities the students reported they participate in on a daily routine included using it as a source for information ($n = 43$) and for social interactions ($n = 32$). The most common activity that 41 students reported they used the Internet for on a monthly bases was to purchase items. An activity that majority ($n = 44$) of students reported they never took part in was selling items.

Table 4.12

Students' Additional Uses of the Internet (N = 62)

Usage Type	Daily	Weekly	Monthly	Never
Email	58	4	0	0
Information	43	15	2	1
Social Interactions	32	5	2	23
Entertainment	17	8	16	19
Download music, etc.	13	17	21	11
Sell Items	1	0	15	44
Purchase Items	1	6	41	8

Fifty of the student iPod participants ($N = 62$) reported that they had taken a course that was completely online. Six of the 12 students that stated they had not taken an online course were apart of the AGED 5312 treatment group. Majority ($n = 48$) of the students reported they believed they would perform best within a course that was a combination of traditional and technology setting. Nine students stated they preferred a traditional setting, and the remaining five students indicated they would perform best in a completely technology based course. The treatment group AGED 5312 contained the most students ($n = 4$) prefer to have a traditional classroom setting.

Students' usage of the iPod and similar devices prior to the study was also determined. Fifty percent ($N = 62$) of the students reported they did have an iPod or similar device prior to the iPod implementation course study, see Table 4.13. Fourteen students ($n = 28$) indicated they would now purchase an iPod or similar device after using

it within this studied course. Additionally, 50% of the students also reported they had iTunes installed on their computer prior to the iPod implemented course. Twenty-six of the students that reported they did not have iTunes installed on their computer prior to the study did now have it installed at the completion of this semester.

The most common device the students ($n = 31$) already owned prior to this study was a MP3 Player ($n = 11$) and a Nano ($n = 10$), as well as 5% of the participants had a iPod was a music only device. Additionally, four students reported they had more than one of the convenient technology advancements.

Table 4.13

Students' Prior Purchase of iPod or Similar Devices Before Study (n = 31)

Device/s	Frequency (f)	Percent (%)
MP3 Player	11	17.70
Nano	10	16.10
iPod (music only)	5	8.10
Video iPod	1	1.60
iPod (music only), Nano, MP3 Player	1	1.60
Nano & MP3 Player	1	1.60
iPod (music only) & MP3 Player	1	1.60
Video iPod & MP3 Player	1	1.60

Student iPod participants' computer aptitude test score were obtained in order to determine students' self-efficacy with technology prior to this study. The highest score a student could obtain on the computer aptitude test was a 100. Overall the average score

for the students ($N = 62$) on this test was a 63, with a standard deviation of 11.39, see Table 4.14. The test used provided the students with a 100% possible score for each of the seven subcategories that were also incorporated into this study. The subcategory students overall obtained the highest mean score on was computer software ($M = 88.34$). The subcategory the students ranked the lowest on was computer hardware ($M = 41.68$).

All four treatment groups overall mean score on the test were very similar. Some of the treatment groups did though excel in some of the subcategories over the other groups. ACOM 5307 ($n = 22$) contained the highest mean score within the subcategory computer hardware, with a mean score of 50 ($SD = 31.38$). AGED 5312 ($n = 21$) presented the highest mean score ($M = 89.47$) on the computer setting content. This treatment group also obtained the highest keyboard usage score with a mean of 63. One treatment group nearly obtained a perfect score, with a mean of 97, on computer software, which was AGED 7100 traditional based ($n = 13$). AGED 7100 distance based ($n = 6$) excelled in computer terminology, with a mean score of 83. The subcategory email was extremely similar among all four of the treatment groups with an average mean score of 75 ($SD = 11.48$). Internet is the final subcategory researchers observed within this study. The treatment group that obtained clearly the lowest mean score ($M = 49.92$) within this subcategory was AGED 7100 traditional based.

Table 4.14

Overall View of Students' Computer Aptitude Test Scores (N = 62)

Test Subcategories	Mean (<i>M</i>)	Standard Deviation (<i>SD</i>)
Computer Software	88.34	17.48
Computer Settings	83.90	32.75
Email	75.61	11.48
Computer Terminology	64.04	43.05
Networking	59.43	38.01
Keyboard Usage	56.19	32.70
Internet	54.56	38.12
Windows	52.65	21.59
Computer Hardware	41.68	30.54
Total	63.37	11.39

The treatment group that obtained the highest overall score on the Computer Aptitude Test was ACOM 5307 ($n = 22$). The overall mean score for this treatment group was 65.59, with a standard deviation of 11.36, see Table 4.15. Some of the subcategories that this treatment group excelled in included: computer software ($M = 86.41$) and computer settings ($M = 79.55$). Subcategories that obtained some of the lower scores within ACOM 5307 included: keyboard usage ($M = 51.55$) and computer hardware ($M = 50.05$).

AGED 7100 traditional based ($n = 13$) received the second highest total mean score when compared to the other treatment groups. This treatment group's mean score

was 62.62, with a standard deviation of 8.49. Computer software ($M = 97.46$) and computer settings ($M = 87.50$) were subcategories that this treatment group excelled in.

This treatment group also struggled within the following subcategories: networking ($M = 44.85$) and computer hardware ($M = 35.85$).

Table 4.15

Students' Computer Aptitude Test Scores By Treatment Group (N = 62)

Test Subcategories	<u>ACOM 5307</u>		<u>AGED 7100 Traditional</u>		<u>AGED 7100 Distance</u>		<u>AGED 5312</u>	
	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>
Computer Software	86.41	(16.12)	97.46	(9.15)	76.50	(12.16)	76.50	(12.16)
Computer Settings	79.55	(36.71)	87.50	(31.08)	75.00	(41.83)	75.00	(41.83)
Emailing	76.18	(11.05)	75.77	(9.60)	70.67	(12.23)	70.67	(12.23)
Computer Terminology	75.00	(34.41)	62.50	(48.27)	83.33	(25.82)	83.33	(25.82)
Networking	70.45	(36.71)	44.85	(38.13)	70.00	(27.39)	70.00	(27.39)
Internet	56.14	(39.71)	49.92	(39.73)	66.67	(27.97)	66.67	(27.97)
Windows	55.41	(23.13)	53.25	(14.13)	48.67	(34.43)	48.67	(34.43)
Keyboard Usage	51.55	(35.26)	55.38	(28.77)	50.17	(40.91)	50.17	(40.91)
Computer Hardware	50.05	(31.38)	35.85	(30.35)	50.17	(28.09)	50.17	(28.09)
Total	65.59	(11.36)	62.62	(8.49)	62.33	(18.46)	62.33	(18.46)

AGED 7100 distance based ($n = 6$) obtained the third high overall mean score when compared to the other treatment groups. The students' total mean score for the computer aptitude test was 62.33, with a standard deviation of 18.46. Subcategories that the students within this treatment group excelled in included: computer terminology ($M = 83.33$) and computer software ($M = 76.50$). The subcategories that received the lowest scores within this treatment group were: keyboard usage ($M = 50.17$) and Windows ($M = 48.67$).

AGED 5312 ($n = 21$) obtained the lowest total mean score on the computer aptitude test with a mean score of 61.81 ($SD = 11.39$). Computer settings ($M = 89.47$) and computer software ($M = 88.10$) were two of the subcategories that this treatment group excelled in. Subcategories that AGED 5312 were lowest in were: computer terminology ($M = 47.37$) and computer hardware ($M = 34.10$).

The average mean score was obtained on the GEFT score among participants ($N = 62$) was 11.63 ($SD = 5.42$), see Table 4.16. AGED 7100 distance based ($M = 15.67$) and AGED 7100 traditional based ($M = 12.31$) students mean scores were classified as field-independent learners. ACOM 5307 students on average were classified as field-dependent learners, with a mean of 9.95 ($SD = 5.81$).

Table 4.16

Students' Score on the Group Embedded Figures Test (N = 62)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>	Range
AGED 7100 (distance)	6	15.67	1.97	13-18
AGED 7100 (traditional)	13	12.31	5.77	1-18
AGED 5312	21	11.81	5.01	1-18
ACOM 5307	22	9.95	5.81	0-18
Overall	62	11.63	5.42	0-18

Students that obtain a score from 7-to-18 on the GEFT test are classified as a field-independent learner. There were a total of 50 students classified as a field-independent learner, see Table 4.17. AGED 5312 contained the most students that ranked within this category ($n = 18$). Field-dependent learners score between 0-to-6 on the GEFT. ACOM 5307 had the most students ($n = 7$) that were classified within this category, and AGED 7100 distance based students contained zero field-dependent learners within the treatment group.

Table 4.17

*Students' Classification as Independent/Dependent Learner Based From the Group**Embedded Figures Test (N = 62)*

Treatment Group	<i>n</i>	Field-Independent	Field-Dependent
AGED 5312	21	18	3
ACOM 5307	22	15	7
AGED 7100 (traditional)	13	11	2
AGED 7100 (distance)	3	6	0
Total	62	50	12

The California Critical Thinking Disposition Inventory (CCTDI) was another standardized test that was implemented into this study. The range for the overall score is from 70-to-420. Facione and Facione (1992c) stated that students that score a 350 or higher indicate a broad strength within critical thinking. Students that obtain less than a 280 as their overall score indicate to researchers an overall deficiency within critical thinking. Overall scores that range between 210-to-280 indicate to researchers the student possesses differentiating feelings within critical thinking. Students that obtain critical thinking of a 210 or below initiate to researchers that the individual has a significant opposition within this. With all student iPod participants ($N = 62$) combined the overall total mean score on the CCTDI was 301.00 ($SD = 26.02$), and ranged from 250-to-359, see Table 4.18.

There were a total of seven categories that were observed within the CCTDI test, which included: truth-seeking, open-minded, analyticity, inquisitiveness, CT (critical

thinking) confidence, systematicity, and maturity. Each of these categories was reported on a scale that ranges from 10-to-60. Students that score a 50 or above within a category on the critical thinking test are considered strong in that specific area. A score that is in the 40's still reflects that the student contains positive aspects within that critical thinking category. Scores that range from 30-to-40 indicates that the student has differentiating feelings within this critical thinking category. Students with a score below a 30 within a critical thinking category are considered to portray significant weakness within this area. With all student iPod participants ($N = 62$) combined the critical thinking category that they excelled in was inquisitiveness with a mean of 47.60 ($SD = 5.02$), and ranged from 37-to-56. With all treatments groups combined these students also had four other categories that fell into the 40's category of critical thinking, which included analyticity ($M = 45.19$), self-confidence ($M = 44.92$), maturity ($M = 44.13$), systematicity ($M = 42.00$). The remaining two categories ranked in the 30-to-40 category, which included open-minded ($M = 39.00$) and truth-seeking ($M = 38.84$).

Table 4.18

Overall Students' California Critical Thinking Disposition Inventory Test Scores (N = 62)

Categories	Mean	SD	Range
Inquisitiveness	47.60	5.02	37-56
Analyticity	45.19	4.60	35-55
Self-Confidence	44.92	4.82	32-54
Maturity	44.13	6.17	32-55
Systematicity	42.00	7.84	25-55
Open-Minded	39.00	5.10	28-50
Truth-Seeking	38.84	5.24	30-52
Total	301.00	26.02	250-359

The ACOM 5307 ($n = 22$) treatment group obtained the highest overall score on the CCTDI test with a total mean of 311.73 ($SD = 25.86$), and ranged from 255-to-354, see Table 4.19. The highest overall category that was ranked among the students within this treatment group was inquisitiveness with a mean of 49.09 ($SD = 4.94$), and ranged from 39-to-56. This treatment group also excelled within this category when comparing it to the other treatment groups. Open-minded is the category that ranked the lowest within this treatment group with a mean score of 40.23 ($SD = 5.53$), and ranged from 30-to-49. Even though this treatment group struggled with this category they were actually the highest within this area when researchers compared treatment groups. The other five categories all fell within the 40's categories, which included: analyticity ($M = 47.32$),

systematicity, ($M = 43.86$), self-confidence ($M = 46.86$), maturity ($M = 46.00$), and truth-seeking ($M = 40.27$).

Table 4.19

ACOM 5307 Students' California Critical Thinking Disposition Inventory Test Scores (n = 22)

Categories	Mean	SD	Range
Inquisitiveness	49.09	4.94	39-56
Analyticity	47.32	3.48	43-55
Systematicity	43.86	5.11	30-51
Self-Confidence	46.86	3.66	41-54
Maturity	46.00	5.61	33-54
Truth-Seeking	40.27	5.33	31-52
Open-Minded	40.23	5.53	30-49
Total	311.73	25.86	255-354

The treatment group that obtained the second highest CCTDI test score was AGED 7100 distance based ($n = 6$) with a total mean score of 305.50 ($SD = 35.47$), and ranged from 250-to-359, see Table 4.20. The students within this treatment group excelled in the critical thinking category analyticity with a mean score of 49.00 ($SD = 6.63$), and ranged from 38-to-55. This treatment group excelled within this category as well when being compared to the other treatment groups. Other critical thinking categories that also fell into the 40's category included self-confidence ($M = 47.17$), inquisitiveness ($M = 47.33$), systematicity ($M = 44.67$), and maturity ($M = 43.00$). The

category that ranked the lowest within this treatment group was open-minded with a mean score of 36.83 ($SD = 7.00$), and ranged from 30-to-50. Truth-seeking also fell in the 30's category with a mean score of 37.50 ($SD = 4.85$). Both of these categories also ranked the lowest when compared to the other treatment groups.

Table 4.20

*AGED 7100 Distance Based Students' California Critical Thinking Disposition Inventory**Test Scores (n = 6)*

Categories	Mean	<i>SD</i>	Range
Analyticity	49.00	6.63	38-55
Self-Confidence	47.17	4.79	41-53
Inquisitiveness	47.33	5.01	41-56
Systematicity	44.67	8.45	32-54
Maturity	43.00	7.92	33-53
Truth-Seeking	37.50	4.85	32-44
Open-Minded	36.83	7.00	30-50
Total	305.50	35.47	250-359

The treatment group AGED 7100 traditional based ($n = 13$) ranked third when researchers compared the total mean score. The students within this treatment group total mean score was 297.00 ($SD = 22.62$), and ranged from 258-to-331, see Table 4.21. The critical thinking category that these students excelled in was inquisitiveness with a mean of 47.23 ($SD = 5.25$), and ranged from 37-to-56. Other categories that fell into the 40's bracket included: maturity ($M = 43.85$), self-confidence ($M = 43.62$), analyticity ($M =$

40.77), and systematicity ($M = 40.77$). The category that ranked the lowest within this treatment group was truth-seeking with a mean score of 38.54 ($SD = 5.59$), and ranged from 30-to-48. The other category that also fell into the 30's bracket was open-minded with a mean score of 39.77 ($SD = 4.51$).

Table 4.21

AGED 7100 Traditional Based Students' California Critical Thinking Disposition

Inventory Test Scores (n = 13)

Categories	Mean	SD	Range
Inquisitiveness	47.23	5.25	37-56
Maturity	43.85	5.19	34-50
Self-Confidence	43.62	5.44	32-53
Analyticity	43.23	3.75	36-51
Systematicity	40.77	9.38	25-55
Open-Minded	39.77	4.51	31-48
Truth-Seeking	38.54	5.59	30-48
Total	297.00	22.62	258-331

The treatment group that contained the lowest total score on the CCTDI was AGED 5312 ($n = 21$), which obtained a total mean score of 290.95 ($SD = 22.19$) and ranged from 250-to-331, see Table 4.22. The category that the students in this treatment group excelled in was inquisitiveness with a mean score of 46.33 ($SD = 4.91$), and ranged from 37-to-56. Even though this category was the highest category that was ranked within this treatment group it ranked the lowest when compared it to the other treatment

groups. Other categories that fell into the 40's bracket included: self-confidence ($M = 43.05$), analyticity ($M = 43.10$), maturity ($M = 42.67$), and systematicity ($M = 40.50$). The category that was the lowest within this treatment group was open-minded with a mean score of 37.86 ($SD = 4.22$), and ranged from 28-to-44. Truth-seeking also fell into the 30's bracket with a mean score of 37.90 ($SD = 5.06$).

Table 4.22

AGED 5307 Students' California Critical Thinking Disposition Inventory Test Scores (n = 21)

Categories	Mean	SD	Range
Inquisitiveness	46.33	4.91	37-56
Self-Confidence	43.05	4.77	32-53
Analyticity	43.10	4.00	35-51
Maturity	42.67	6.69	32-55
Systematicity	40.05	8.87	25-55
Truth-Seeking	37.90	5.06	31-48
Open-Minded	37.86	4.22	28-44
Total	290.95	22.19	250-331

Students prior Graduate Record Exam (GRE) was also implemented into this study. When integrating in all students ($N = 62$) the average score on the verbal section was 422 with a standard deviation of 78.23, and the average score on the quantitative section was 503 with a standard deviation of 111.05. Therefore, the total average mean score for the students was 926, with a standard deviation of 165.08, see Table 4.23.

The treatment group that excelled the highest on total GRE score was AGED 7100 distance based ($n = 6$), with a mean score of 1,037 ($SD = 176.03$). This treatment group also obtained the highest score on both categories by scoring a 473 ($SD = 85.48$) on the verbal section, and a 563 ($SD = 112.72$) on the quantitative section. AGED 5312 ($n = 21$) contained the lowest average mean score on the GRE with a mean score of 897 ($SD = 155.09$). This treatment group scored the lowest on the verbal section of the test with a mean score of 408 ($SD = 70.49$), and when being compared to the other treatment groups AGED 5312 was low also on the quantitative section of the test. AGED 5312 average mean score on the quantitative section was a 490, with a standard deviation of 112.98.

Table 4.23

Students' Graduate Record Exam Scores (N = 62)

Treatment Group	<i>n</i>	<u>Total</u>		<u>Verbal</u>		<u>Quantitative</u>	
		<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)
AGED 7100 (distance)	6	1,036.67	(176.03)	473.33	(85.48)	563.33	(112.72)
AGED 7100 (trad)	13	934.62	(170.42)	408.46	(89.43)	526.15	(106.42)
ACOM 5307	22	917.73	(166.82)	430.91	(74.70)	486.82	(111.07)
AGED 5312	21	897.14	(155.09)	407.62	(70.49)	489.52	(112.98)
Overall	62	925.81	(165.08)	422.42	(78.23)	503.39	(111.05)

Students cumulative grade point average (GPA) was also collected which included the students' semester grade within the iPod implemented course. The students ($N = 62$) average GPA was a 3.81, with a standard deviation of 0.31, see Table 4.24.

ACOM 5307 obtained the highest cumulative GPA with a mean score of 3.94 ($SD = 0.20$). The other three treatment groups all had accumulated a GPA within hundredths of each other.

Table 4.24

Students' Grade Point Average (N = 62)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>	Range
ACOM 5307	22	3.94	0.20	3-4
AGED 7100 (distance)	6	3.79	0.48	3-4
AGED 7100 (traditional)	13	3.75	0.25	3-4
AGED 5312	21	3.73	0.34	3-4
Overall	62	3.81	0.31	3.00-4.00

Since students GPA was so similar researchers opted to implement an instructor's rank on each student. The highest possible score that each student could receive on this instrument was a 50, and a 10 was the highest they could achieve on each of the categories. The treatment group that obtained clearly the lowest overall instructor rating was AGED 7100 traditional based ($n = 13$) with a mean score of 31 ($SD = 9.12$), and a range of 13-to-42, see Table 4.25. This treatment group also contained consistently the lowest scores when compared to the other treatment groups within all of the categories, which included: punctuality, commitment, performance, attitude, and professionalism. The other three treatment groups, which included: ACOM 5307, AGED 5312, and AGED 7100 distance based, were consistent and contained very little variance between them on their overall total and within each category.

Within the treatment group AGED 7100 distance based ($n = 6$) the instructor's overall rank of the students received a mean score of 39 ($SD = 7.64$). Attitude and punctuality both ranked the highest and received the same mean score ($M = 8.00$). Performance contained the lowest score within this group as it received a mean score of 7.33 with a standard deviation of 1.86. The other two categories, commitment and professionalism, both fell in the middle and also obtained the same mean score of 7.83

Table 4.25

Instructor's Rank on Students in Treatment Group AGED 7100 Distance Based ($n = 6$)

Category	Mean (M)	SD	Range
Attitude	8.00	1.10	6-9
Punctuality	8.00	2.00	4-9
Commitment	7.83	1.47	5-9
Professionalism	7.83	1.47	5-9
Performance	7.33	1.86	4-9
Total Average	39.00	7.64	24-45

The overall instructor ranked mean score of the students in ACOM 5307 ($n = 22$) was 38.77 ($SD = 5.90$), see Table 4.26. The highest ranked category within this treatment group was attitude with a mean of 8.05 ($SD = 1.25$), and a standard deviation of 5-to-10. The other four categories were within hundredths of each other, which included: professionalism ($M = 7.77$), performance ($M = 7.68$), commitment ($M = 7.64$), and punctuality ($M = 7.64$).

Table 4.26

Instructor's Rank on Students in Treatment Group ACOM 5307 (n = 22)

Category	Mean (<i>M</i>)	<i>SD</i>	Range
Attitude	8.05	1.25	5-10
Professionalism	7.77	1.41	5-10
Performance	7.68	1.17	6-10
Commitment	7.64	1.26	5-10
Punctuality	7.64	1.36	5-10
Total Average	38.77	5.90	27-50

AGED 5312 ($n = 21$) instructor ranked the students on average within this treatment group a 37 total score ($SD = 9.94$), with a range of 16-to-49, see Table 4.27. Professionalism was ranked the highest among the categories with a mean score of 7.81 ($SD = 2.25$), and ranged from 2-to-10. The category that ranked the lowest within this treatment group was punctuality with a mean score of 7.00 ($SD = 2.59$), and ranged from 1-to-10.

Table 4.27

Instructor's Rank on Students in Treatment Group AGED 5312 (n = 21)

Category	Mean (<i>M</i>)	<i>SD</i>	Range
Professionalism	7.81	2.25	2-10
Attitude	7.62	2.06	3-10
Commitment	7.43	1.94	3-10
Performance	7.43	2.27	1-10
Punctuality	7.00	2.59	1-10
Total Average	37.29	9.94	16-49

The instructor of the treatment group AGED 7100 traditional based ($n = 13$) ranked the students on average a 31 ($SD = 9.12$), and ranged from 13-to-42, see Table 4.28. Attitude was ranked the highest within this treatment group with a mean score of 6.54 ($SD = 1.85$), and ranged from 3-to-9. Punctuality was ranked second within this treatment group with a mean score of 6.31 ($SD = 2.25$), and ranged from 1-to-8. The three other treatment groups all obtained the same mean score of 6.08, which included: performance ($SD = 1.80$), professionalism ($SD = 1.98$), and commitment ($SD = 2.10$).

Table 4.28

Instructor's Rank on Students in Treatment Group AGED 7100 Traditional Based (n = 13)

Category	Mean (<i>M</i>)	<i>SD</i>	Range
Attitude	6.54	1.85	3-9
Punctuality	6.31	2.25	1-8
Performance	6.08	1.80	3-9
Professionalism	6.08	1.98	2-9
Commitment	6.08	2.10	2-8
Total Average	31.08	9.12	13-42

Results Related to Objective Two

2. Describe the magnitude of iPod usage within each teaching strategy.

In order to determine the magnitude of the usage of the iPod within each teaching strategy, researchers examined each treatment group in order to determine first if the instructors of each course required the students to use the iPod as an educational resource. A total of 27 students responded to the question that related to instructors requirements on the students to use the technology advancement. Sixteen of these students stated the instructor of their treatment group did not require them to use the iPod as an educational resource, see Table 4.29. In ACOM 5307, the treatment group that implemented the teaching strategy and made the podcasts available to students, seven students reported the instructor did not require them to use the iPod as a resource. This

treatment group contained the most students that indicated the instructor did not require them to use this technology advancement. The treatment group AGED 5312 suggested to the students to view the podcasts, seven students reported the instructor required them to use the iPod as an educational resource. This treatment group contained the most students that reported the instructor required them to use the technology advancement.

Table 4.29

Students' Belief Towards Instructors' Requiring Using the iPod as an Educational Resource (n = 27)

Treatment Group	<i>n</i>	Yes	No
AGED 5312	10	7	3
AGED 7100 (traditional)	5	3	2
AGED 7100 (distance)	5	1	4
ACOM 5307	7	0	7
Total	27	11	16

Researchers also established how frequently new podcasts were made available for the students, how frequently students actually downloaded the provided podcasts, and how often students listen and viewed the podcasts. Majority of students ($n = 27$) representing all treatment groups reported that the podcasts were made available to them on a weekly bases. Additionally, majority of the students indicated they downloaded the podcasts on a weekly bases as well. Furthermore, majority of students within all treatment groups reported listening and viewing the podcasts weekly, but some students did indicate that they only watched the podcasts before a test.

Seven of the students in the treatment group ACOM 5307 (treatment group that made podcasts available for the students) replied to the questions that pertained to when podcasts were available, and their downloading and viewing habits see Table 4.30. Six of these students reported items were posted for them to view once a week. On average these students downloaded the podcasts also once a week, and then they would view these podcasts on a weekly bases as well.

Table 4.30

ACOM 5307 Frequency of Available Podcasts, and Students' Downloading and Viewing Habits (n = 7)

Frequency	Weekly	Monthly	Don't Know	Other
Podcasts Available	6	0	1	---
Students Viewing Habits	6	0	---	---
Students Downloading Habits	5	2	0	1

AGED 5312 (treatment group suggested for students to view podcasts) had a total of 10 students that responded to questions that pertained to when podcasts were available, and their downloading and viewing habits, see Table 4.31. Eight of these students stated the podcasts were made available to them to view weekly. Nine of the students reported downloading the podcasts on a weekly bases, with six students actually watching the podcasts on a weekly bases.

Table 4.31

*AGED 5312 Frequency of Available Podcasts, and Students' Downloading and Viewing**Habits (n = 10)*

Frequency	Daily	Weekly	Monthly	Before A Test	Other
Podcasts Available	1	8	0	---	---
Students Download Habits	0	9	1	---	---
Students Viewing Habits	0	6	---	3	1

AGED 7100 distance based (treatment group required students to view podcasts) had a total of 5-out-of-6 students that replied to the questions that pertained to when podcasts were made available to the students, and their downloading and viewing habits see Table 4.32. All five of these students reported that podcasts were made available to them weekly. They also all stated that they each downloaded the podcasts on a weekly bases as well. Furthermore, majority ($f = 4$) of the students stated that they watched the podcasts on a weekly bases.

Table 4.32

*AGED 7100 Distance Based Frequency of Available Podcasts, and Students'**Downloading and Viewing Habits (n = 5)*

Frequency	Weekly	Before A Test
Podcasts Available	5	---
Students Download Habits	5	---
Students Viewing Habits	4	1

AGED 7100 traditional based (treatment group also required students to view podcasts) had a total of five students that responded to questions that pertained to when podcasts were made available to the students, and their downloading and viewing habits, see Table 4.33. All five of these students replied that podcasts were available for them to download on a weekly bases. Four of the students reported downloading the podcasts on a weekly bases as well. However, how often students actually viewed the provided podcasts varied from weekly ($f = 2$), to before a test ($f = 2$), and for other reasons ($f = 1$).

Table 4.33

AGED 7100 Traditional Based Frequency of Available Podcasts, and Students'

Downloading and Viewing Habits (n = 5)

Frequency	Daily	Weekly	Before A Test	Other
Podcasts Available	0	5	---	---
Students Download Habit	1	4	---	---
Students Viewing Habit	0	2	2	1

Thirty-five of the 62 student iPod participants reported they did not use the iPod as an educational resource. Fifteen of the nonusers were in the ACOM 5307 treatment group, 11 were in AGED 5312, eight were in AGED 7100 traditional based, and one was in AGED 7100 distance based. Based-off-of the 26 students that reported using the iPod as an educational resource they indicated on a 10-point Likert scale (1 = not helpful and 10 = very helpful) how helpful the iPod served as an educational resource in the course. The overall mean score was 6.12 ($SD = 2.49$), see Table 4.34. The level of helpfulness varied within each treatment group. AGED 7100 distance based ranked the iPod as most

helpful with a mean of 8.00 ($SD = 2.56$). ACOM 5307 indicated that they found the iPod to be the least helpful and they ranked it with a mean score of 5.14 ($SD = 1.86$).

Table 4.34

Students' Rank On How Helpful the iPod Was as an Educational Resource Within Each Treatment Group (n = 26)

Treatment Group	<i>n</i>	Mean	Standard Deviation
AGED 7100 (distance)	5	8.00	2.55
AGED 5312	9	6.00	3.00
AGED 7100 (traditional)	5	5.80	1.74
ACOM 5307	7	5.14	1.86
Overall	26	6.12	2.49

Note: 1 = not helpful and 10 = very helpful

However, of the 62 participants 35 of the students reported they did not every use the iPod as an educational resource. Nineteen of these non-users even reported that they did not even attempt to use the iPod. Additionally, from the non-users ($n = 34$) 88.2% ($f = 30$) of the students that reported they did not think the iPod was hard to use. Twelve of these students were from the ACOM 5307 treatment group, nine from AGED 5312, 8 from AGED 7100 traditional based, and one student from treatment group AGED 7100 distance based.

There was only one student that reported that the iPod was hard to use. This student was enrolled in the treatment group ACOM 5307. The student indicated the most difficult part of using the iPod was uploading the podcasts from their library to the iPod.

These iPod non-users ($n = 35$) were also asked to determine on a 10-point Likert scale (1 = not important and 10 = very important) how much more they would have used the iPod if a more in-depth tutorial would have been provided to them at the beginning of the semester. Among all treatment groups the mean score for this statement was 7.15, with a standard deviation of 2.87, see Table 4.35. AGED 7100 distance based ($n = 1$) contained the greatest score among the treatment groups with a mean score of 10.00 on this question. The treatment group that established clearly the lowest average pertaining to this statement was ACOM 5307 with a mean of 5.93 ($SD = 2.81$).

Table 4.35

Students' Value of a More In-Depth iPod Tutorial Provided at the Beginning of the Semester ($n = 33$)

Treatment Group	n	Mean (M)	SD
AGED 7100 (distance)	1	10.00	---
AGED 7100 (traditional)	7	8.29	2.98
AGED 5312	11	7.73	2.87
ACOM 5307	14	5.93	2.81
Overall	33	7.15	2.87

Note: 1 = not important and 10 = very important

The students though that opted to use the iPod as an educational resource received podcasts throughout the entire Spring 2007 semester. The number of podcasts that each treatment group received varied. The primary researcher recorded the podcasts that were downloaded and viewed based on this point system: 0 = not downloaded; 1 = downloaded but not viewed; 2 = downloaded and viewed. This recording system was

implemented by the primary researcher to accurately record each student's educational iPod usage within each treatment group. ACOM 5307 students received the most podcasts, 19, throughout the Spring semester, see Table 4.36. Therefore, based on the researcher recording system the highest possible education iPod usage a student could receive was a 38. The average educational iPod usage among the students in this treatment group was 11.14 ($SD = 12.86$), and the students usage ranged from 0-to-32.

AGED 5312 was provided with the fewest podcasts, which was six. The highest possible education iPod usage score these students could obtain was a 12. The average education iPod usage within AGED 5312 was 5.30 ($SD = 5.43$), and the students usage ranged from 0-to-12.

AGED 7100 traditional and distance based each received 12 podcasts to view. Therefore, the highest possible education iPod usage score these students could obtain was a 24. The average usage of the educational podcasts among the AGED 7100 traditional based students was 8.17 ($SD = 8.80$), and the students usage ranged from 0-to-22.

Even though the podcasts were exactly the same within the traditional and distance based AGED 7100 courses researchers noticed a difference when comparing the treatment groups mean scores. AGED 7100 distance based average use of the educational podcasts was 9.83 ($SD = 7.39$), with students usage ranging from 2-to-21.

Table 4.36

Students' Use of Educational Podcasts Within Each Treatment Group

Treatment Group	<i>n</i>	# Podcasts/Education Usage Score	Mean	<i>SD</i>	Range
ACOM 5307	22	19/38	11.14	12.86	0-32
AGED 7100 (distance)	6	12/24	9.83	7.39	2-21
AGED 7100 (traditional)	13	12/24	8.17	8.80	0-22
AGED 5312	21	6/12	5.30	5.43	0-12

Note: 0 = not downloaded, 1 = downloaded but not viewed, and 2 = downloaded and viewed.

The researcher went a step further to establish each treatments group actual iPod usage. This was established by dividing the mean score for each treatment group by the number of provided podcasts. Based from this AGED 5312 used the iPod the most when compared to the number of podcasts that were provided, and ACOM 5312 clearly used them the least.

Additionally, within the researcher-developed instrument students were asked if they ever viewed some of the podcasts more often than others. Twelve students ($n = 27$) indicated that they did actually view some podcasts more than others, see Table 4.37. AGED 5312 contained the most students ($n = 6$) that viewed podcasts more often than others. The treatment group that contained the fewest students that reported viewing podcasts more often than others was AGED 7100 traditional based, with one student reporting yes to this practice.

Table 4.37

Students That Viewed Podcasts More Often Than Others (n = 27)

Treatment Group	Yes	No
AGED 5312	6	4
ACOM 5307	3	4
AGED 7100 (distance)	2	3
AGED 7100 (traditional)	1	4
Total	12	15

Students reported ($n = 12$) viewing the most frequent podcasts on an average of three times ($SD = 1.41$), with a range of 2-to-7, see Table 4.38. Researchers discovered some variance among the treatment groups pertaining to the number of times the students viewed the most frequent podcast. AGED 5312 ($n = 6$) contained the highest frequently view score, with a mean of 3.5 ($SD = 1.87$) and a range of 2-to-7. Students within the treatment group AGED 7100 ($n = 1$) traditional based viewed their most frequent podcast the least ($M = 2.00$) when compared to the other treatment groups.

Table 4.38

Students' Most Frequently Viewed Podcasts (N = 12)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>	Range
AGED 5312	6	3.50	1.87	2-7
ACOM 5307	3	2.67	0.58	2-3
AGED 7100 (distance)	2	2.50	0.71	2-3
AGED 7100 (traditional)	1	2.00	---	---
Overall	12	3.00	1.41	2-7

Due to technology advancements one option that students were provided with allowed them to view the provided podcasts on their computer through their iTunes library or on the posted site. Therefore, researchers opted to determine if this occurred, and, if so, the number of times it happened. Seventy-nine percent of the students ($n = 27$) reported that they had viewed the provided podcasts on their computer through iTunes or on the posted site, see Table 4.39. The most common treatment group this practice occurred in was AGED 5312 with seven students indicating such activity.

Table 4.39

Students That Viewed Podcast on Their Computer Through Their iTunes Library or on the Provided Site (n = 27)

Treatment Group	Yes	No
AGED 5312	7	3
ACOM 5307	5	2
AGED 7100 (traditional)	5	0
AGED 7100 (distance)	4	1
Total	21	6

Additionally, researchers wanted to establish approximately how many times student had viewed a podcasts on their computer through their iTunes library or on the provide site. The average number of times the students ($n = 21$) reported viewing the podcasts through this practice was five ($SD = 3.07$), with a range of 2-to-12. AGED 7100 distance based ($n = 5$) contained the highest mean score that pertained to the number of times podcasts were viewed on the computer, see Table 4.43. The mean score for this treatment group was 6.75 ($SD = 3.10$), with a range of 4-to-11. The treatment group that reported viewing the podcast the least on their computer was AGED 5312 ($n = 7$). The average number of times this type of practice occurred within this treatment group was 3.29 ($SD = 1.38$), with a range of 2-to-6.

Table 4.40

Number of Times Students Viewed Podcasts on Their Computer Through Their iTunes

Library or on the Provide Site (n = 21)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>	Range
AGED 7100 (distance)	4	6.75	3.10	4-11
ACOM 5307	5	6.20	2.78	3-10
AGED 7100 (traditional)	5	4.80	4.38	2-12
AGED 5312	7	3.29	1.38	2-6
Overall	21	5.00	3.07	2-12

Students were also asked on the researcher-developed instrument to indicate outside of educational purposes what else the student used the provided iPod for, see Table 4.41 With all of the treatment groups combined seven of the students ($n = 27$) reported that they only used the iPod for the course. However, 33.3% of the students reported using it also for music, which was a consistent additional usage among each of the treatment groups. Seven students indicated that they used the iPod for music, videos, and podcasts (non-course related). AGED 5312 contained the most students ($f = 3$) that indicated using the iPod for all three of these features.

Table 4.41

Students' Additional Usage of the iPod Outside of Educational Podcasts (n = 27)

Treatment Group	Music	Podcasts	Course Only	Music & Videos	Music & Podcasts	Music, Videos, & Podcasts
AGED 5307	3	0	3	0	0	4
ACOM 5307	2	1	2	0	0	2
AGED 7100 (distance)	2	0	2	1	0	0
AGED 7100 (traditional)	2	0	0	0	2	1
Total	9	1	7	1	2	7

In addition, researchers examined the students provided iPods to collect their ($N = 62$) actual additional use of the iPod, which included: number of songs, number of videos, number of photos, and total number of gigabytes (GB) filled on the iPod. The most songs that a student had obtained on their iPod was 3,835 see Table 4.42. The average student had downloaded 700 songs. Some students opted to not download any songs onto their provided iPod. The greatest number of videos that had been downloaded onto a student's iPod was 325, on average though a student had obtained 39 videos on their iPod at the completion of this study. The student that had the most photos on their iPod had contained 357 photos, with the average being 27. The student that had the greatest number of GB filled on their iPod had downloaded 31GB of information onto their provided 60GB technology advancement. The average student had 5GB filled ($SD = 7.28$).

Table 4.42

Students' Additional Usage of Their Provided iPod (N = 62)

Additional Features Used	Mean	SD	Range
Number of Songs	700.21	1,067.10	0-3,835
Number of Videos	38.64	75.19	0-325
Number of Photos	27.43	78.96	0-357
Total Gigabytes Filled	5.37	7.28	0-31

The number of songs, number of videos, number of photos, and number of GB that were filled was also broken down for each treatment group. AGED 7100 traditional based ($n = 13$) on average obtained the greatest number of songs on their iPods with a mean of 1,084, see Table 4.43. Additionally, they downloaded on average 25 videos, 11 photos, and contained 7 GB ($SD = 8.57$) of data onto their iPod. The students within this treatment group excelled among the other treatment groups when it came to downloading photos and when comparing total number of GB filled. However, this treatment group was the lowest when comparing number of videos that students within this group on average obtained.

Table 4.43

AGED 7100 Traditional Based Additional Usage of Their Provided iPod (n = 13)

Additional Features Used	Mean	SD	Range
Number of Songs	1084.33	1,336.95	0-3,835
Number of Videos	24.92	32.89	0-119
Number of Photos	10.50	36.37	0-126
Total Gigabytes Filled	6.59	8.57	0-31

The treatment group AGED 5312 ($n = 21$) downloaded on average 856 songs, which ranks second among the treatment groups when comparing the number of songs, see Table 4.44. Additional uses of the iPod within this treatment group on average among the students included downloading: 32 videos, downloading 20 photos, and 5 total GB filled of information.

Table 4.44

AGED 5312 Additional Usage of Their Provided iPod (n = 21)

Additional Features Used	Mean	SD	Range
Number of Songs	856.40	1,226.48	0-3,835
Number of Videos	32.20	74.11	0-325
Number of Photos	20.30	67.29	0-280
Total Gigabytes Filled	5.06	7.43	0-31

Students within the treatment group ACOM 5307 ($n = 22$) contained on average 421 songs, 47 videos, and 39 photos, see Table 4.45. Additionally, these students filled approximately 5.82GB ($SD = 7.44$) of data onto their provided iPod.

Table 4.45

ACOM 5307 Additional Usage of Their Provided iPod (n = 22)

Additional Features Used	Mean	SD	Range
Number of Songs	421.42	725.54	0-2,409
Number of Videos	46.85	77.64	0-300
Number of Photos	38.95	97.36	0-357
Total Gigabytes Filled	5.82	7.44	0-26

AGED 7100 distance based ($n = 6$) downloaded the fewest songs when compared to the other treatment groups, with a mean score of 294 ($SD = 514.70$), see Table 4.46. In addition, this treatment group also obtained the least filled GB ($M = 3.00$). This treatment group did though download on average the most videos with a mean of 60.17 ($SD = 129.78$), along with photos with a mean of 46.67 ($SD = 114.31$).

Table 4.46

AGED 7100 Distance Based Additional Usage of Their Provided iPod (n = 6)

Additional Features Used	Mean	SD	Range
Number of Songs	294.17	514.70	0-1,312
Number of Videos	60.17	129.78	3-325
Number of Photos	46.67	114.31	0-280
Total Gigabytes Filled	3.00	3.86	0-11

Results Related to Objective Three

3. Determine the relationship between student's iPod usage as a course resource to their computer aptitude test score by treatment group.

The relationship between students' iPod usage to their computer aptitude test score was established within each treatment group and then with treatment groups combined. Pearson product-moment correlation was used to correlate the students' iPod use as an educational resource, number of songs, number of videos, number of photos, and number of gigabytes filled to their overall computer aptitude test score, along with each computer aptitude category: computer hardware, computer settings, computer software, computer terminology, email, Internet, keyboard usage, networking, and Windows. Davis (1971) was used in order to establish substantial relationships ($r \geq 0.50$).

Within the ACOM 5307 ($n = 22$) treatment group there were five substantial relationships that were found. A very high, positive relationship ($r = .70$) was found between overall computer aptitude test score and number of songs (Davis, 1971), see Table 4.47. Another very high, positive relationship found ($r = .70$) was found between students' overall computer aptitude test score and total number of gigabytes filled. A substantial, negative relationship ($r = -.68$) was discovered between computer settings and number of photos. Additionally, a substantial, positive relationship was found between Windows and number of gigabytes filled ($r = .53$), and computer hardware and number of gigabytes filled ($r = .52$).

Table 4.47

*Relationship Between ACOM 5307 Students' iPod Usage to Their Computer Aptitude**Test Score (n = 22)*

Computer Aptitude	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Overall Score	.12	.70*	.43	.12	.68*
Computer Hardware	.16	.42	.43	.10	.52*
Computer Settings	-.15	.20	.20	-.68*	.14
Computer Software	.18	.36	.33	.28	.36
Computer Terminology	.25	.34	.16	-.04	.42
Email	-.09	-.06	-.21	.44	-.26
Internet	.23	.42	.14	.40	.37
Keyboard Usage	-.11	.32	.11	-.33	-.15
Networking	.08	.30	-.05	.28	.42
Windows	.05	.38	.38	.11	.53*

* $r \geq 0.50$ substantial relationship (Davis 1971)

The next treatment group that relationships were established within was AGED 5312 ($n = 21$). There was one substantial relationship that was found within this treatment group. A positive, substantial relationship (Davis, 1971) was found between networking and number of videos ($r = .57$), see Table 4.48.

Table 4.48

*Relationship Between AGED 5312 Students' iPod Usage to Their Computer Aptitude**Test Score (n = 21)*

Computer Aptitude	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Overall Score	.09	.05	.29	.42	.00
Computer Hardware	-.06	-.17	.35	.45	-.17
Computer Settings	.38	.27	.08	.12	.25
Computer Software	-.03	.33	-.02	-.07	.29
Computer Terminology	.11	-.16	.25	.17	-.12
Email	-.21	.20	.18	.02	.15
Internet	.27	-.33	-.10	.11	-.25
Keyboard Usage	.03	.08	.11	.07	-.04
Networking	-.07	.07	-.57*	-.04	.00
Windows	-.12	.13	.24	.40	.08

* $r \geq 0.50$ substantial relationship (Davis 1971)

AGED 7100 distance based ($n = 6$) had 12 substantial relationships between students' iPod usage and their computer aptitude test (Davis, 1971), see Table 4.49. Two of the relationships were very high, positive, which included: email and number of songs ($r = .75$), and computer hardware and iPod as an educational resource ($r = .70$).

Networking and number of videos was established as a very high, negative relationship (r

= -.85). Additionally, there were a total of 10 substantial, positive relationships, which included: overall computer aptitude score and iPod as an educational resource ($r = .68$); email and total number of gigabytes filled ($r = .65$); Windows and iPod as an educational resource ($r = .65$); Internet and the iPod as an educational resource ($r = .61$); email and number of videos ($r = .61$); email and number of songs ($r = .61$); overall computer aptitude score and number of songs ($r = .54$); networking and number of songs ($r = .51$); and computer settings and iPod as an educational resource ($r = .50$).

Table 4.49

*Relationship Between AGED 7100 Distance Based Students' iPod Usage to Their**Computer Aptitude Test Score (n = 6)*

Computer Aptitude	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Overall Score	.68*	.54*	.39	.39	.38
Computer Hardware	.70*	.34	.29	.29	.22
Computer Settings	.50*	.34	.30	.29	.28
Computer Software	-.26	-.11	-.05	-.06	.02
Computer Terminology	.30	.13	.32	.32	.23
Email	.10	.75*	.61*	.61*	.65*
Internet	.61*	-.18	-.29	-.29	-.32
Keyboard Usage	.43	.34	.21	.20	.24
Networking	-.07	.51*	-.85*	.00	.35
Windows	.65*	.49	.32	.32	.33

* $r \geq 0.50$ substantial relationship (Davis 1971)

AGED 7100 traditional based ($n = 13$) had a total of six substantial relationships between iPod usage and computer aptitude test scores. A very high, positive ($r = .79$) was found between Windows and number of photos (Davis, 1971), see Table 4.50. Computer hardware and number of photos ($r = .64$), keyboard usage and number of videos ($r = .56$), and overall computer aptitude test score and number of photos ($r = .53$) all three

established a substantial, positive relationship. There were two substantial, negative relationships established, which included networking to number of videos ($r = -.66$), and email to number of photos ($r = -.58$).

Table 4.50

Relationship Between AGED 7100 Traditional Based Student's iPod Usage to Their Computer Aptitude Test Score (n = 13)

Computer Aptitude	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Overall Score	.17	-.45	-.20	.53*	-.49
Computer Hardware	.05	-.40	.33	.64*	-.42
Computer Settings	.34	.27	-.09	.10	.25
Computer Software	.29	.19	.24	.09	.16
Computer Terminology	-.36	-.46	-.37	-.40	-.47
Email	-.20	.21	.15	-.58*	.15
Internet	.13	-.44	-.32	.39	-.31
Keyboard Usage	.32	.15	.56*	.23	.03
Networking	-.32	.09	-.66*	.01	.06
Windows	.21	-.29	-.09	.79*	-.35

* $r \geq 0.50$ substantial relationship (Davis 1971)

With all treatment groups combined ($N = 62$) there were no substantial relationships found between students' iPod usage and their computer aptitude test scores.

However, there were a total of four moderate, positive relationships established (Davis, 1971), which included: overall computer aptitude and number of videos ($r = .36$); computer software and number of songs ($r = .33$); overall computer aptitude and number of videos ($r = .33$); and computer hardware and number of photos ($r = .30$). A moderate, negative relationship was found between computer settings and number of photos ($r = -.34$), see Table 4.51.

Table 4.51

Relationship Between Students' iPod Usage to Their Computer Aptitude Test Score (N =

62)

Computer Aptitude	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Overall Score	.20	.12	.33	.29	.11
Computer Hardware	.18	-.11	.36	.30	-.04
Computer Settings	-.03	.26	.14	-.34	.19
Computer Software	.07	.33	.06	.04	.29
Computer Terminology	.14	.21	.17	.07	-.10
Email	-.11	.17	.11	.20	.11
Internet	.23	-.20	-.02	.24	-.11
Keyboard Usage	-.01	.18	.14	-.09	-.02
Networking	.01	.05	-.18	.18	.11
Windows	.11	.14	.28	.26	.14

* $r \geq 0.50$ substantial relationship (Davis 1971)

Results Related to Objective Four

4. Determine the relationship between students' iPod usage to each of the instrumentations incorporated into this study, which included: Group Embedded Figures Test, California Critical Thinking Disposition Inventory, Graduate Record Exam, and instructor's rank on the students.

The relationship of each teaching strategy using the students' iPod usage to their Group Embedded Figures Test (GEFT), California Critical Thinking Disposition Inventory (CCTDI) and each of the seven categories, and Graduate Record Exam (GRE) and each of the two categories was established within each treatment group and then as a whole. Pearson product-moment correlation was used to correlate the students' iPod use as an educational resource, number of songs, number of videos, number of photos, and number of gigabytes filled to the instrumentations that were incorporated into this. Davis (1971) was used in order to establish substantial relationships ($r \geq 0.50$).

Within the treatment group ACOM 5307 ($n = 22$) there were three substantial relationships established (Davis, 1971), which included: the GEFT and number of gigabytes filled ($r = .57$); GRE verbal section and number of gigabytes filled ($r = .51$); and GRE verbal section and number of songs ($r = .50$), see Table 4.55.

Table 4.52

*Relationship Between ACOM 5307 Students' iPod Usage to Their Group Embedded**Figures Test, California Critical Thinking Disposition Inventory, and Graduate Record**Exam Scores (n = 22)*

Instrumentation	iPod as Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
GEFT	.40	.49	.32	.12	.57*
CCTDI Total	-.27	-.28	-.33	.16	-.38
Truth-Seeking	-.23	-.05	-.18	-.04	-.08
Open-Minded	-.21	-.08	-.10	-.03	-.30
Analyticity	-.17	-.16	-.08	.13	.00
Systematicity	-.03	-.15	.02	-.04	.01
Self-Confidence	.17	-.14	-.01	.15	-.08
Inquistivness	.03	.10	-.08	.28	.27
GRE	-.02	.37	.24	.20	.40
Verbal	.10	.50*	.25	.21	.51*
Quantitative	-.09	.23	.20	.16	.24

* $r \geq 0.50$ substantial relationship (Davis 1971)

Two substantial, negative relationships (Davis, 1971) were established in AGED 5312 ($n = 21$), which included: self-confidence and total number of gigabytes filled ($r = -.54$), and systematicity and number of songs ($r = -.52$), see Table 4.53.

Table 4.53

*Relationship Between AGED 5312 Students' iPod Usage to Their Group Embedded**Figures Test, California Critical Thinking Disposition Inventory, and Graduate Record**Exam Scores (n = 21)*

Instrumentation	iPod as Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
GEFT	-.22	-.13	.12	.25	-.26
CCTDI Total	-.35	-.28	-.45	-.26	-.28
Truth-Seeking	-.02	-.00	-.27	-.21	.10
Open-Minded	-.45	.28	-.32	-.24	.25
Analyticity	.05	-.06	-.36	-.08	-.04
Systematicity	.05	-.52*	-.18	-.10	-.42
Self-Confidence	-.45	-.48	-.05	-.08	-.54*
Inquistivness	-.34	-.24	-.33	-.17	-.39
GRE	.29	.17	.12	.10	.25
Verbal	-.07	.16	-.13	-.01	.18
Quantitative	.44	.13	.24	.15	.23

* $r \geq 0.50$ substantial relationship (Davis 1971)

There were numerous substantial relationships established within the AGED 7100 distance based ($n = 6$) treatment group. A substantial, negative relationship was established between the GEFT and the iPod as an educational resource ($r = -.69$), see Table 4.54. Very high, negative relationships were established between the CCTDI total and number of songs ($r = -.80$), total number of gigabytes filled ($r = -.80$), number of

photos ($r = -.78$), and number of videos ($r = -.76$). Very high, negative relationships were also established between analyticity CCTDI category and total number of gigabytes filled ($r = -.85$), total number of photos ($r = -.81$), number of videos ($r = -.82$), and number of songs ($r = -.79$). The CCTDI subcategory systematicity and total number of gigabytes filled ($r = -.79$), number of songs ($r = .73$), number of videos ($r = .73$), and number of photos ($r = .73$) also achieved very high, negative relationships. A very high, negative relationship was found between the CCTDI subcategory self-confidence and number of songs ($r = -.71$). There were also substantial, negative relationships found between self-confidence and number of photos ($r = -.63$), number of videos ($r = -.61$), and total number of gigabytes filled ($r = -.58$). The CCTDI truth-seeking category established substantial, negative relationships with total number of gigabytes filled ($r = -.62$), number of photos ($r = -.56$), number of videos ($r = -.54$), and number of songs ($r = -.54$). Additionally, the CCTDI category inquisitiveness established substantial, negative relationships with number of songs ($r = -.68$), number of photos ($r = -.62$), total number of gigabytes filled ($r = -.61$), and number of videos ($r = -.60$). Furthermore, there was a moderate, positive relationship found between the GRE verbal section and the iPod as an educational resource ($r = 0.53$).

Table 4.54

Relationship Between AGED 7100 Distance Based Students' iPod Usage to Their Group

Embedded Figures Test, California Critical Thinking Disposition Inventory, and

Graduate Record Exam Scores (n = 6)

Instrumentation	iPod as Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
GEFT	-.69*	-.32	-.17	-.17	-.21
CCTDI Total	.22	-.80*	-.76*	-.78*	-.80*
Truth-Seeking	.40	-.54*	-.54*	-.56*	-.62*
Open-Minded	.64*	-.30	-.25	-.27	-.23
Analyticity	-.34	-.79*	-.82*	-.81*	-.85*
Systematicity	.18	-.73*	-.73*	-.73*	-.79*
Self-Confidence	-.03	-.71*	-.61*	-.63*	-.58*
Inquistivness	.30	-.68*	-.60*	-.62*	-.61*
GRE	.46	-.13	-.23	-.24	-.23
Verbal	.53*	-.40	-.41	-.42	-.41
Quantitative	.31	.10	-.06	-.06	-.06

* $r \geq 0.50$ substantial relationship (Davis 1971)

AGED 7100 traditional based ($n = 13$) had a total of eight substantial relationships between the students' iPod usage and the incorporated instrumentations. A positive, substantial relationship (Davis, 1971) was found between analyticity and number of photos ($r = .63$), see Table 4.55. The other seven relationships were substantial, negative, which included: self-confidence and total number of gigabytes

filled ($r = -.65$); inquisitiveness and total number of gigabytes filled ($r = -.63$); open-minded and the iPod as an educational resource ($r = -.63$); inquisitiveness and the iPod as an educational resource ($r = -.62$); self-confidence and number of songs ($r = -.58$); systematicity and number of songs ($r = -.55$); and inquisitiveness and number of songs ($r = -.50$).

Table 4.55

Relationship Between AGED 7100 Traditional Based Students' iPod Usage to Their Group Embedded Figures Test, California Critical Thinking Disposition Inventory, and Graduate Record Exam Scores (n = 13)

Instrumentation	iPod as Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
GEFT	.05	-.20	-.11	.29	-.41
CCTDI Total	-.34	-.46	-.35	.31	-.40
Truth-Seeking	-.02	.14	-.12	.08	.25
Open-Minded	-.63*	-.05	-.53	-.13	-.00
Analyticity	.45	-.06	-.31	.63*	.03
Systematicity	.03	-.55*	.03	.27	-.42
Self-Confidence	-.36	-.58*	.07	-.02	-.65*
Inquistivness	-.62*	-.50*	-.42	.14	-.63*
GRE	.20	.14	-.04	.02	.18
Verbal	.03	.07	-.29	.05	.13
Quantitative	.29	.17	.17	-.01	.18

* $r \geq 0.50$ substantial relationship (Davis 1971)

With all treatment groups combined ($N = 62$) researchers found two substantial, negative relationships (Davis, 1971) between number of songs and systematicity ($r = -.51$), and self-confidence ($r = -.50$), see Table 4.56. Additionally, there were five moderate, negative relationships found between: self-confidence and total number of gigabytes filled ($r = -.46$); CCTDI total and number of videos ($r = -.38$); CCTDI total and number of songs ($r = -.37$); systematicity and total number of gigabytes filled ($r = -.36$); and CCTDI total and total number of gigabytes filled ($r = -.35$).

Table 4.56

Relationship Between Students' iPod Usage to Their Group Embedded Figures Test, California Critical Thinking Disposition Inventory, and Graduate Record Exam Scores

(N = 62)

Instrumentation	iPod as Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
GEFT	.13	.01	.13	.13	-.10
CCTDI Total	-.12	-.37	-.38	-.06	-.35
Truth-Seeking	-.05	-.01	-.24	-.09	.07
Open-Minded	-.17	.05	-.22	-.12	.02
Analyticity	.09	-.24	-.25	-.01	-.11
Systematicity	.09	-.51*	-.14	-.07	-.36
Self-Confidence	.01	-.50*	-.05	.01	-.46
Inquistivness	-.09	-.27	-.25	.02	-.29
GRE	.13	.15	.10	.09	.20
Verbal	.11	.12	-.02	.06	.17
Quantitative	.11	.15	.16	.10	.18

* $r \geq 0.05$ substantial relationship (Davis 1971)

The relationship between students' iPod usage and the instructor's overall rank on the students, punctuality, commitment, performance, attitude, and professionalism was also established for each treatment group. The treatment groups were not combined when researchers observed this instrumentation due to fluctuation within each instructor's ranking system. Pearson product-moment correlation was used to correlate the students' iPod use as an educational resource, number of songs, number of videos, number of

photos, and number of gigabytes filled to the instructor's rank on the students. Davis (1971) was used in order to establish substantial relationships ($r \geq 0.50$).

In the treatment group ACOM 5307 ($n = 22$) there were no substantial relationships found. However, according to Davis (1971) there were found moderate, negative relationships established between total number of gigabytes filled and instructor's rank on students total ($r = -.36$), commitment ($r = -.44$), attitude ($r = -.40$), and performance ($r = -.35$), see Table 4.57.

Table 4.57

Relationship Between ACOM 5307 Students' iPod Usage to Instructor's Rank On The Students ($n = 22$)

Category	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Total Score	-.07	-.12	.08	-.12	-.36
Punctuality	-.05	.03	.09	-.13	-.19
Commitment	-.17	-.13	-.04	-.17	-.44
Performance	-.09	-.09	.06	-.11	-.35
Attitude	.01	-.29	.03	.02	-.40
Professionalism	-.03	-.07	.19	-.13	-.23

* $r \geq 0.05$ substantial relationship (Davis 1971)

In AGED 5312 ($n = 21$) there were a total of six substantial, negative relationships (Davis, 1971) established between: instructor's rank on students total score and total number of gigabytes filled ($r = -.52$); professionalism and total number of gigabytes filled ($r = -.63$); performance and number of videos ($r = -.59$); commitment and

total number of gigabytes filled ($r = -.56$); performance and number of photos ($r = -.54$); and punctuality and number of videos ($r = -.51$), see Table 4.58.

Table 4.58

Relationship Between AGED 5312 Students' iPod Usage to Instructor's Rank On The Students (n = 21)

Category	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Total Score	.01	-.34	-.46	-.42	-.52*
Punctuality	-.18	-.26	-.51*	-.47	-.38
Commitment	.05	-.39	-.28	-.19	-.56*
Performance	.01	-.26	-.59*	-.54*	-.41
Attitude	.16	-.22	-.28	-.28	-.38
Professionalism	.08	-.42	-.37	-.34	-.63*

* $r \geq 0.05$ substantial relationship (Davis 1971)

Very high, negative relationships (Davis, 1971) were established (Table 4.59) between instructor's rank on students total and number of songs, number of videos, number of photos, total number of gigabytes filled; punctuality and number of songs, number of videos, number of photos, total number of gigabytes filled; commitment and number of songs, number of videos, number of photos, total number of gigabytes filled; performance and number of songs, number of videos, number of photos, total number of gigabytes filled; attitude and number of songs, number of videos, number of photos, total number of gigabytes filled; professionalism and number of songs, number of videos,

number of photos, total number of gigabytes filled within the treatment group AGED 7100 distance based ($n = 6$).

Table 4.59

Relationship Between AGED 7100 Distance Based Students' iPod Usage to Instructor's Rank On The Students ($n = 6$)

Category	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Total Score	-.33	-.95*	-.96*	-.96*	-.95*
Punctuality	-.34	-.95*	-.98*	-.98*	-.99*
Commitment	-.48	-.86*	-.94*	-.94*	-.92*
Performance	-.26	-.91*	-.87*	-.88*	-.85*
Attitude	-.22	-.92*	-.89*	-.89*	-.88*
Professionalism	-.28	-.95*	-.94	-.94*	-.93*

* $r \geq 0.05$ substantial relationship (Davis 1971)

No substantial relationships (Davis, 1971) between students' iPod usage and the instructor's rank on students were established within AGED 7100 traditional based ($n = 13$). However, seven moderate, positive relationships were found between commitment and number of videos ($r = .43$); punctuality and number of videos ($r = .39$); instructor's rank on students total and number of videos ($r = .37$); performance and the iPod as an educational resource ($r = .34$); punctuality and number of songs ($r = .34$); attitude and number of videos ($r = .33$); and commitment and the iPod as an educational resource ($r = .30$), see Table 4.60. A moderate, negative relationship was found between attitude and number of photos ($r = -.41$).

Table 4.60

Relationship Between AGED 7100 Traditional Based Students' iPod Usage to

Instructor's Rank On The Students (n = 13)

Category	iPod As Edu. Resource	# of Songs	# of Videos	# of Photos	# of GB Filled
Total Score	.26	.18	.37	-.18	.15
Punctuality	.28	.34	.39	-.16	.27
Commitment	.30	.21	.43	-.14	.23
Performance	.34	.02	.22	.02	.06
Attitude	.10	.14	.33	-.41	.06
Professionalism	.14	.05	.26	-.15	.05

* $r \geq 0.05$ substantial relationship (Davis 1971)

Results Related to Objective Five

- Determine students' attitudes and opinions of using the iPod.

When determining students attitude and opinion of using the iPod within each teaching strategy researchers first established students opinion on the workload within each iPod implemented course. Students were asked to determine this on a 10-point Likert scale (1 = no work at all and 10 = overabundance of workload). The mean score among the treatment groups ($N = 62$) for this opinion was 5.67 with a standard deviation of 1.69, see Table 4.61. The treatment group that reported having the greatest workload was AGED 5312 ($n = 21$) with a mean score of 6.95 ($SD = 1.47$). AGED 7100 traditional based ($n = 13$) indicated that they had the least workload when compared to the other treatment groups with a mean score of 4.46 ($SD = 1.66$).

Table 4.61

Students' Attitude Towards Workload Within iPod Implemented Course (N = 62)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>
AGED 5312	20	6.95	1.47
AGED 7100 (distance)	6	5.33	1.21
ACOM 5307	22	5.32	1.29
AGED 7100 (traditional)	13	4.46	1.66
Overall	62	5.67	1.69

Note: 1 = no work at all and 10 = overabundance of work

As noted in objective two there were a total of 27 students that actually used the iPod as an educational resource. These 27 students were asked on the researcher-developed instrument if they would ever take another iPod enabled course. Twenty-three of these students stated that they would take another iPod enabled course. Two of the students reported they might take another iPod enabled course, while two students said no. These two students that reported no to this question were enrolled in the AGED 5312 and AGED 7100 traditional based treatment groups.

The students that opted to use the iPod as an educational resource ($n = 27$) were also asked on a 10-point Likert scale (1 = no value and 10 = critical) to determine how useful the iPod served as an educational resource. The mean score among the treatment groups pertaining to this statement was 6.89, with a standard deviation of 2.33, see Table 4.62. AGED 7100 distance based clearly ranked the iPod as an educational resource as being the most critical with a mean score of 8.20, and a standard deviation of 1.79. The other three treatment groups ranked this statement fairly similar. The mean score for the

other three treatment groups on this statement included: AGED 7100 traditional based with 6.80 ($SD = 1.30$), ACOM 5307 with 6.71 ($SD = 1.98$), and AGED 5312 with 6.40 ($SD = 3.10$).

Table 4.62

Students' Opinion on How Useful the iPod Served as an Educational Resource (n = 27)

Treatment Group	<i>n</i>	Mean (<i>M</i>)	<i>SD</i>
AGED 7100 (distance)	5	8.20	1.79
AGED 7100 (traditional)	5	6.80	1.30
ACOM 5307	7	6.71	1.98
AGED 5312	10	6.40	3.10
Overall	27	6.89	2.33

Note: 1 = no value and 10 = critical

Student iPod users ($n = 27$) were asked to reflect back throughout the iPod implemented semester and to think about how the technology advancement impacted their learning. With all treatment groups combined 22 students reported that they iPod helped them learn the content more efficiently, see Table 4.63. Students that stated that the iPod did not help them learn the content more efficiently were in the following treatment groups: AGED 5312 ($n = 3$), AGED traditionally based ($n = 1$), and ACOM 5307 ($n = 1$). Fifty-nine percent of these students also stated that the iPod allowed them to learn additional material beyond the course lecture. AGED 5312 contained the most students ($n = 6$) that reported that the iPod allowed them to learn the material beyond the course lecture, and AGED 7100 distance based had the fewest students ($n = 2$) that stated that the iPod allowed them to learn the material beyond the course lecture.

Table 4.63

Student Users' Reflection on How the iPod Impacted Their Learning (n = 27)

Treatment Group	<u>It Helped Me Learn The Content More Efficiently</u>		<u>I Learned Additional Material Beyond Course Lecture</u>	
	Yes	No	Yes	No
AGED 5312	7	3	6	4
ACOM 5307	6	1	5	2
AGED 7100 (distance)	5	0	2	3
AGED 7100 (traditional)	4	1	3	2
Total	22	5	16	11

Additionally, researchers were interested in determining how likely student iPod users ($n = 27$) were multitasking when using it for educational purposes, and how convenient the technology advancement was when studying for the course. The data for both of these statements was established on a 10-point Likert scale (1 = not likely and 10 = very likely, and 1 = not convenient and 10 = very convenient). With treatment groups combined the students reported a mean score of 7.19 ($SD = 2.65$) on how likely they were multitasking when using the iPod for educational purposes, see Table 4.64. The treatment groups AGED 7100 distance based ($n = 5$) and AGED 7100 traditional based ($n = 5$) both ranked this statement the highest with a mean score of 8.00. AGED 5312 ($n = 10$) received a mean score of 6.80 ($SD = 3.26$) on this statement, and ACOM 5307 ($n = 7$) ranked the lowest with a mean score of 6.57 ($SD = 1.72$)

Overall iPod student users also ranked the convenience of the iPod when studying for the course with a mean score of 7.65 ($SD = 2.44$). ACOM 5307 and AGED 7100

distance based both ranked this statement the highest with a mean score of 8.00. AGED 7100 traditional based obtained a mean score of 7.20 ($SD = 2.17$) on this statement. The treatment group that ranked this statement the lowest when compared to other treatment groups was AGED 5312 with a mean score of 7.11 ($SD = 3.44$).

Table 4.64

Student iPod Users Likelihood to be Multitasking and Convenience Students Found in the iPod as a Resource When Studying for the Course (n = 27)

Treatment Group	n	Multitasking While Using The iPod ¹		Convenience Found In Using The iPod For Education ²	
		Mean	SD	Mean	SD
AGED 7100 (dist)	5	8.00	1.58	8.00	1.87
AGED 7100 (trad)	5	8.00	3.46	7.20	2.17
AGED 5312	10	6.80	3.26	7.11	3.44
ACOM 5307	7	6.57	1.72	8.00	1.63
Overall	27	7.19	2.65	7.54	2.44

Note: ¹ 1 = not likely and 10 = very likely; ² 1 = not convenient and 10 = very convenient

Researchers also determined if the students that reported using the iPod throughout this semester ($n = 27$) if in future courses they would listen to the iPod for educational purposes. This was established on a 10-point Likert scale (1 = least likely and 10 = most likely). Among all treatment groups this opinions' mean score was 7.85, with a standard deviation of 1.99, see Table 4.65. AGED 7100 traditional based ranked this statement the highest when compared to the other treatment groups with a mean score of

9.40, and a standard deviation of 0.89. The treatment group that ranked this opinion the lowest was AGED 5312 with a mean score of 7.00, and a standard deviation of 2.67.

Table 4.65

Students' Opinion on Listening to the iPod as an Educational Resource In the Future (n = 27)

Treatment Group	<i>N</i>	Mean (<i>M</i>)	<i>SD</i>
AGED 7100 (distance)	5	9.40	0.89
ACOM 5307	7	8.00	1.29
AGED 7100 (traditional)	5	7.80	1.30
AGED 5312	10	7.00	2.67
Overall	27	7.85	1.99

Note: 1 = least likely and 10 = most likely

Students ($n = 27$) were next asked on a 10-point Likert scale (1 = not likely and 10 = very likely) to determine how likely they would enroll in another iPod implemented course, and how likely they would enroll in a traditional based course. The average among treatment groups to enroll in another iPod implemented course was 7.26 ($SD = 2.16$), with a range of 1-to-10, see Table 4.66. AGED 7100 distance based ($n = 5$) clearly ranked the highest when they were asked to establish how likely they would enroll in another iPod implemented course with a mean score of 9.20 ($SD = 1.10$), and a range of 8-to-10. AGED 5312 ($n = 10$) and AGED 7100 traditional based ($n = 5$) both ranked how likely they would enroll in another iPod implemented course somewhat lower than AGED 7100 distance based. AGED 7100 traditional based mean score on this statement

was 6.60 ($SD = 1.95$), and AGED 5312 mean score on this statement was 6.40 ($SD = 2.41$).

The average mean score on the statement that determined how likely students were to enroll in a traditional based course among the treatment groups ($n = 27$) was 8.52 ($SD = 1.58$), with a range of 4-to-10. AGED 7100 distance based also ranked this statement the highest with a mean score of 9.40 ($SD = 1.34$), and a range of 7-to-10. The other three treatment groups ranked this statement relatively close together with AGED 5312 mean score of 8.60 ($SD = 1.43$), ACOM 5307 mean score of 8.14 ($SD = 1.22$), and AGED 7100 traditional based mean score of 8.00 ($SD = 2.45$).

Table 4.66

Students' Likelihood to Enroll in an iPod/Traditional Based Course (n = 27)

Treatment Group	n	<u>iPod Based</u>			<u>Traditional Based</u>		
		Mean	SD	Range	Mean	SD	Range
AGED 7100 (dist)	5	9.20	1.10	8-10	9.40	1.34	7-10
ACOM 5307	7	7.57	1.81	5-10	8.14	1.22	7-10
AGED 7100 (trad)	5	6.60	1.95	4-9	8.00	2.45	4-10
AGED 5312	10	6.40	2.41	1-10	8.60	1.43	6-10
Overall	27	7.26	2.16	1-10	8.52	1.58	4-10

Note: 1 = not likely and 10 = very likely

All students ($N = 62$) were asked 19 questions on the researcher-developed instrument in order to determine combined and individual treatment groups attitudes and opinions of using the iPod. Out of the 19 statements that students were asked to rank on a 6-point Likert scale (1 = strongly disagree and 10 = strongly agree) the one that was overall ranked the highest with treatment groups combined was: The grade that I project to get in this course is accurate to my ability. This statement received a mean score of 5.15, with a standard deviation of 1.05, see Table 4.67. Other statements that ranked towards the top among all students included: It was easy to access the downloaded information onto my iPod ($M = 5.02$); I am confident using the iPod ($M = 4.92$); I am comfortable with the level of technology used in this course ($M = 4.90$); It is easy to download materials onto my iPod ($M = 4.85$).

Statements that were ranked the lowest among all students with treatment groups combined included: I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting ($M = 2.88$); The convenience of the iPod allowed me to study more than I usually do ($M = 3.13$); The iPod implementation into this course made the class more enjoyable for me ($M = 3.15$); I enjoyed listening to the iPod instead of having to read my notes when studying ($M = 3.28$). The statement that ranked the lowest was: A great deal of my success in this course is due to my use of the iPod. This statement received a mean score of 2.58, with a standard deviation 1.57.

Table 4.67

Students' Overall Opinions and Attitudes on Using the iPod (N = 62)

Statement	Mean	SD
The grade that I project to get in this course is accurate to my ability.	5.15	1.05
It was easy to access the downloaded information on my iPod.	5.02	1.30
I am confident using the iPod.	4.92	1.38
I am comfortable with the level of technology used in this course.	4.90	1.17
It is easy to download materials onto my iPod.	4.85	1.38
Overall, I am satisfied with this course.	4.70	1.31
Instructors in technology driven courses spend a greater amount of time preparing resources for the students.	4.51	1.32
I am satisfied with the training provided to use the iPod.	4.20	1.49
I excel in courses that use technology.	4.15	1.34
The instructor seems enthusiastic about implementing the iPod.	4.07	1.74
I enjoyed this course including the implementation of the iPod.	4.03	1.46
The material I download is helpful when studying.	3.93	1.63
A technology based course is more work for the student than a traditional class type setting.	3.55	1.58
I think that all classes should implement the iPod as an educational resource.	3.38	1.73
I enjoyed listening to the iPod instead of having to read my notes when studying.	3.28	1.74
The iPod implementation into this course made the class more enjoyable for me.	3.15	1.76
The convenience of the iPod allowed me to study more that I usually do.	3.13	1.78

Table 4.67. Continued.

Statement	Mean	SD
I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting.	2.88	1.82
A great deal of my success in this course is due to my use of the iPod.	2.58	1.57

Note: 1 = strongly disagree and 10 = strongly agree

The treatment group that contained the highest ranked attitude and opinion statement was AGED 7100 distance based ($n = 6$). The statement that was ranked the highest was: The instructor seems enthusiastic about implementing the iPod with a mean score of 5.83, and a standard deviation of 0.41, see Table 4.68. Other statements that ranked high within this treatment group included: I am comfortable with the level of technology used in this course ($M = 5.67$); The grade that I project to get in this course is accurate to my ability ($M = 5.50$); The material I download is helpful when studying ($M = 5.50$); The iPod implementation into this course made the class more enjoyable for me ($M = 5.33$).

The statement that this treatment group ranked the lowest among the 19 asked was: A technology based course is more work for the student than a traditional class type setting. The mean score for this statement was 3.00, with a standard deviation of 1.79. Other statements that ranked low within this treatment group included: I am satisfied with the training provided to use the iPod ($M = 4.33$); The convenience of the iPod allowed me to study more than I usually do ($M = 4.50$); Instructors in technology driven courses spend a greater amount of time preparing resources for students ($M = 4.67$); A greater deal of my success in this course is due to my use of the iPod ($M = 4.67$).

Table 4.68

AGED 7100 Distance Students' Opinions and Attitudes on Using the iPod (n = 6)

Statement	Mean	SD
The instructor seems enthusiastic about implementing the iPod.	5.83	0.41
I am comfortable with the level of technology used in this course.	5.67	0.52
The grade that I project to get in this course is accurate to my ability.	5.50	0.55
The material I downloaded is helpful when studying.	5.50	0.84
The iPod implementation into this course made the class more enjoyable for me.	5.33	0.82
Overall, I am satisfied with this course.	5.33	0.82
It was easy to access the downloaded information on my iPod.	5.33	1.21
I am confident using the iPod.	5.33	1.21
I enjoyed this course including the implementation of the iPod.	5.17	0.75
I excel in courses that use technology.	5.00	0.89
It is easy to download materials onto my iPod.	5.00	1.55
I think that all classes should implement the iPod as an educational resource.	4.83	0.98
I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting.	4.83	1.47
I enjoyed listening to the iPod instead of having to read my notes when studying.	4.67	0.82
A great deal of my success in this course is due to my use of the iPod.	4.67	1.03
Instructors in technology driven courses spend a greater amount of time preparing resources for students.	4.67	1.03
The convenience of the iPod allowed me to study more than I usually do.	4.50	1.38
I am satisfied with the training provided to use the iPod.	4.33	1.75

Table 4.68. Continued.

Statement	Mean	SD
A technology based course is more work for the student than a traditional class type setting.	3.00	1.79

Note: 1 = strongly disagree and 10 = strongly agree

The treatment group that obtained the second highest attitude and opinion statement when compared to the other groups was ACOM 5307 ($n = 22$). The statement that ranked the highest was: The grade that I project to get in this course is accurate to my ability. The mean score that was obtained on this statement was a 5.64, with a standard deviation of 0.58, see Table 4.69. Other statements that ranked high within this treatment group included: It was easy to access the downloaded information on my iPod ($M = 4.91$); I am confident using the iPod ($M = 4.86$); I am comfortable with the level of technology used in this course ($M = 4.86$); I is easy to download materials onto my iPod ($M = 4.82$).

The statement that ranked the lowest within this treatment group was: A great deal of my success in this course is due to my use of the iPod. This statement received a mean score of 2.38, with a standard deviation of 1.20. Other statements that ranked low in ACOM 5307 included: I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting ($M = 2.55$); The convenience of the iPod allowed me to study more than I usually do ($M = 2.95$); The instructor seems enthusiastic about implementing the iPod ($M = 2.95$); The iPod implementation into this course made the class more enjoyable for me ($M = 3.14$).

Table 4.69

ACOM 5307 Students' Opinions and Attitudes on Using the iPod (n = 22)

Statement	Mean	SD
The grade that I project to get in this course is accurate to my ability.	5.64	0.58
It was easy to access the downloaded information on my iPod.	4.91	1.44
I am confident using the iPod.	4.86	1.52
I am comfortable with the level of technology used in this course.	4.86	1.04
It is easy to download materials onto my iPod.	4.82	1.50
Overall, I am satisfied with this course.	4.77	1.27
Instructors in technology driven courses spend a greater amount of time preparing resources for students.	4.62	1.20
The material I downloaded is helpful when studying.	4.29	1.38
I am satisfied with the training provided to use the iPod.	4.18	1.33
I excel in courses that use technology.	4.14	1.36
I enjoyed this course, including the implementation of the iPod.	4.05	1.40
I think that all classes should implement the iPod as an educational resource.	4.00	1.76
A technology based course is more work for the student than a traditional class type setting.	3.57	1.50
I enjoyed listening to the iPod instead of having to read my notes when studying.	3.14	1.56
The iPod implementation into this course made the class more enjoyable for me.	3.14	1.80
The instructor seems enthusiastic about implementing the iPod.	2.95	1.36
The convenience of the iPod allowed me to study more than I usually do.	2.95	1.69

Table 4.69. Continued.

Statement	Mean	SD
I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting.	2.55	1.57
A great deal of my success in this course is due to my use of the iPod.	2.38	1.20

Note: 1 = strongly disagree and 10 = strongly agree

AGED 7100 traditional based ($n = 13$) ranked third when compared to the other treatment groups. The statement that ranked the highest within this group was: It was easy to access the downloaded information on my iPod. This statement obtained a mean score of 5.33, with a standard deviation of 0.65, see Table 4.70. Other statements that ranked high within AGED 7100 traditional based included: The grade that I project to get in this course is accurate to my ability ($M = 5.17$); The instructor seems enthusiastic about implementing the iPod ($M = 5.17$); It is easy to download materials onto my iPod ($M = 5.08$); I am confident using the iPod ($M = 5.08$).

The statement that ranked the lowest within this treatment group was: A great deal of my success in this course is due to my use of the iPod. This statement received a mean score of 1.75, with a standard deviation of 1.14. Other statements that ranked low within AGED 7100 traditional based included: I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting ($M = 2.50$); I think that all classes should implement the iPod as an educational resource ($M = 2.67$); The material I downloaded is helpful when studying ($M = 2.83$); The convenience of the iPod allowed me to study more than I usually do ($M = 3.08$).

Table 4.70

AGED 7100 Traditional Students' Opinions and Attitudes on Using the iPod (n = 13)

Statement	Mean	SD
It was easy to access the downloaded information on my iPod.	5.33	0.65
The grade that I project to get in this course is accurate to my ability.	5.17	0.84
The instructor seems enthusiastic about implementing the iPod.	5.17	1.53
It is easy to download materials onto my iPod.	5.08	0.67
I am confident using the iPod.	5.08	0.79
I am comfortable with the level of technology used in this course.	4.83	1.64
Overall, I am satisfied with this course.	4.58	1.51
Instructors in technology driven courses spend a greater amount of time preparing resources for students.	4.54	1.13
I am satisfied with the training provided to use the iPod.	4.08	1.73
I excel in courses that use technology.	4.00	1.60
I enjoyed this course, including the implementation of the iPod.	3.92	1.08
A technology based course is more work for the student than a traditional class type setting.	3.25	1.60
I enjoyed listening to the iPod instead of having to read my notes when studying.	3.25	1.91
The iPod implementation into this course made the class more enjoyable for me.	2.92	1.56
The convenience of the iPod allowed me to study more than I usually do.	3.08	1.89
The material I downloaded is helpful when studying.	2.83	1.80
I think that all classes should implement the iPod as an educational resource.	2.67	1.67

Table 4.70. Continued.

Statement	Mean	SD
I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting.	2.50	1.68
A great deal of my success in this course is due to my use of the iPod.	1.75	1.14

Note: 1 = strongly disagree and 10 = strongly agree

AGED 5312 ($n = 21$) obtained on average lower mean scores that pertained to the students attitudes and opinions towards the use of the iPod when compared to the other treatment groups. The statement that did rank the highest within this treatment group out of the 19 asked was: It was easy to access the downloaded information on my iPod. This statement's mean score was 4.86, with a standard deviation of 1.46, see Table 4.71. Other statements that also ranked high within this treatment group included: I am comfortable with the level of technology used in this course ($M = 4.76$); I am confident using the iPod ($M = 4.76$); It is easy to download materials onto my iPod ($M = 4.71$); The grade that I project to get in this course is accurate to my ability ($M = 4.52$).

The attitude and opinion statement that AGED 5307 ranked the lowest was: A great deal of my success in this course is due to my use of the iPod. This statement's mean score was 2.67, with a standard deviation of 1.74. Other statements that also ranked low within this treatment group included: The iPod implementation into this course made the class more enjoyable for me ($M = 2.67$); I think that all classes should implement the iPod as an educational resource ($M = 2.76$); I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the tradition setting ($M = 2.86$); The convenience of the iPod allowed me to study more than I usually do ($M = 2.95$).

Table 4.71

AGED 5312 Students' Opinions and Attitudes on Using the iPod (n = 21)

Statement	Mean	SD
It was easy to access the downloaded information on my iPod.	4.86	1.46
I am comfortable with the level of technology used in this course.	4.76	1.09
I am confident using the iPod.	4.76	1.58
It is easy to download materials onto my iPod.	4.71	1.55
The grade that I project to get in this course is accurate to my ability.	4.52	1.33
Overall, I am satisfied with this course.	4.52	1.37
Instructors in technology driven course spend a greater amount of time preparing resources for students.	4.33	1.65
I am satisfied with the training provided to use the iPod.	4.24	1.55
The instructor seems enthusiastic about implementing the iPod.	4.10	1.67
I excel in courses that use technology.	4.00	1.27
A technology based course is more work for the student than a traditional class type setting.	3.86	1.62
The material I downloaded is helpful when studying.	3.76	1.51
I enjoyed this course, including the implementation of the iPod.	3.76	1.76
I enjoyed listening to the iPod instead of having to read my notes when studying.	3.05	1.91
The convenience of the iPod allowed me to study more than I usually do.	2.95	1.83
I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting.	2.86	1.96
I think that all classes should implement the iPod as an educational resource.	2.76	1.48

Table 4.71. Continued.

Statement	Mean	SD
The iPod implementation into this course made the class more enjoyable for me.	2.67	1.62
A great deal of my success in this course is due to my use of the iPod.	2.67	1.74

Note: 1 = strongly disagree and 10 = strongly agree

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this research study was to determine the impact and effectiveness of different teaching strategies when incorporating the iPod into the classroom as an educational resource. Furthermore, this study sought to explore relationships between their iPod usage to the computer aptitude, Graduate Record Examination, Group Embedded Figures Test, and California Critical Thinking Disposition Inventory, and Instructor's Rank on Students.

The researcher has established the following null hypothesis:

Ho = There is no relationship between students' iPod usage and their computer aptitude, Graduate Record Examination, Group Embedded Figures Test, California Critical Thinking Disposition Inventory, and instructor's rank on the students.

In order to identify these factors, the following objectives were formulated:

1. Determine demographics of iPod users.
2. Describe the magnitude of iPod usage within each teaching strategy.
3. Determine the relationship between student's iPod usage as a course resource to their computer aptitude test score by treatment group.
4. Determine the relationship between students' iPod usage to each of the instrumentations incorporated into this study, which included: Group Embedded Figures Test, California Critical Thinking Disposition Inventory, Graduate Record Exam, and instructor's rank on the students.

5. Determine students' attitudes and opinions of using the iPod.

Summary

This study was conducted in order to establish the most effective teaching strategy to use when incorporating the iPod in as an educational resource within a university type classroom. The ultimate goal of this research was to establish findings for future research that is related to iPods and other technology advancements that are used for educational purposes. Students' attitudes and opinions towards the iPod implementation were also established which were established on Likert type scales.

Several factors were implanted into this study in order to establish a greater understanding of the students used, which included: computer aptitude test score, Group Embedded Figures Test, California Critical Thinking Disposition Inventory, Graduate Record Exam, grade point average, instructor's rank on the students, along with basic demographics.

Coggins (1988) established that students entering a course with higher levels of education were more likely to complete the course. Researchers found this to be true as all students that participated within this study were at the master or doctoral level of their education, and all students (100%) completed all instrumentations that were incorporated into this study. The target audience included students enrolled in the following courses during the 2007 Spring semester: ACOM 5307, AGED 5312, AGED 7100 distance based, and AGED 7100 traditional based. Therefore, the convenience sample limited the study to the researchers' desired population.

Conclusions Related to Objective One

The first objective of this study was to determine the demographics of the iPod users in each treatment group. The sample size for this study was 62. The average age of the student iPod participants was 30. The treatment group ACOM 5307 contained the oldest students with an average age of 36, and AGED 7100 traditional based had the youngest average age of 24. Students were predominately Caucasian, with slightly more males. Two-thirds of the students were ranked as master level students, which were enrolled mostly in AGED 5312 and AGED 7100 traditional based. AGED 7100 distance based had an equal number of master and doctoral level students.

Majority of students indicated they were enrolled in the iPod implemented courses because the course was required for their major. Additionally, with treatment groups combined students indicated that the iPod implemented courses were slightly difficult. Students ranked AGED 5312 as the most difficult iPod implemented course, and ACOM 7100 traditional based was ranked the easiest when compared to the other treatment groups.

With treatment groups combined the students on average reported that they study slightly less for a technology based course, as opposed to a traditional based course. ACOM 5307 and AGED 5312 reported the greatest number of hours of studying for a traditional and technology based course. AGED 7100 traditional based reported clearly the fewest number of hours that they study for a traditional based course.

The average age the student iPod participants reported they first used a computer was 12. ACOM 5307 contained the oldest students had first used a computer. AGED

7100 traditional based students' were the youngest users of when they first used a computer, which was approximately five years away from ACOM 5307. Additionally, 60 of the student iPod participants reported that they personally owned a computer, with majority of them having a PC. Furthermore, nearly all students reported that they used the computer for educational purposes, and it was ranked as a highly important feature that they used for education purposes. Majority of the students had completed a university level instructional computer course prior to the iPod implementation study, and had received an "A" in it.

All students reported they use the Internet for educational purposes. However, students ranked the importance of the Internet for educational purposes slightly more important than they ranked the computer. Nearly all students indicated that they use a broadband connection when using the Internet for educational purposes. The average age a student expressed they first used the Internet was 18. ACOM 5307 once again produced the oldest age and reported that they first used the Internet on an average of 22, along with AGED 7100 traditional based having the youngest first Internet users with an average age of 13.

Students were also asked to establish additional uses of the Internet other than for educational purposes. Nearly all students reported that a daily activity that they use the Internet for was email. The most popular weekly activities that students reported using the Internet for was to obtain information and to download music, etc. Majority of students indicated a monthly activity that they use the Internet for is to purchase items, with majority of them also stating that they never use the Internet to sell items.

Majority of the student iPod participants reported they had completed a course that was completely online prior to the iPod implemented course. Additionally, majority of the students stated that they believe they will perform best within a course that is a combination of traditional and technology based.

A study that was conducted during the 2004-2005 academic year at Central Michigan University found that 81.9% of the students did not own an iPod (Switzer & Csapo, 2005). However, majority of the student iPod participants indicated that they already owned an iPod or similar device prior to the iPod implement study occurred. The most common device that students reported they already owned prior to the study was an MP3 Player and a Nano. Of the students that reported not owning a technology advancement device such as this prior to the study half of them expressed that they would now purchase one.

Several instrumentations were implemented into this study. One test that was completed at the beginning of the study in order to determine the students' prior experience with technology was the computer aptitude test. This test allowed researcher to analyze students' previous experience and current access to technology (McKeachie & Svinicki, 2006). Researchers found when all four treatment groups were combined their overall score on this test was very similar, coupled with the email subcategory also being very similar. However, some of the treatments groups excelled higher within some of the subcategories when compared to the other treatment groups. ACOM 5307 contained the highest score within the subcategory computer hardware. AGED 5312 presented the highest mean score within the computer setting and keyboard usage subcategories.

AGED 7100 distance based scored excelled over the other treatment groups within the subcategory computer terminology. AGED 7100 traditional based score the highest within the subcategory computer software, which was nearly a perfect score. This treatment group also obtained clearly the lowest score within the subcategory Internet.

The next instrument that researchers implemented into this study was the Group Embedded Figures Test (GEFT). With all treatment groups combined the average score of this test was a 12, which indicates that on average students were independent-dependent learners. Researchers counted participants scores to determine how many students fell into each of the GEFT categories (independent, independent-dependent, and dependent learners). Based from this over two-thirds of the students were classified as independent learners. Talbert, Vaughn, Croom, and Lee (2007) stated that independent learners can see individual elements of a pattern, which indicates to researchers that these type of students would be more likely to use the iPod. AGED 7100 distance contained the most independent learners. ACOM 5307 had the overall lowest score, and had the most students that were classified as independent-dependent learners.

Another instrumentation that was incorporated into this study was the California Critical Thinking Disposition Inventory (CCTDI) test. The overall mean score on this test was 301, which indicates that as a whole the students display a positive strength within critical thinking (Facione & Facione, 1992c). Dile and Mezack (1991) stated that “non-traditional” students tend to out-perform traditional students, and their age and experience are contributing factors to this. Researchers found this to be true as the treatment group that excelled the highest on the CCTDI test was ACOM 5307 with a score of 312. These

findings are also directly aligned with research conducted by Threlkeld and Brozoska (1993). These researchers described successful distance learners as mature, highly motivated, flexible, and self-disciplined. AGED 5312 scored the lowest on this test with a score of 291, which displays to researchers that these students still do contain a positive strength within critical thinking. With treatment groups combined five-out-of-seven categories fell into the positive critical thinking bracket, leaving open-minded and truth-seeking to be labeled as differentiating. All of ACOM 5307 categories were ranked as positive critical thinking aspects. AGED 7100 distance and traditional based, and AGED 5312 both had five-out-of-seven categories rank within the positive critical thinking bracket, leaving truth-seeking and open-minded as differentiating among these students within these three treatment groups.

The next instrumentation that was implemented into this study was the Graduate Record Exam (GRE). This test was incorporated into this study because it is used in order to determine qualification of prospective graduate students. With treatment groups combined the overall mean score for this test was 926. AGED 7100 distance based clearly excelled on this test with a mean score of 1,037, and AGED 5312 scored the lowest on it with a score of 897.

Researchers also examined students' grade point average (GPA) with the iPod implemented course grade averaged into this. Researchers found that students' GPA were very similar and therefore opted to incorporate in the researcher-designed instrumentation for the instructor's to rank each student. AGED 7100 distance based received the highest overall instructor's rank with a score of 39, and AGED 7100 traditional based obtained

the lowest overall score with a 31. Researchers found that ACOM 5307's attitude to be slightly higher when compared to the other treatment groups. Jurasek (1991) stated that distance education students have a significantly greater positive attitude than other students. Additionally, AGED 7100 traditional based, youngest students, ranked the lowest within all five of the categories that were established within this instrumentation.

Conclusions Related to Objective Two

The second objective of this study was to describe the magnitude of iPod usage within each teaching strategy. According to the *Duke University iPod First Year Evaluation Report* they found that 75% of their students' did use the iPod for at least one feature for educational purposes (Carlson, 2004). However, this study found that 35 of the 62 iPod participants reported that they did not use the iPod as an educational resource, with 15 being in ACOM 5307, 11 in AGED 5312, eight in AGED 7100 traditional based, and one in AGED 7100 distance based. This finding is clearly supported by McKeachie and Svinicki (2006) which stated that some students could be resentful towards the implementation of technology and taking the initiative towards learning, because they are use to learning in a passive and responsive setting. Swanson (1988) stated that understanding why a person accepts or rejects computer technology has proven to be one of the most challenging issues information systems research. Nineteen of these non-users even reported that they did not even attempt to use the iPod; with nearly all of these non-users reporting that they did not think the iPod was hard to use. Additionally, these non-user students noted that a more in-depth iPod tutorial at the beginning of the semester would have been important to them. AGED 7100 traditional based found this to be very

important, and ACOM 5307 students established this as slightly important to them.

Over half of the students that actually used the iPod as an educational resource, 26, reported that the instructor of the iPod implemented course required them to use the device. Majority of the students in AGED 5312 believed this, with zero students indicating that the ACOM 5307 instructor did not require the students to use the iPod. Nearly all students reported that podcasts were made available to them, students would download the podcasts, and student would view the podcasts on a weekly bases. Based from the actual iPod users and with the treatment groups combined students indicated that the iPod was slightly helpful. AGED 7100 distance based ranked the iPod as the most helpful with a score of 8, and ACOM 5307 ranked it the least helpful with a score of 5.

The students that opted to use the iPod as an educational resource received podcasts that were tailored to the course that they were enrolled into throughout the semester. McKeachie and Svinicki (2006) stated that the consideration of which technology to use that aligns with the students, course content, and teaching style needs to be taken into consideration when developing teaching strategies. This research directly aligns with and creates an understanding of the variance among the number of podcasts that each treatment produced for their students. Furthermore, Laurillard (2002) stated that when incorporating a teaching strategy into a curriculum the primary focal point needs to be the learning objectives that have already been established for that course, and to address the students' learning needs. The treatment group that provided students with the most podcasts was ACOM 5307 with 19. AGED 5312 provided its students with the

fewest podcasts, six, and this course suggested for the students to view the podcasts. Taking the overall iPod usage as an educational resource mean score for each treatment group divided-by the number of provided podcasts, students in AGED 5312 (students were suggested to use the device) used the iPod the most, while students in ACOM 5307 (podcasts were available for students) clearly used the iPod the least. Another interesting factor that researcher discovered within this study was that AGED 7100 traditional and distance based students were provided with the same exact podcasts and each treatment group was also required to view the podcasts. However, students in AGED 7100 distance based viewed more podcasts than the students enrolled in AGED 7100 traditional based.

In addition, researchers wanted to establish if the students viewed podcasts more often than others, and they found that 12 students did do this. Researchers found this to be a positive finding as the information processing system stresses that the more repetitious information is presented to a student, the more likely chunks of it will be transmitted to their long-term memory. AGED 5312 had the most students that viewed podcasts more often than others with an average of three-and-a-half, and AGED 7100 traditional based students reported the fewest practices such as this. Another option for student iPod participants due to technology advancements allowed students to view the podcasts through their iTunes library or on the posted site, and 79% of the iPod users reported that they did this. This type of practice was done relatively the same throughout all treatment groups.

Researchers also wanted to establish how else students used their provided iPod besides for educational purposes. One-third of the students reported that they only used

the iPod for music. Seven students indicated that they used the device for music, videos, and podcasts (non-course related).

In order to determine students' additional iPod usage researchers examined every provided iPod. The average student had obtained approximately 700 songs onto their iPod, with 3,835 being the most. The average student had 39 videos, with 325 being the most a student had obtained. Thirty-nine was the average number of photos contained onto an iPod, with 357 being the most. Finally, an average student had filled 5GB of information onto their iPod, with one student filling 31GB. AGED 7100 traditional based students' on average obtained the most songs, photos, and GB, but the fewest videos when compared to the other treatment groups. AGED 7100 distance based students' on average contained the most videos, but the fewest songs, photos, and GB when compared to the other treatment groups.

Conclusions Related to Objective Three

The third objective of this study was to establish the relationship between student's iPod usage as a course resource to their computer aptitude test score by treatment group. There were a total of five substantial relationships found within ACOM 5307, which was established between their overall computer aptitude test score and number of songs, overall computer aptitude test score and number of GB filled, computer settings and number of photos, Windows and number of GB filled, and computer hardware and number of GB filled.

AGED 5312 established one substantial relationship, which was found between networking and number of videos.

AGED 7100 distance based had a total of 12 substantial relationships established, which were between: email and number of songs, computer hardware and iPod as an educational resource, networking and number of videos, overall computer aptitude score and iPod as an educational resource, email and total number of gigabytes filled, Windows and iPod as an educational resource, Internet and the iPod as an educational resource, email and number of videos, email and number of songs, email and number of photos, overall computer aptitude score and number of songs, networking and number of songs, and computer settings and iPod as an educational resource.

AGED 7100 traditional based had a total of six substantial relationships, which were established between: Windows and number of photos, computer hardware and number of photos, keyboard usage and number of videos, overall computer aptitude test score and number of photos, networking and number of videos, and email and number of photos.

With all treatment groups combined, there were no substantial relationships established between computer aptitude test score to iPod usage. However, four significant relationships were established.

Conclusions Related to Objective Four

The fourth objective of this study was to determine the relationship between students' iPod usage to each of the instrumentations incorporated into this study, which included: Group Embedded Figures Test, California Critical Thinking Disposition Inventory, Graduate Record Exam, and Instructor's Rank on the Student.

Within the treatment group ACOM 5307 there were a total of three substantial relationships (Davis, 1971) established between: the GEFT and number of GB filled, GRE verbal section and number of GB filled, and GRE verbal section and number of songs.

Two substantial relationships were established within AGED 5312, which included self-confidence and total number of GB filled, and systematicity and number of songs.

There were numerous substantial relationships established within AGED 7100 distance based. Three specific relationships were found between the iPod as an educational resource and the GEFT, open-minded category of the CCTDI, and the verbal section of the GRE. Other substantial relationships that were found between students' iPod usage other than for educational purposes and overall CCTDI score, and CCTDI categories: truth-seeking, analyticity, systematicity, self-confidence, and inquisitiveness.

AGED 7100 traditional based had a total of eight substantial relationships that were found between: analyticity and number of photos, self-confidence and total number of GB filled, inquisitiveness and total number of GB filled, open-minded and the iPod as an educational resource, inquisitiveness and the iPod as an educational resource, self-confidence and number of songs, systematicity and number of songs, and inquisitiveness and number of songs.

With all treatment groups combined there were two substantial relationships established which were found between: number of songs and systematicity, and self-confidence. Furthermore, there were five additional significant relationships also

established.

Conclusions Related to Objective Five

The fifth objective of this study was to determine students' attitudes and opinions of using the iPod. Researchers first opted to determine students' attitude towards the workload within the iPod implemented course. With the treatment groups combined students on average believed that the iPod implemented course was slightly more work than a traditional course. The treatment group that ranked the workload as being higher was AGED 5312, while AGED 7100 traditional based ranked the workload as being slightly less than normal.

Researchers then wanted to determine how useful the iPod served as an educational resource. As noted earlier there were only 27 students that chose to use the iPod as an educational resource. These students reported on average that this device was slightly important to them. AGED 7100 distance based ranked the value of the iPod as an educational resource clearly higher when compared to the other treatment groups. The Council for Higher Education Accreditation (2003) stated that "...student learning has been the central concern of higher education from the beginning" (p. 1). Therefore, researchers were enlightened to discover that a vast majority of the student iPod users indicated that the iPod did help them learn the course content more efficiently. This finding is also supported by the Edgar Dale Cone of Learning (1969), which predicts that students that opt to use the visual and audio features on the iPod will remember 50% of the provided content. Findahl (1971), Reese (1983), and Drew and Grimes (1987)

discovered that redundant audio and video presentations were superior when producing recall and understanding information from a single-channel. Researchers found that majority of the iPod users indicated that the iPod did help them learn the content more efficiently. Additionally, researchers discovered that over half of iPod users reported that they did learn the content beyond the course lecture.

In addition, researchers wanted to establish if student users were multitasking when using the iPod and if they found the iPod to be convenient when being used for educational purposes. Duke University reported that their students' iPod users during the first year implementation found an advantage in the device as they were able to multitask while studying. With the treatment groups combined students indicated that they were more likely to be multitasking when using the iPod as an educational resource. iPod researchers also discovered students to find convenience in using the iPod for educational purposes as well. This research directly aligns with Switzer and Csapo (2005), which stated that students' motivation behind purchasing digital devices was due to the available features and for convenience.

Next, researchers determined students' opinion on listening to the iPod as an educational resource in the future. Overall, students reported that they were likely to do this. Students that were enrolled in AGED 7100 distance based reported that they were very likely to use this device in the future for education purposes. Researchers even went a step further as they opted to determine how likely students in the future were to enroll in an iPod based course versus a traditional based course. With the treatment groups combined students reported on average that they were slightly more likely to enroll in a

traditional based course over an iPod based course. The treatment group that was clearly the most likely to enroll in an iPod based course was AGED 7100 distance based. This finding could be directly related to research conducted by McKeachie and Svinicki (2006) which stated that, “distance education presents one of the most challenging and satisfying forms of teaching.”

Finally, there were 19 questions that all students were asked within the researcher-developed instrument to determine students’ overall attitude and opinions of using the iPod as an educational resource. The five statements that were ranked on average among the top included: The grade that I project to get in this course is accurate to my ability; It was easy to access the downloaded information onto my iPod; I am confident using the iPod; I am comfortable with the level of technology used in this course; It is easy to download materials onto my iPod. The five statements that were ranked on average towards the bottom among all students included: I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting; The convenience of the iPod allowed me to study more than I usually do; The iPod implementation into this course made the class more enjoyable for me; I enjoyed listening to the iPod instead of having to read my notes when studying; A great deal of my success in this course is due to my use of the iPod.

Recommendations for Future Researchers

Researchers for this study implemented an experimental design type study but did not incorporate in a control. Future researchers should implement a control group in order

to establish an even greater understanding of the students' iPod usage.

Since this study established that more than half of the student iPod participants opted to not even use the device, future research should more closely examine which aspect of the technology is of the greatest negative impact to the learning process. There are two broad areas that future researchers could examine in greater depth which would include the hardware (iPod) and software (podcasts).

Researchers suggest for the population size to be larger within future studies in order to establish possible additional significant differences. In addition, researchers suggest for future studies to incorporate a greater population of minority participants, which will help establish a greater representation of the entire population. Furthermore, researchers recommend future researchers to obtain courses from an array and mix of colleges, instead of just being in the College of Agricultural. Another suggestion is to incorporate in different universities that have differentiating values, structures, and location. Also, future research should examine undergraduates' usage of technology advancements as an educational resource. All of these suggestions have capabilities of enhancing future researcher with a primary focus of establishing an even greater representation of the entire population.

One unanticipated problem that occurred during this study was that some students would view the podcast lessons via their computer versus listening to them on their iPod. This was done through their iTunes library or the posted podcast site. Therefore, they would receive the provided materials but this activity went unmeasured. For future studies, it would be advisable to have the provided downloadable podcasts at a location

that must be logged into and can count the number of times a student enters into these lectures.

Other suggestions that researchers have for future studies are to incorporate a more in-depth tutorial for beginners, specifically for the students that struggled with using the device. In addition, researchers do advise providing each treatment group with the same number of podcasts so that the field is the same when establishing which treatment group used the podcasts the most for educational purposes. Additionally, future researchers could look at the effects of student learning based on the quality of the audio and visual. Furthermore, it is suggested that future researchers examine courses that are of the same credit value so that students' actual usage of the iPod in a one hour course versus a three hour course does not become an extemporaneous variable. Researchers are optimistic that these recommendations could lead to significant findings within future studies.

Discussion

In Naisbitt's latest book *Mind Set!* (2006), he describes the future as a picture puzzle.

The future is a collection of possibilities, directions, events, twists and turns, advances, and surprises. As time passes, everything finds its place and together all pieces form a new picture of the world. In a projection of the future, we have to anticipate where the pieces will go, and the better we understand the connections, the more accurate the picture will be. (p. 43)

Just as Naisbitt (2006) stated we may never know what the final picture of education and technology advancements will look like. It is important though as

educators to strive to stay abreast of the latest advancements and to tailor to students' educational needs that they so desire.

This study determined students' iPod usage, and attitude and opinions of using the iPod within each teaching strategy. The results of this study will lay a foundation and serve as a valuable tool for future research that examines technology advancements as educational resources. These results in the end should lead to an enhancement in overall student learning.

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APPENDIX A
IRB LETTER OF APPROVAL

**Texas Tech University
Institutional Review Board for the Protection of Human Subjects
Office of Research Services
203 Holden Hall/MS 1035
742-3884**

March 20, 2006

Dr. M Todd Brashears
Ag Ed & Communications
Mail Stop: 2131

Regarding: 500367 Determining the Undergraduate Food Science Curriculum & Course Material in an Intro to Food Science Course

Dr. M Todd Brashears:

The Texas Tech University Protection of Human Subjects Committee approved your claim for an exemption for the proposal referenced above on March 17, 2006.

Exempt research is not subject to continuing review, but any modifications that (a) change the research in a substantial way, (b) might change the basis for exemption, or (c) might introduce any additional risk to subjects should be reported to the IRB, before they are implemented, in the form of a new claim for exemption or a proposal for expedited or full board review.

Extension of exempt status for exempt projects that have not changed is automatic. You should inform the Secretary of the Committee when the exempt research is completed (at least via response to yearly reminders) so that the file can be archived.

Best of luck on your project.

Richard P. McGlynn, Chair
Protection of Human Subjects Committee

APPENDIX B

RESEARCHER-DEVELOPED ATTITUDE AND OPINION INSTRUMENT

iPod Usage in the Classroom



A study conducted by the Department of Agriculture Education and Communications and the Department of Animal and Food Sciences at Texas Tech University

This survey is completely confidential and purely for education and research purposes.

Spring 2007

The use of technological advancements to replace traditional classroom resources has become a very popular trend among most major colleges and universities in the nation. The iPod is the latest technology advancement that is currently being implemented into classrooms. While this trend has been increasing, little research has been conducted in order to determine the impact and effectiveness this device has on students in the classroom.

Researchers are conducting this study with hopes of better understanding students' technology usage when it comes to educational resources. The results for this study will allow professors to provide the most beneficial and available resources to other students in the future. Therefore, it is important that you are truthful and thorough when answering.

The questions that follow will focus on how you used the iPod (if you even used it), your attitude and opinion of the iPod in the classroom, and previous/current technology usage. There is also a demographic section, which will allow researchers to better understand you and others that participate in this study.

Please remember that all personal information within this survey will be kept confidential, and your identity will not be released with your answers in anyway. Also, any responses to the following questions will not have an impact on your grade in this course in anyway, and only the aggregate information will be supplied to your instructor.

The researchers hope that you have enjoyed your experience with the iPod in this course. Thank you for your time and cooperation with everything this semester.

The iPod Researchers

15. **Did you listen to some podcasts more often than others?**

No

Yes → **If Yes,**

approximately how many times did you listen to the most frequently viewed podcasts?

_____ number of times.

16. **How many hours do you study for a traditional course?**

_____ number of hours.

17. **How many hours do you study for a technology based course?**

_____ number of hours.

18. **Reflecting back on your iPod experience, how do you believe the use of technology impacted your learning?**

	<u>Yes</u>	<u>No</u>
→ It helped me learn the content more efficiently.	<input type="checkbox"/>	<input type="checkbox"/>

→ I learned additional material beyond the course lectures.	<input type="checkbox"/>	<input type="checkbox"/>
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19. **Other than the course podcasts, what else have you used the iPod for? (check all that apply)**

Music

Videos

Podcasts (*other than the courses*)

I only used the iPod for

Section C: Your Attitudes and Opinion of iPod Usage in this Course

INSTRUCTIONS: The following statements are intended to determine your attitudes and opinions toward iPod usage as an educational resource for this course. Please indicate by circling the number that best represents your level of agreement with each statement. If you did not use the iPod in the course, please answer all of the following questions that apply.

- Very Strongly Disagree = 1*
- Disagree = 2*
- Slightly Disagree = 3*
- Slightly Agree = 4*
- Agree = 5*
- Very Strongly Agree = 6*

Attitude and Opinions	<i>Disagree</i>	<i>Agree</i>
25. It is easy to download materials onto my iPod.	1 2 3 4 5 6	
26. It is easy to access the downloaded information on my iPod.	1 2 3 4 5 6	
27. The material I download is helpful when studying.	1 2 3 4 5 6	
28. The instructor seems enthusiastic about implementing the iPod.	1 2 3 4 5 6	
29. I think that all classes should implement the iPod as an educational resource.	1 2 3 4 5 6	
30. I excel in courses that use technology.	1 2 3 4 5 6	
31. I am confident using the iPod.	1 2 3 4 5 6	

Attitude and Opinions		<i>Disagree</i>				<i>Agree</i>
32.	I enjoyed this course, including the implementation of the iPod.	1	2	3	4	5 6
33.	The iPod implementation into this course made the class more enjoyable for me.	1	2	3	4	5 6
34.	The grade that I project to get in this course is accurate to my ability.	1	2	3	4	5 6
35.	I am satisfied with the training provided to use the iPod.	1	2	3	4	5 6
36.	I am comfortable with the level of technology used in this class.	1	2	3	4	5 6
37.	A great deal of my success in this course is due to my use of the iPod.	1	2	3	4	5 6
38.	Overall, I am satisfied with this course.	1	2	3	4	5 6
39.	I learned more using the iPod in this course than I think I would have otherwise if it was set-up in the traditional setting.	1	2	3	4	5 6
40.	A technology based course is more work for the student than a traditional class type setting.	1	2	3	4	5 6

Attitude and Opinions		<i>Disagree</i>				<i>Agree</i>	
		1	2	3	4	5	6
41.	Instructors in technology driven courses spend a greater amount of time preparing resources for students.						
42.	The convenience of the iPod allowed me to study more than I usually do.						

→ *(Proceed to Section D on Page 10)*

47. **To the best of your memory, how old were you when you first started using a computer?**

Age _____

48. **Have you ever completed computer instructional course, where you learned how to use Word, Excel, etc.?**
 Yes
 No → **If No, proceed to question # 53.**

49. **How many computer courses have you completed?**
(include high school)

_____ number of computer courses completed.

50. **Where was the most recent course completed?**

High School
 Junior/Community College
 University

51. **How many semesters ago was your most recent computer course completed?**

Current – 2 semesters
 3 – 5 semesters
 6 – 8 semesters
 9 – More semesters

52. **What was your grade in the computer instructional course?**

Grade _____

58. Besides course work how often do you take part in other activities on the Internet? (check appropriate response for each)

<u>Type</u>	<u>Daily</u>	<u>Weekly</u>	<u>Monthly</u>	<u>Never</u>
E-mail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Entertainment (<i>games</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase Items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social Interactions (<i>MySpace</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information (<i>news</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sell Items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Download music, movies, podcasts, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

59. Have you ever taken a class that was completely online?

- Yes
- No

60. In which of the following learning situations do you feel you would perform the best? (select only one)

- Completely Technology Based
- Combination of Technology and Traditional
- Traditional (classroom setting only)

61. Reflecting back on your entire educational experience, how do you believe the use of technology impacted your learning?

- | | Yes | No |
|---|--------------------------|--------------------------|
| → It helped me learn the content more efficiently. | <input type="checkbox"/> | <input type="checkbox"/> |
| → I learned additional material beyond the course lectures. | <input type="checkbox"/> | <input type="checkbox"/> |

iPod Use

62. **Did you own an iPod or similar device prior to this course?**

Yes → **If Yes,**

what type?

- iPod (*music only*)
- Video iPod
- Nano
- MP3 Player
- Other _____

No → **If No,**

will you purchase one after using it in this course?

- Yes
- No

63. **Did you already have iTunes installed onto your computer prior to your iPod experience in this course?**

Yes

No → **If No,**

do you now have it installed on your computer?

- Yes
- No

→ (*Proceed to Section E on Page 15*)

Section E: Demographic Information

INSTRUCTIONS: The following questions will help us learn about you. Please check the appropriate box or fill-in the blank to the appropriate answer. Please note that as with the previous questions, all answers will remain anonymous.

64. **Gender**
 Male
 Female
65. **In what year were you born?** _____
66. **What is your ethnicity? (check one)**
 Caucasian
 Hispanic
 African-American
 Native-American
 Asian
 Other _____
67. **What percent of college do you personally pay for?**
(Make sure to include financial aid and scholarships as a percentage of payment.)
 0-24%
 24-49%
 50-74%
 75-100%
68. **What is your current academic standing?**
 Freshman
 Sophomore
 Junior
 Senior
 Grad – Master Level
 Grad – Doctoral Level

This Study is Sponsored by
Texas Tech University
International Center for Food Industry Excellence

Thank you for your help with this study.
This study will be very beneficial for understanding future technology usage in the classroom

APPENDIX C

LETTER TO DOC-AT-A-DISTANCE STUDENTS

April 12, 2007

Hello _____,

I would like to once again personally thank you for being apart of my entire thesis data collection process. Enclosed you will find several documents that I once again need you to complete. Below is a list of documents that should be included in your packet and instructions for each item.

1. A smaller envelope that says **Do Not Open**. As noted on the envelope, please bring this document with you to Methods of Tech Change on April 18, 2007. You will receive further instructions then.
2. The *California Critical Thinking Disposition Inventory* includes a blue booklet and answer sheet. Please complete this test on your own time and return both the test booklet and answer sheet. Keep in mind that this test should take you between 15 to 20 minutes. Make sure you mark your answers on the provided sheet using a #2 pencil.
3. The *Data on Your iPod* response sheet can be completed once you have completed your final for this course. Please be viewing your iPod and be very accurate and precise when completing this section. Further instructions for this are noted on the document.
4. The final document, the *iPod Usage in the Classroom* instrumentation, can also be answered after the completion of your final for this course. This questionnaire is very similar to the one that you completed last semester, but it is vital for you to complete this questionnaire as complete as possible regarding this semester. Please follow the directions within this document accordingly to your personal usage.

Once you have completed all four of these items, please return the materials to me in the provided envelope. I am fully aware that everyone is very busy, but I would greatly appreciate it if all of these items could be returned to me by May 15, 2007.

Thanks again for all of you help with this study. If you have any questions about any of this feel free to contact me at: karin.k.fritz@ttu.edu.

Sincerely,

Karin Fritz

APPENDIX D
INSTRUCTOR'S INSTRUMENT

Student's Name:

Please rank this student while comparing it to the other students currently enrolled in your iPod implemented course.

1. Punctuality

Least Punctual in Class		Less Punctual in Class		Fairly Punctual in Class		More Punctual in Class		Most Punctual in Class	
1	2	3	4	5	6	7	8	9	10

2. Commitment

Least Committed to Class		Less Committed to Class		Fairly Committed to Class		More Committed to Class		Most Committed to Class	
1	2	3	4	5	6	7	8	9	10

3. Performance

Least Performance in Class		Less Performance in Class		Fairly Performance in Class		More Performance in class		Greatest Performance in Class	
1	2	3	4	5	6	7	8	9	10

4. Attitude

Worst Attitude in Class		Bad Attitude in Class		Fair Attitude in Class		Good Attitude in Class		Best Attitude in Class	
1	2	3	4	5	6	7	8	9	10

5. Professionalism

Worst Professional in Class		Less Professional in Class		Fairly Professional in Class		More Professional in Class		Most Professional in Class	
1	2	3	4	5	6	7	8	9	10

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