MEASUREMENT OF LEARNER ATTITUDES TOWARD

INTERNET DELIVERED MULTI MEDIA

THESIS

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ABSTRACT

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What do learners think about the use of Internet delivered multi media techniques for instructional purposes? What are learners' attitudes towards learning while using Internet delivered multi media? Few studies have been published that examine learners' attitudes towards learning in a multi media environment. Learning in the twenty-first century is increasingly inundated with new technology. Learners are being faced with opportunities to find information on demand and interact with their teachers and with fellow students outside of the traditional classroom. They need to be able to draw on their own findings, knowledge and experience to enable them to adapt what they learn.

This thesis focuses on developing an instrument to measure learners' attitudes and beliefs towards learning using Internet delivered multi media. A large portion of this

study was development of a valid and reliable instrument. This process required careful and critical analysis of the terminology, word choices and statements. This valid and reliable attitude assessment tool can be continuously refined as it is tested with new groups.

This study describes learners' attitudes towards Internet delivered multi media. The subjects in this study anonymously completed the pre-test and experienced an on-line Internet delivered multi media presentation. The subjects, then, anonymously completed the post-test after the intervention. A significant difference in attitudes towards Internet delivered multi media between the two identified comfort groups was found on the pre-test and does not exist on the post-test. It is assumed the intervention is responsible for changing the subjects' attitudes towards Internet delivered multi media. Such that after viewing the short multi media segment, those uncomfortable with computers now have a higher attitude score for multi media.

CHAPTER ONE

INTRODUCTION

Humans are sensory beings. The more senses we call into action during our
constant learning process, the more complete the learning becomes and the level of
learning enjoyment increases. On the average, people learn approximately 11 percent
through what is heard and an astonishing 83 percent through what is seen. Other
researchers have reported after ten days, people generally remember only 7 percent of
what they have heard and 35 percent of what they have seen. This same research also
finds that individuals retain only 20 percent of what they hear, 30 percent of what they
see and 50 percent of what they see *and* hear (Cruver, 2001). Through the use of dawning
multimedia environments and Internet based instruction, humans converge all of their
senses into a powerful and ever expanding ability to not only learn but also to retain what
is learned.

Multimedia applications have exploded on the scene from mid- 90's to today.
Multimedia applications in the mid- 90's were uncommon teaching tools due to their high
cost. The early use of computers to present text was a big step. However, integration with
graphics, video, animation, and sound would come later. At the dawn of Y2K the
integration was taking place at blazing speed along with the expanding multimedia

market. Today technology is a fact of American life. It influences how individuals live, work and play. New technologies are essential for business success and as a means to acquire information. "For example, in 1993 an estimated 12 million plus Americans regularly used electronic mail. By October 1994, the number of e-mail users was estimated to be more than 27 million." (Office of Technology Assessment, 1995). The need for the education of our children in technology related media is greater than ever. Schools around the country have had to respond to an epidemic of sorts relating to the need for technology integration in the learning process. Lack of funding for technology integration made it difficult for schools to keep pace. However in the past few years, increases in congressional spending have helped schools close the gap. *Interactive multimedia* is a tool which educators have used to bring our children into a new age.

Computer multimedia has evolved from the simple computer program to single-user CD-ROM interactive programs to networked digitized audio and video streamed presentations that can be asynchronous or synchronous. Not only has software evolved, hardware performance now leads software in the market. In the past, software programmers wrote code that taxed the hardware. As a result, increased performance and lower costs have helped make multimedia commonplace in both home and school. Today nearly all personal computers (PC's) are capable of displaying video, though the resolution available depends on the power of the computer and monitor. A typical hardware and software package that is capable of adding multimedia to a computer includes a CD-ROM/DVD player, a sound card, advanced graphics card with extensive video memory, speakers and a bundle of CD-ROMs (Vrtacnik, 2000).

Internet based multimedia has the flexibility to reach learners of various ages and learning styles. This flexibility has created a paradigm shift from the traditional teacher/learner interaction to a situation where the learner has access and control of most of the informational content in various forms accessible at the learners' convenience. The students may access the information at their discretion at any chosen location. The technologies support both synchronous and asynchronous interactions with students. Synchronous delivery occurs when learner and teacher are viewing content, video, or a course at the same time, whereas asynchronous delivery occurs when the learner and teacher view the content or course at different times.

Multimedia is being widely hailed as the next great innovation in education and there is considerable anecdotal evidence for the benefits of including multimedia features in the learning process. "Perry, Perry (1998), and Ellis (2001) cited case studies in which improvements in student attitude, student and teacher enthusiasm and improved teamwork were noted in test cases using multimedia enhancements.

However, the growth of multimedia innovation does not guarantee participation and acceptance by the learner. Learner attitudes that are negative towards multimedia-based instruction may deter using this technology for learning. Therefore, the awareness of student attitudes towards multimedia-based instruction is critical when developing multimedia-based curriculum. Attitudes influence the acceptance of this medium and the future behaviors in the learning process. Therefore, the learners' attitudes must be continuously monitored (Garcia, 2001).

Goals and objectives:

The study goals are: (1) to measure learner attitudes towards internet based media/multimedia education; (2) to identify demographic differences of attitudes towards internet based media/multimedia education (age, gender, prior use of computers); and (3) to identify learner preference. In order to accomplish these goals, the following must be completed.

1. Develop a valid and reliable instrument to measure learners' attitudes toward Internet delivered multi media.

2. Pilot the instrument, complete a factor analysis and improve the instrument based upon that analysis.

The researchers believe the learners that participate in this study will experience positive attitudinal differences towards Internet based media/multimedia education after experiencing a streaming audio multimedia presentation on line.

This study will describe the results of the change in learners attitudes towards Internet delivered multi media, the results of the pilot study and future directions of Internet delivered multi media education.

DEFINITION OF TERMS

Animated GIF (Graphics Interchange Format): This is a graphic image file on a Web page the provide the illusion of movement - for example, a twirling icon or a banner with a hand that waves or letters that magically get larger. Asynchronous: Describes objects or events that are not coordinated in time.

Asynchronous communication: Communication taking place at different times. For example with on-line learning, the teachers and students interact asynchronously by electronic mail, streaming media conferencing programs or chat rooms instead of face-to-face conversations.

Asynchronous Learning Networks (ALNs): Distributed learning environments that are "virtual classrooms" involving asynchronous interaction and the exchange of information exclusively on-line without face-to-face interaction.

Bandwidth: Describes the total capacity to transfer data over a measured time period between computers. Bandwidth is directly proportional to the amount of data transmitted or received per unit time. For example, it takes more bandwidth to download a photograph in one second than it takes to download a page of text in a few seconds, depending on size of the file. Large sound files, computer programs, and animated videos require more bandwidth for acceptable system performance. Virtual reality and full-length three-dimensional audio/visual presentations require the most bandwidth. See figure 1 for illustration of bandwidth.

Fatter pipe, greater bandwidth

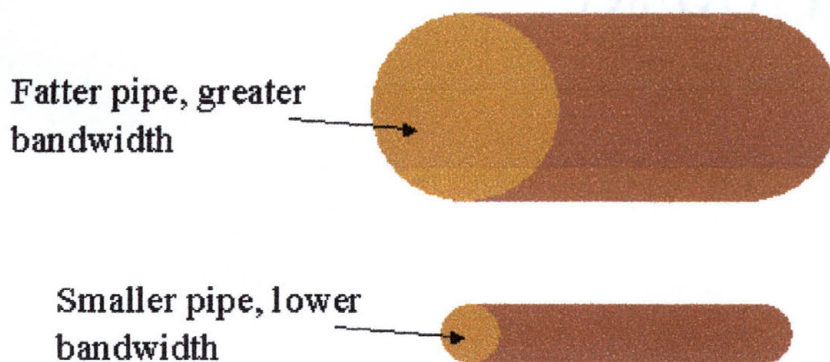Smaller pipe, lower bandwidth

Figure 1. Bandwidth Illustration

Blackboard: Course authoring software for web or on-line courses.

Browser: A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web.

CD ROM (Compact Disc-Read-Only Memory): Pronounced see-dee-rom and the abbreviation of **C**ompact **D**isc-**R**ead-**O**nly **M**emory. This is an optical disk capable of storing large amounts of data, up to 640 megabyte.

CD ROM player/CD-ROM drive: This is a device that reads information from a CD-ROM. The player may be internal or external to the computer case.

Chat room: This is a virtual room where visitors can meet others and share ideas on a particular subject while conversing over the Internet.

Computer: A computer is a programmable, electronic machine that can store, retrieve, and process data.

Computer Assisted Instruction (CAI): Computer assisted instruction is normally applied to the "drill and practice" type of computerized instruction as used for military training or elementary education, in which little if any two way exchange of ideas occurs.

Computer Mediated Communication (CMC): Computer mediated communication describes interactive textual exchange in learning networks. A related term is computer mediated instruction, or CMI. Learning networks are comprised of professors and students communicating with each other in real time (synchronously) or off-line and sequentially (asynchronously).

DVD: **D**igital **V**ersatile **D**isc or digital video disc a new type of CD-ROM that holds 4.7GB(gigabytes), which is enough space for a full-length movie.

DVD player: Plays the DVD or CD-ROMs, video CDs and DVD-ROMs.

E-learning: Instructional content or learning experiences delivered or enabled by electronic technology.

E-mail (electronic mail): A service that sends messages on computers via a local or global network.

GIF: **G**raphics **I**nterchange **F**ormat is one of the two most common file formats for graphic images on the World Wide Web.

HTML (Hypertext Markup Language): The set of markup symbols or codes inserted in a file intended for display on a World Wide Web browser page. The markup tells the Web browser how to display a Web page's words and images for the learner.

Hyperlink: a link in an HTML document that leads to another World Wide Web site, or another place within the same document.

Hypermedia: The linking of multimedia to Web documents. This is the integration of text, images, sound, graphics, animation, and video by way of hyperlinks.

Hypertext: A special type of database system in which objects (text, pictures, graphics) are creatively linked to each other. Selecting one object allows the user to see all other objects linked to it. This type of system is useful for browsing large databases.

Illustrated audio: Static PowerPoint slides with recorded audio files.

JPEG (Joint Photographic Experts Group): is a graphic image file format for images on the World Wide Web.

Internet: A worldwide information highway that is comprised of a global network of millions of interconnected computer all over the world.

Listserv: An automated electronic mailing list to post messages that are distributed to all list subscribers.

Media: plural of medium, is from the Latin word for middle and describes that which stands between the receiver and the source of the message. It is commonly used to describe ways to convey information and entertainment.

Multicast: Multicast is communication between a single sender and multiple receivers on a network.

Multimedia: Multimedia is the delivery of information in a computer-based presentation that integrates two or more kinds of media including text, graphic, motion video, still video, voice recognition, animation and sound. It is also defined as the use of computers to present text, graphics, video and animation and sound in an integrated way.

- Text and sound
- Text, sound, and still or animated graphic images
- Text, sound, and video images
- Video and sound
- Multiple display areas, images, or presentations presented concurrently
- In live situations, the use of a speaker or actors and "props" together with sound, images, and motion video

Multimedia Compact Disc (MMCD) : A CD-ROM that can hold 4.7 Gigabytes of data, including video.

<u>Online instruction</u>: On-line instruction refers to teaching and learning mediated by a computer. Online instruction implies a connection to a computer system at a venue distinct from the learner's personal computer; this venue can be across the world or across campus.

<u>Plug-In</u>: Plug-in applications are programs that can easily be installed and used as part of your Web browser. The browser can be configured to recognize a plug-in application automatically and its function is integrated into the main HTML file that is being presented.

Popular plug-ins to download are Adobe's Acrobat, a document presentation and navigation program that lets you view documents just as they look in the print medium, RealNetworks' streaming videoplayer, and Macromedia's Shockwave for Director, an interactive animation and sound player. There are hundreds of possible plug-ins. Most users wait until they need a particular plug-in before they download it.

<u>Server</u>: A server is a computer program that provides services to other computer programs in the same or other computers or the computer which hosts that software.

<u>Sound card</u>: The sound card enables the computer to output sound through the speakers, to record sound from a microphone connected to the computer, and to manipulate sound stored on a disk.

<u>Streaming media</u>: Multimedia content stored on a server and delivered to a client computer without significant delay in starting. The streaming file starts to play before it has all downloaded to the client computer.

<u>Streaming sound</u>: Streaming sound is sound that is played as it arrives. The alternative is a sound recording that does not start playing until the entire file has arrived. Support for streaming sound may require a plug-in player or come with the browser.

<u>Streaming video</u>: Streaming video is a sequence of moving images that are sent in a compressed form over the Internet and displayed by the learner as they arrive. A Web user does not have to wait to download a large file before seeing the video or streaming media. The media is sent in a continuous stream and is played as it arrives. The user needs a *player* program that uncompresses and sends video data to the display and audio data to speakers. A player can be either part of a browser or downloaded from the software maker's Web site.

Streaming video is usually sent from prerecorded video files, yet may be distributed as part of a live broadcast. In a live broadcast, the video signal is converted into a compressed digital signal and transmitted from a special Web server that is able to do multicast, sending the same file to multiple users at the same time.

Synchronous: Describes events that are coordinated in time.

Synchronous communication: Communication that takes place at the same time. For example with on-line learning, the student and teacher may communicate via streaming media by a Web camera or videoconferencing.

Synchronized Multimedia Integration Language (SMIL): This standard allows multimedia content to be synchronized. SMIL can greatly reduce the bandwidth required for streaming media.

Unicast: Unicast is communication between a single sender and a single receiver over a network.

Uniform Resourse Locator or URL: The global address of documents and other resources on the World Wide Web.

Web page: A document on the World Wide Web. Each Web page is identified by the URL (Uniform Resource Locator).

WebCT: Course authoring tool for web or on-line courses.

Webserver: A Web server is a program that serves the files from Web pages to Web users.

Website: A location or site on the World Wide Web. Each Web site contains a home page, which is the first document users see when entering a site. Each site is owned and managed by an individual or company.

World Wide Web: A system of Internet servers that support specially formatted documents. The World Wide Web is synonymous with *the Internet*.

CHAPTER TWO

LITERATURE REVIEW

Advances in technology are increasing our capacity to communicate greater quantities of information to learners in a manner that increases learning while providing a more efficient use of time (Gatlin-Watts, et. al, 1999). Multimedia has made learning more meaningful and interesting. Multimedia is a vehicle for fostering interaction and reinforcing the connection between curriculum and learning. It can energize, reshape, and enrich educational experiences when integrated into instruction. Internet delivered multi media enhance teaching-learning strategies and processes that promote learner-content, learner-learner, and learner-instructor interactions. Internet delivered multi media use can enhance student self-reflection, problem solving, critical analysis, cultural sensitivity, and acquisition and development of new knowledge (Gatlin-Watts, 1999).

Multimedia offers numerous platforms for learning and teaching. It is a technique of organizing information using text, graphics, sounds, video, streaming media or any combination of these. Internet delivered multi media is using these formats through the Internet. This provides a vibrant environment that allows learners to immediately access information. A unique feature of multimedia allows the learner to have different levels of control over the pace of the material.

Some believe multimedia provides a pedagogical approach to revolutionize traditional educational methods. However, "to establish the effectiveness of multimedia as an instructional tool, the results of learning by multimedia needs to be compared to attitudes and knowledge of the learners using a text (Nowaczyk, 1998). In the "Student Perception of Multimedia in the Undergraduate Classroom" study the learners evaluated the effectiveness of multimedia. The results indicated the learners were able to differentiate among the media in terms of their contributions to maintaining or increasing learner interest as well as to the understanding of course material. The effectiveness of multimedia appears to vary with learner ability (Nowaczyk, 1998).

What do learners think about the use of multimedia techniques for instructional purposes? Few studies have been done to examine the learners' attitudes and perceptions towards learning in a multimedia environment. What is an attitude? What is a perception? According to Guan and others, Fishbein and Ajzen define *attitude* as a "learned predisposition to respond in a consistent favorable and unfavorable manner with respect to a given object," (Guan, 1998). Instructional activities should have some measurable, positive effect on learners' attitudes.

Hayes and Robinson (2000) stated, "Learners' attitudes toward computer based education have been positive at all levels." They also reported a study conducted by Arndt, Clevenger and Meiskey. This group mailed a 74-item questionnaire to fifteen hundred students. The questions included demographic information; ways learners were introduced to computers and learner's attitudes toward computers. Of the 1500

questionnaires mailed, 737 were returned. Learners who perceived the knowledge of computing as important in their careers viewed the computer as pleasing, as having a warm emotional impact and as being effective and powerful (Hayes, et.al, 2000). This study concluded there is no gender-linked differences in attitudes toward computers, however Collis reported negative attitudes by women toward computer usage. (Hayes, et. al, 2000).

A meta-analysis conducted by Kulik, Kulik and Cohen (1980) consisted of 59 studies, 11 that contained results from quantitative comparisons of learner attitudes toward instruction in computer based and conventional classes. Of the eleven studies, 8 reported the rating of computer-based instruction was higher than conventional classes. Seven of the studies examined effects on learner attitudes toward subject matter (Hayes, et. al., 2000).

The cliché, "A picture is worth a thousand words," is intuitively agreed with. Someone may describe a person to us yet the description is rarely "pictured" until the photograph of the person is presented. Multimedia involves multiple senses. This use of multiple senses along with repetition enhances learning. A learner who sees and hears something is more apt to remember the fact versus *only* seeing it or *only* hearing the fact. Multimedia engages more of the senses by using still pictures, pictures with audio, streaming media and video. These interactions engage higher order thinking processes in the brain and facilitate learning. The learner may view the information at their own pace and multiple times to enhance learning (Takacs, et. al 1999).

Multimedia can empower learners to have greater control over their learning processes. Learners are able to decide when an how to learn. Learners cannot take a multimedia course passively. It enables self-paced learning and learners must interact with the media. The depth and direction of the course may change however, the information may be geared to match the learners' capabilities (Gatlin-Watts, et. al, 1999). Learning styles are important variables in cognitive information processes. Learning styles are perceptions, processes and preferences used by individuals to learn. Learning styles are ways people retain information or skills. Kolb's (1985) definition emphasizes processing and perception of information within a learning situation.

Learning Styles

Kolb (1984) identified four learning styles based on learner's information processing and understanding. Learners are either active or reflective information processors. Their understanding is based on concrete or abstract perceptions. Kolb identifies four learning styles; diverger, accommodator, assimilator and converger.

Divergers use reflective processing and concrete conceptualization. This group tends to have broad interests and like to gather information. Divergers would rather observe situations instead of taking part in a situation. Therefore this group would prefer to learn in situations that allow them to observe, such as a lecture.

Accommodators are active processors and rely on concrete concepts. When faced with a problem, an accommodator may rely on "gut" feelings rather than facts. These learners prefer "hands-on" challenging experiences.

Assimilators are active processors of information. They rely on abstract concepts and reflective processing. This group is logical, concise and focused on abstract ideas and concepts. Assimilator learners prefer to have organized and structured instruction along with developing their own theories.

Convergers are active processors of information, problem solvers and make decisions based on solutions to problems. They prefer practical instructional settings that allow them to solve problems.

Multimedia "hooks" learners through the use of sight, sound and response. A multimedia environment can be very motivating because it deviates from the mundane workbooks and texts with which learners are *all too* familiar. Multimedia tools invite learners to interact and explore classroom experiences that should improve attitudes. With the integration of text, voice, video, photography and animation, there comes a revolution in the art of instruction and the joy of learning. This model allows instructors to go beyond classroom techniques and bring to life what was once impossible (Takacs, et. al 1999).

The U.S. Congress Office of Technology Assessment (1995) found technology has changed the way we teach and learn. Some teachers use technology in a "traditional

teacher-centered" method for drill and practice for mastery of basic skills. Others use technology to support a "student-centered" approach to instruction so students make their own scientific inquiries and engage in collaborative activities. The teacher assumes the role of facilitator or coach (Office of Technology Assessment, 1995).

Accessibility Implications for Multimedia

Multimedia techniques are engaging instructional tools.

> "Everyone benefits from dynamic visual displays and dialog. Well, not everyone. Viewers who are deaf miss all audio content that is not also presented in a visual form. Those who are blind can access only the visual content that is also presented in spoken form. It is not difficult to make video and multimedia products accessible to viewers with sensory impairments, but special considerations should be made at the design phase to assure full access to everyone."
> (Burgstahler, 2001)

Electronic accommodations can assist those who are deaf by providing text captioning or links to texts. Millions of Americans have enough hearing loss to affect their ability to hear at a typical volume level. Some people are born deaf or are hard-of-hearing, others experience a hearing loss from accident or illness, and some gradually lose their ability to hear. The elderly are the fastest growing group of individuals who are deaf or hard-of-hearing. Text links allow these people to fully access educational materials with fellow students.

Although captions were developed to make home television accessible to viewers who are deaf and hard-of-hearing, they are important to Internet based video. There are several types of captioning. "Off-line captioning" is developed once the video has been created. The captioner types the captions, which are the recorded on the video image. Captions typically appear on the screen as a group and erase as a group since they do not scroll. Captions are either "open" or "closed." Open captioning appears on the screen wherever the video is presented. It is recommended that products be specifically designed for people with disabilities, for training and education. Closed captions appear only when special equipment, called decoders, are purchased by individuals. "Since 1993 all television sets thirteen inches or larger sold for use in the United States must have built-in decoders." (Burgstahler, 2001)

"Real-time captions" are simultaneously created during a video production. They are most frequently used for live programs such as videoconferences. Similar to a courtroom reporter, a trained stenotypist enters spoken content by typing phonetic codes on a special keyboard that facilitates high-speed transcription. Computer software translates the phonetic codes into text that typically scroll across the bottom of the video production in a continuous motion.

Captioning is usually considered when the video production is complete. Special precautions need to be considered to avoid covering critical visual content with captioning. Burgstahler provides several suggestions for making attractive and functional captions, these include:

- Use one or two lines of text.
- Use a sans serif font, such as Helvetica, and proportional spacing.
- Caption the exact wording of speakers, including slang and grammatical errors. Occasionally a few words may be edited to facilitate reading speed.
- Caption sound effects that contribute to the understanding of the content.
- Use italics to indicate the narrator, off-screen voices, sound effects, and other vital information.
- Synchronize captions with the aural content.
- Avoid changing the location of captions on the screen.

(Burgstahler, 2001)

People who are blind cannot access the visual content of a video production unless there is an audio link available. Once a video product is complete, audio content must be added to the production. When pauses occur in the original production, the audio description voice reads the titles and speakers' names, describes the scenery, objects, and other visual information. Because additional audio description is not of value to other audiences it can be distracting. Audio descriptions are usually not included with a standard video but can be provided as an optional format. Providing this option is particularly important for Internet based videos used in educational programs at all levels. The audio link may be used by those who need this service therefore, it is not distracting to other viewers.

The National Center for Accessible Media (NCAM) is a research and development facility that works to make media accessible to disabled persons, minority-language users and people with low literacy skills. This site also maintains separate types of disabilities. NCAM promotes the use of a Web Access symbol and provides model examples of accessible pages. Creators of web and CD-based multimedia projects need an authoring

tool to make their materials accessible to persons with disabilities. NCAM meets this need by providing MAGpie, the ideal authoring environment for multimedia providers who want to add captions, subtitles and audio descriptions to their work. The Trace Research and Development Center provide funding for MAGpie. (http://www.wqbh.org/wqbh/pages/ncam)

What is Streaming Media?

"Streaming media technology enables a teacher or trainer to include real time audio video into content web sites (Howles, 2002)." This is due to the bandwidth. Bandwidth describes the speed the data flows between computers. Bandwidth is directly proportional to the amount of data transmitted or received per unit of time (Webopedia, 2002). Successful streaming media is dependant on the encoding process for transmission and the amount of bandwidth required to view the media properly. Text, graphics, animation, audio and video require a certain amount of bandwidth to move across the networks rapidly.

Many times the streaming media is encoded for transmission to cable modems or DSL connections. If learners are accessing courses page with a high bandwidth line, they can see and hear high quality streaming media more quickly because it passes easily through the big pipe. However, when learners are using a slow dialup connection with a standard 28.8 or 56K modem the streaming media must be capable of passing through the smaller bandwidth. Therefore, to stream media at this speed a high degree of compression

is need for the audio and video files. The compression may eliminate portions of the audio and video data. The compression allows for "reasonable" changes to be made to the picture element, making the picture appear to move yet the learner will see choppy video playing for a few seconds and then pause for several seconds until more streaming data is transferred to the computer. This explains why many videos seen over the Internet have poor sound and clarity (Webopedia, 2002).

Streaming media differs from typical audio/video presentations on the Web. It can be viewed while it is being downloaded. Streaming audio became available on the Web in 1995. "Before streaming media technology, a video file had to be downloaded in its entirety before it could be viewed. Depending on the media quality and file size, it could take longer to download than to actually view it (Cox, 2002).

Three of the most popular formats for streaming media are: REAL Networks REAL Media, Apple QuickTime and Microsoft Windows Media. The users will need to install *player* software on their personal computers to view the content. RealNetworks RealPlayer (http://www.real.com/realone/index.html?lang=en&loc=us) is available free. MicroSoft's Windows Media Player (http://www.real.com/realone/index.html?lang=en&loc=us) and Apple Quicktime Player (http://www.apple.com/quicktime/) are available free from each manufacturer's website.

The implications for Internet based pedagogy are tremendous. We are now able to teach educational courses on the desktop. Streaming media allows the learner to link to a video or audio content in a matter of seconds.

Streaming technology started about eight years ago. At that time, the file would have to be fully downloaded to the computer's hard drive before viewing could begin. Now the files take two minutes to two hours to download depending on the file size. Streaming technology allows the learner to view and listen to the slides as they are downloaded in real time. The content of the media file begins to flow in a continuous stream from the remote server to the learner's computer. The media file may momentarily pause or break up due to heavy Internet traffic or a poor network connection (Howles, 2002)

The content material for the streaming media may be prerecorded or a live presentation. The live presentation requires the learner to access a web site to watch and listen to the material. This type of learning is synchronous, all learners access the content at the same time. In the event a learner accesses the content late or after the streaming has began, the learner will begin at this point. Similar to walking into a movie after it has already started. The prerecorded content material allows the learner to view the content anywhere and anytime. This type of learning is asynchronous, the learner can view the content at various times of day or night. The beauty of this type of streaming media is the learner does not miss any of the content. "This is the magic of making streaming technology such a promising form of education and training" (Howles, 2002).

Streaming media may be able to ease the limits of time and space for educational activities. Streaming media will be able to bring the experts to the learners. It is

especially important for the increasing number of nontraditional students in higher education and corporate training.

There are different approaches to streaming content for teaching via the Internet. The options include: audio, audio with slides, motion video, animation live web casts and combinations of these approaches. It is important to select the most suitable approach for the content material, budget and resources available

Audio is the simplest type of media to stream due to requiring the least amount of time and technical expertise to produce. Audio is the most reliable source of all the streaming formats. Audio streaming is best for delivering music, recorded interviews, language comprehension instruction and news reports. Audio files reside on the content provider's servers and due to this there may be a slight delay for the user after clicking on an audio link (Howles, 2002).

Many teachers and trainers use PowerPoint slides for lectures. A recorded audio file can be added to the static slides for viewing at a later time. This is referred to as Illustrated audio and it can be just as effective as video and is easier to produce.

Streaming video may be used for primarily used with online educational purposes to promote psychomotor skills such as in a medical or laboratory procedure (Howles, 2002). Streaming video usually refers to motion video with accompanying audio that is delivered "live" over the Internet in real time. The user does not have to download a file to a personal computer and play it back later (Van Horn, 2001).

"Streaming " is a technique used to speed up the delivery of the large video files. Streaming divides the large media files into smaller pieces, that are passed or "streamed' to the computer and then passed back to the server. The files viewed by streaming are not permanently downloaded (Knee, 2000).

In order for a video file to play smoothly, the video data must be available continuously and in the proper sequence without interruption. The video file remains on the server with streaming. The initial part of the video is copied to a buffer on the PC and then, after a short delay, called "preroll", starts to play and continues as the rest of the file is being pulled down. Streaming provides a steady method of delivery controlled by interaction between the PC and the server. Depending on the type of server, it may regulate the stream according to the network congestion and optimize the presentation on the PC (Strom, 2001).

Sound and video files require a high data rate and a large amount of bandwidth. For example, one second of full screen motion video requires about 240,000 kilobits per second or 30 megabites per second of bandwidth in order to play on a computer. Accommodating the bandwidth requirements for rich media is the greatest challenge to streaming media (Howles, 2002).

Delivering media files to the user/learner requires a streaming server. This server consists of hardware, software, a computer with media files and a connection to the network (Howles, 2002). There are three main manufacturers of streaming servers, Apple QuickTime, RealNetworks RealServer, and Windows Media Server,

The streaming server is capable of delivering a limited number of streams at any given moment in time. Hundreds of learners will NOT be able to access the server simultaneously. The capacity of a streaming server is measured in terms of the simultaneous streams available in a moment in time. This can range between 20-5000. Once a server has reached the maximum capacity, a message appears on the user screen telling the user to try playing the stream at a later time (Howles, 2002).

Instruments

There are numerous computer attitude scales available in the literature. Many have been developed with the purpose of measuring anxiety and other attitudes toward computers. The Computer Anxiety Index (Montag et. al., 1984) examines negative attitudes toward computers, caution with computers and disinterest in computers. The Computer Attitude Scale (Gressard & Loyd, 1984), measures confidence and computer anxiety and liking. Utilizing a Likert-type format, The Attitudes Towards Computers Scale (Raub, 1981), assesses computer usage, computer appreciation and societal impact. The Bloomberg Erikson Lowrey Computer Attitude Task (Erickson, 1987) is a composite of the first three scales combining 5 subscales: computer liking, comfort with computers, usefulness of computers, attitude towards success with computers, and computers as a male domain (Garcia, 2001).

All of the previous references review existing surveys that are available and measure attitudes towards computers and focus on general attitudinal parameters rather than on in-depth attitude-related dimensions. The surveys reviewed, explore learners'

attitudes towards computers, and none of them elicit learners' perceptions about multimedia instruction.

However, Garcia developed the Multimedia Attitude Survey (MAS) to focus on multimedia technology and multimedia based instruction. The MAS provides teachers with a tool to assess learner attitudes toward multimedia-based instruction. It can have practical implications in helping to modify the curriculum and in understanding how learners feel about multimedia instruction in order to guarantee more positive outcomes (Garcia, 2001).

Smith and Woody at North Georgia College and State University compared multimedia and traditional teaching approaches. They observed the multimedia class performing poorly early on in the term yet slightly exceeding the traditional class toward the end of the term. They also documented an interaction between class format and student learning style. The conclusion of this study suggested multimedia benefits students with a high visual orientation (Smith, et. al., 2000).

New technologies often meet with resistance. Perry and Perry created a Multimedia Opinion Survey to measure student's preference among various presentation methods. The Multimedia Opinion survey classified the items under the affective and cognitive domains. The Perry's study concluded students prefer to attend classes that utilize multimedia. Students felt multimedia held their attention better than traditional methods of learning. This study also concluded, multimedia positively affects student learning, retaining information, and understanding difficult concepts better (Perry, 1998).

The increased use of multimedia in education continues as technology and software improve. Multimedia increases flexibility and access to learning for life-long learners. It also enhances psychomotor and intellectual skills such as problem solving and decision making along with collaborative learning skills. Perry and Perry concluded learners preferred to attend classes that utilize multimedia. The learners found the multimedia class to be more interesting and enjoyable. The study also concluded learners were able to cover more material, retain course material longer and understand difficult concepts better when taught with multimedia (Perry, 1998).

On the other hand, Nowaczyk's group reported there is little evidence to support the effectiveness of multimedia as a positive influence in the learning process. Nowaczyk documented the study by R.E. Clark, who argues there is little solid evidence to support any specific medium over another in terms of learning benefits. The students may be responding to a change in presentation of material and not the multimedia. Nowaczyk's group also hypothesized that students will value those forms of multimedia that enhance their learning of material as it related directly to course examinations (Nowaczyk, et.al, 2000).

Innovation of Multimedia

First, the process of innovation will be explored. Research relating to the diffusion of innovation has been based primarily on individual characteristics. Rogers (1995) describes an innovation as an "idea, practice, or object perceived as new by an individual or other unit of adoption" (p. 117). When an innovation is introduced into a society, not

everyone adopts it at the same time. Some may never adopt the innovation. Rogers

(1995) compiled diffusion research from multiple disciplines and found one key to

examining the diffusion process is to recognize that it is a social process in which

individuals tend to adopt or not adopt an innovation as a result of conversations with

others. Networks of communication are used by diffusion scholars to determine the rate

of innovation diffusion and an individual's time of adoption (Rogers, 1995). Four

adoption categories based on time of adoption have been developed out of diffusion

research: early adopters, early majority, late majority and laggards (Rogers, 1995).

Rogers' diffusion of innovation model identifies the early adopters as the

"innovators" who make up no more than three percent of the population. These tend to be

the "techies" who are intrigued by new developments in hardware and software. They are

able to use the technology independently with out any assistance or support (Rogers,

1995).

"Early adopters" make up about ten percent of the population and are considered the

"visionaries". They combine an interest in and competence using technology with a

desire to incorporate these new technologies. "Early adopters" are quite self-sufficient in

the use and application of technology (Rogers, 1995).

However, of the majority of the population, seventy percent are divided into two

classifications, the "early majority" and the "late majority." The "early majority" are

receptive to new technology and willing to use it as long as it is proven and reliable. The

"late majority" are skeptical and less receptive to new technology. This group has to be

convinced or coerced to accept the technology. The last groups are the "laggards" and they have absolutely no interest in using new technology and are usually the loudest opposition to change (Rogers, 1995).

Innovation towards technology occurs in stages. The transformation stage is usually first. This first stage is marked by the adopters seeking out the resources and expertise to implement or incorporate the technology into the learning environment. The second stage, a wave of adopters, may have a strong commitment to quality learning yet are wary of new technology. This group of adopters begins to see this situation as an opportunity instead of a threat, yet still fearful of the unknown unlike the risk takers. Adopting new technology places new demands on the adopters (Hagner, 2000).

The process of managing an innovation is comprised in five steps. The first step is to understand the forces that trigger change in the current way business is conducted. Changes to the status quo may occur for various reasons, possibly in this instance, the desire to improve technology and on-line learning. Other triggers include changes in competition, funding, and attitudes of the major stakeholders, organizational structures and rewards (Jaffee, 1998).

The second step involves debating about the appropriate responses to the triggers. Contributions to the debate may be a domino reaction by those who stand to lose or gain as a result of the likely innovation. Such responses are subject to scrutiny due to being based on anything other than evidenced based research (Rogers, 1995).

The formulation of recommendations may be seen as a part of the debate process. However, this is the third step of innovation. The recommendations are often driven by a political agenda and further may shape the debate process. The evidence of the research is paramount at this time to form a platform for the debate (Jaffee, 1998).

Implementation is the fourth step in innovation. Implementation must be correctly supported by the appropriate mechanisms to be successful. Identifying resources, funding and support at this stage will make or break the implementation stage, especially when one of these is lacking.

The final step involves evaluating and reviewing the success or failure of the innovation. Although evaluation is characterized by all aspects of the innovation process, from the needs analysis to the implementation, it is important to separate this step. The outcomes may be evaluated utilizing various research methods and may identify triggers for further refinement of the innovation or may prompt a search for a better method (Jaffee, 1998).

Corporate culture influences the success of new technology. The relationship between innovation and culture is recognized in the books, *Diffusion of Innovations* by Everett M.Rogers and *Sustaining Innovation* by Paul C. Light (Hagner, 2000). Innovators must consider the organizational culture to succeed at implementing new technology.

CHAPTER THREE

METHODOLOGY AND PROCEDURES

Statement of Research Hypothesis

Learners who experience an Internet delivered multi media presentation will change

their attitudes and perceptions about learning by this medium.

The Research Design:

This is a descriptive quasi-experimental qualitative and quantitative study to

identify learner's attitudes towards Internet delivered multi media. Descriptive studies

usually assess attitudes, opinions, preferences, demographics, practices and procedures.

Descriptive data are gathered either by interview, questionnaire, or observation. This

study developed an instrument to measure learners attitudes.

The subjects identify their attitudes towards Internet delivered multi media

instruction (pre-test), experience an on-line Internet multimedia audio-streamed

presentation and are surveyed again (post-test) to determine the change in attitude and

perception toward this type of instruction after the intervention. The Southwest Texas

State University Institutional Review Board for the human subjects research has approved the design of this study.

Instrument Development:

Constructing a valid and reliable instrument was essential (found in Appendix C). Validity is expressed by three different approaches: content validity, criterion-related validity and construct validity, however, each is pertinent to the other. The reliability of an instrument expresses the degree an instrument measures whatever it was set out to measure. The more reliable an instrument, the more confidence the instrument scores obtained would be reproduced when administered again to the same participants (test-re-test).

The first draft instrument used a two position forced choice response to the statements. This instrument forces respondents to choose between the two options provided, Agree or Disagree. This format enhances consistency of responses, makes it easier to tabulate and code the data into a database and is easier and quicker for subjects to respond. However the disadvantages of this format may include constraining or limiting the respondents' choice. Some respondents are uncomfortable in completing a scale with no neutral position.

The first section of the instrument identified standard demographic information from the participants: a) gender, b) ethnic origin, and c) age and technology related information: a) computer experience, and b) comfort using computers. The second

section of the instrument identified learner beliefs and values towards Internet delivered

multi media instruction. The respondent selected one of the two choices, agree or

disagree. The respondent expressed his or her opinion towards the strengths, weaknesses

and importance of Internet delivered multi media instruction on the third section of the

instrument. The quantitative items on the instrument include:

- Learners' attitudes toward computer and professor interaction
- Learners' attitudes toward the learner's control over the content
- Learners' attitude towards the degree of involvement in the course activities
- Learners' perceptions towards self-paced instruction
- Learners' level of anxiety when working with Internet delivered instruction
- Learners' perceptions of the user-friendliness of the Interent delivered multi media platform.

The first draft instrument was jury validated for content. The thirty-seven-statement

instrument was administered in a graduate course and fifteen items were eliminated after

careful analysis. This twenty-two-item instrument was pilot tested a second time and two

more questions were eliminated. This reduced the number of items on the instrument to

twenty. Qualitative results for each pilot test indicated that the instrument could

discriminate between attitudes toward Internet delivered multi media instruction.

In a second draft, items were added to the instrument to measure learner values

related to instructional technology. This resulted in a forty-seven-item instrument, in

which the respondent was forced to agree or disagree with the statements.

Draft three of the instrument was then administered to forty-seven (n=47)

undergraduate allied health students. The sample distribution was 70% female and 30%

male, 40% White Non-Hispanic, 47% Hispanic, 4% Asian-Pacific Islander, 6% Black-Non Hispanic and 2% American Indian or Alaskan Native.

This draft of the instrument was reviewed and found to be a homogenous instrument with good internal validity and reliability. The reliability value for the Chrone box internal alpha was 0.897. The Analysis of Variance (ANOVA) was used to test for differences (p<.05) between the group of subjects and the years of computer experience. The subjects grouped based on the following scale: less than 1 year,1-2 years, 2-5 years and more than 5 years. At this time it was suggested to broaden the years of experience to the following: less than 1 year, 2-5 years, 5-10 years and more than 10 years.

There were no differences in attitudes towards multi media between ethnic backgrounds or gender for the undergraduate allied health students. Ninety-five percent of the respondents reported feeling comfortable using computers, 100% of the females and 86% of the males were comfortable with computers. Sixty-eight percent of the subjects had more than 5 years of experience with computers.

The principle components factor analysis with a varamax rotation identified three factors in addition to measurement of attitudes to assist with the overall assessment of individual reactions to multimedia. The three factors are identified in the following table.

Table 1. Factors for Draft Three

Factor 1	Learner score for Internet delivered multi media as an *effective* learning tool.
Factor 2	Learner score for their *preference* for Internet delivered multi media courses.
Factor 3	Learner score for how Internet delivered multi media *enhances* learning.

1) Factor one: Learner score for overall Internet delivered multi media as an

effective learning tool. This factor identified principle components for assessing not only

beliefs about multimedia, but also the type of delivery system.

2) Factor two: Learner score of *preference* for courses using Internet delivered

multi media. This factor measures learners' preference for learning. The subjects in the

study indicated a preference for teacher based delivery over the Internet delivered multi

media.

3) Factor three: Learner score for how Internet delivered multi media *enhances*

learning. This factor measures attitudes of preference. This is a key underlying

assumption that those individuals who perceive that Internet delivered multi media

enhances learning are more likely to gain the most advantage from this type of delivery

system.

The draft four instrument was rewritten as a final twenty-one-statement

instrument with five background and demographic statements (Appendix C and D). A

four-point Likert scale was used with a forced choice response: Strongly Agree (SA),

Agree (A), Disagree (D), Strongly Disagree (SD). This forced-choice scale omitted the

option of neutral or not applicable, which may be troubling to some of the respondents.

Four open-ended statements for the respondents to write in their opinion of the strengths, weakness and importance of Internet delivered multi media. This final instrument was used for the remainder of the study.

Questions to consider:

Do learners prefer courses using Internet delivered multi media?

Do learners find learning by use of Internet delivered multi media more effective than traditional classroom learning?

Is there a difference between genders in regards to preference of courses using Internet delivered multi media?

Do learners with computer experience find Internet delivered multi media easier to use?

Subjects:

The final target population for this study is undergraduate and graduate students enrolled in Southwest Texas State University statistic courses (n=70). There were three classes of students: Class 1: 22 male and female undergraduate students from various ethnic backgrounds. Class 2: 30 female undergraduate students from various ethnic backgrounds. Class 3: 18 male and female graduate students from various ethnic backgrounds. The total subject demographic information was 74.6% female and 25.4% male, between 19 to 48 years of age although majority of the students were between 19 and 26 years of age, from various ethnic backgrounds. These demographics closely resemble the SWTSU demographic profile.

Study Limitations

This study was affected by the following limitations, sample size, technology, terminology and scoring scale. The sample size (n=70) is a small group. A technological glitch was a factor that may have affected the outcome of the post-test is the technology. The class 1 study may have been tainted by the intervention, an Internet delivered multi media presentation. The technology, Internet access, and RealPlayer plug-ins were not functioning on the day of the pilot study. Class 1 completed the intervention and post-test one day later with out any technological problems. This may have impacted the results of the post-test. The third limitation was the content the Internet delivered multi media segment described, streaming media. This content may have been too abstract for the respondents. The recommendation for future studies would be to use content that is applicable to the audience.

The term "Internet delivered multi media", although defined on the instrument is not a common term and the respondents may not have truly understood the concept when answering the questionnaire. Learners' may be apprehensive about trying new teaching methods especially on-line methods without proper orientation or instruction.

The instrument scoring scale utilized 1 = Strongly Agree to 4=Strongly Disagree. This created some confusion with data interpretation. The scoring scale for the future should be reversed to reflect 4=Strongly Agree to 1=Strongly disagree. This reflects the "normal" thought of a large number being a positive or good result and a low number being a negative or poor result.

CHAPTER FOUR

RESULTS

Quantitative Results

Numerous surveys have been constructed to measure learners' attitudes towards computers. However, few instruments have been published that measure learners' attitudes towards learning by Internet delivered multi media. This descriptive study constructed an instrument to measure learner's perceptions about Internet delivered multi media.

Of the total sample population for the final instrument administration (n=70), 63 pre and 64 post tests were available for analysis using SPSS software using a factor analysis with a varamax rotation, analysis of variance, chi square and numerous t-test.

The principle components factor analysis with a varamax rotation identified four factors for the final instrument in addition to measuring attitudes to assist with the overall assessment of individual reactions to multimedia. The four pure constructs are identified in the Table 2, below:

Table 2. Factors for Final Instrument

Factor 1	Learner score for Internet delivered multi media as an *effective* learning tool.
Factor 2	Learner score of Internet delivered multi media as *interactive* learning tool.
Factor 3	Learner score of their *preference* for courses using Internet delivered multi media.
Factor 4	Learner score of how *user friendly* the Internet delivered multi media is.

1) Factor one: Learner score for Internet delivered multi media as an *effective* learning tool. The factor measured the overall reaction to this media as an effective tool for learning. This factor identified principal components for assessing not only beliefs about multimedia, but the type of delivery system. Internet delivered multi media places the responsibility of learning on the learner.

2) Factor two: Learners score of Internet delivered multi media as an *interactive* learning tool. This factor identified the importance of activity versus passivity. This factor plays an important roll in the transfer of learning by this medium. The subjects in the study indicated interaction with a person via Internet delivered multi media is important.

3) Factor three: Learner score of their *preference* for courses using Internet delivered multi media. This factor measures learners' preference for learning medium. The subjects in the study indicated a preference for teacher based delivery over the Internet delivered multi media. This is consistent with the piloted preliminary instrument and is addressed in the Chapter 3, study limitations sections.

4) Factor four: Learner score of how *user friendly* the Internet delivered multi media is. This factor identified and measured the learners' attitudes and perceptions towards the convenience and level of difficulty of this media. Many learners are intimidated by media or find it confusing and these can lead to learning barriers.

The analysis of variance (ANOVA) was used to test for differences $(p < 0.05)$ in total attitudes toward multimedia between the two groups for comfort using computers. The data is illustrated in Table 3 below.

Table 3. Differences in Attitude Towards Multimedia

		Sum of Squares	df	Mean Square	F	Sig
Pre Total	Between Groups	309.778	1	309.778	5.402	0.024*
	Within Groups	3211.343	56	57.345		
	Total	3521.121	57			
Post Total	Between Groups	170.477	1	170.477	2.446	0.124
	Within Groups	3553.353	51	69.693		
	Total	3724.830	52			

*Significant difference

There is a significant difference in attitudes towards multimedia between the two comfort groups on the pre-test. However a significant difference does not exist on the post-test. It is assumed the intervention is responsible for changing the subjects' attitudes towards Internet delivered multi media. Such that after viewing the short multi media segment, those uncomfortable with computers now have a higher attitude score for multi media. Cross tabulations were calculated for gender verses computer experience groups. There was no significant association found between gender and experience.

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The *t* test for independent samples (α =.05) revealed no significant differences between each of the four groups based upon age, race, and gender for the pre and post totals in the attitude instrument.

Qualitative Results

Qualitative results were obtained from the attitudinal survey. Two trends were apparent from the attitudinal survey data. First, overall student response to the effectiveness of Internet delivered media as a learning tool is favorable. Second, attitudes for preference of courses using Internet delivered multi media are not favorable.

Qualitative research results did not support one of the research questions; do learners find Internet delivered multi media learning more effective than traditional classroom learning? Only 31% believe Internet delivered multi media is as effective as traditional lecture instruction. However, 79% believe Internet delivered multi media is an effective tool for learning before the intervention and 87% after the intervention due to the uncomfortable group changing opinions. Seventy-eight percent believe this media enhances the learning process. 53% enjoy learning through streaming media and 61% will tell others about courses using Internet delivered media.

However, majority of the respondents (90%) preferred an instructor to present the course material, 70% valued Internet interaction with the professor or person teaching the material and 98% valued person-to-person contact. Ninety-one percent believe active student participation is important for learning. However, 49% are excited about learning

using this medium and only 39% prefer courses that use Internet delivered multi media. The majority (97%)of the respondents like to learn at times convenient to them.

After the intervention, 76% are not fearful of learning through this medium, nor do they find it confusing (70%) or difficult (70%). A large percentage of the respondents believe this medium is not helpful with retaining (75%) or grasping (59%) difficult concepts.

Only 3% of the respondents reported having less than one year of computer experience. Where as, 70% of the respondents have five or more years of experience. Those with more years of computer experience are more comfortable using computers. This may be responsible for the statistical difference in attitudes towards multimedia between the two comfort groups.

Learners Response To Statements

Students were also given an opportunity on the survey to comment on the strengths, weaknesses, and importance of Internet delivered multi media. Three points stand out from their subjective remarks.

First, the greatest weakness of Internet delivered multi media is the lack of teacher-student interaction and direction. Students may waste precious time searching for answers. In the event technological problems arise, precious time may be wasted searching for the contact person. These issues create discouragement and frustration leading to learning barriers.

The strengths and importance of Internet delivered multi media go hand in hand. Internet delivered multi media is important because it allows institutions to reach people in distant places who may not otherwise have access to the information or content. One of the greatest strengths of this media is repetition. Internet delivered multi media allows students to view the information at times convenient to them and as often as needed. This media also meets the needs of the various learning styles.

Overall the qualitative data provides support that learners' attitudes will change after experiencing an Internet delivered multi media segment. Even after the intervention more students believed this media enhances learning and is an effective learning tool, it did not change their preference for traditional instructor lead courses.

CHAPTER FIVE

CONCLUSION

The main goal of this study was to develop a valid and reliable instrument to measure learner attitudes towards Internet delivered multi media. The second goal was to examine whether a difference in attitudes occurred after experiencing an Internet delivered module.

The subjects in this study identified their own attitude towards Internet-based instruction (pre-test), and experienced an on-line Internet multi media module. The subjects were surveyed again (post-test) to determine the change in attitude toward this type of instruction after the intervention. The hypothesis of this study stated, learners who experience an Internet delivered multi media presentation will change their attitudes and perceptions about learning by this medium. The statistical results of the study do not support this pre-test, post-test hypothesis.

The development of this instrument was a step towards measuring learner's attitudes towards multi media across various disciplines. Faculty or trainers are able to utilize this instrument to measure learner attitudes. A future use of this instrument is to convert the document into the HTML format to measure the attitudes of learners before and after

experiencing an on line course. Future studies would be useful to capture ideas for improving this instrument to better measure attitudes and perceptions of learners towards Internet delivered multi media. Studies are needed to address the use of Internet delivered multi media for specific content such as history or biology courses. More studies are needed to measure the attitudes of learners in different institutions and organizations.

REFERENCES

Billig, S., Gibson, D., Sherry, L., and Tavalin, F. (2001). New Insights on Technology Adoption in Communities of Learners. Retrieved May 4, 2002 from http://www.rmcdenver.com/webproject/SITEproc.html.

Boettcher, J.V. (1998, August). How Many Students are "Just Right" in a Web Course? Syllabus Magazine. 12 (1). Retrieved May 4, 2002, from www.syllabus.com/syllabusmagazine/aug98_magcol.html .

Bonk, C.J., and Reynolds, T.H. (1997). Learner-Centered Web Instruction for Higher-Order Thinking, Teamwork, and Apprenticeship. In Khan, B.H. (Ed), *Web-Based Instruction* (167-178). Englewood Cliffs, NJ: Educational Technology Publications.

Burgstahler, S. (2001). Creating Video and Multimedia Products that are Accessible to People with Sensory Impairments. Retrived from the Internet, May 4, 2002, http://www.washington.edu/doit/Brochures/Technology/vid_sensory.html.

Cox, C., and Pratt, S. (2002). The Case of the Missing Students, and How We Reached Them with Streaming Media. Computers in Libraries. 22(3), 40.

Cruver, P. (2001). Broadband and the Future of Learning. Multimedia. 8(4), 28-29, 31.

Dooley, K. (2001). Towards a Holistic Model for the Diffusion of Educational Technologies: An Integrative Review of Educational Innovation Studies. Educational Technology & Society. Vol 2(4), 1999. ISSN 1436-4552. Retrieved May 4, 2002 from http://ifets.ieee.org/periodical/vol_4_99/kim_dooley.html .

Durrington, V., Repman, J., and Valente, T.(2000). Using Social Network Analysis to Examine the Time of Adoption of Computer-Related Services Among University Faculty. Journal of Research on Computing in Education. 33(1), 16-17.

Ellis, T. (2001). Multimedia Enhanced Educational Products as a Tool to Promote Critical Thinking in Adult Students. Journal of Educational Multimedia and Hypermedia, 10((2), 107-123.

Fichter, D. (2000). And..Action! Multimedia on the Intranet. Online. 24(5), 84, 4.

Freeman, M. and Capper, J. (1999). Educational Innovation: Hype, Heresies and Hopes. <u>Asynchronous Learning Network Magazine.</u> 3(2). Retrieved from May 27, 2002 from <u>http://www.aln.org/alnweb/magazine/Vol3_issue2/ALNMag3_2_ma.htm</u>.

Gatlin-Watts, R., Arn, J., Kordsmeier, W. (1999). Multimedia as an Instructional Tool:Perceptions of College Department Chairs. <u>Education,</u> 120(1), 190-196.

Garcia, J.C . (2001). An Instrument to Help Teachers Assess Learners' Attitudes Towards multimedia Instruction. <u>Education.</u> 122(1), 94-102.

Gay, L., and Airasian, P. (2000). *Educational Research Competencies for Analysis and Application.* Upper Saddle River, New Jersey.

Gloster, A., and Saltzberg, S. (1995). <u>Multimedia and Asynchronous Learning: Changing the Role of Academic Computing.</u> Proceedings of the 1995 CAUSE Annual Conference. Retrieved May 27, 2002 from http://www.educause.edu/asp/doclib/abstract.asp?ID=CNC9540.

Guan, Y., Wang, J., Gable, R., and Young, M. (1998). Student Attitudes Toward Multimedia Classrooms. <u>Paper presented at the Eastern Educational Research Association Conference.</u> Tampa, Fl, February 26, 1998. ED 427774.

Hagner, P. (2000). Faculty Engagement and Support in the New Learning Environment. <u>EDUCAUSE</u>. Sept/Oct, 27-37.

Hayes,B., and Robinson III, E. (2000). Assessing counselor education students' attitudes toward computers and multimedia instruction. <u>Journal of Humanistic Counseling, Education & Development.</u> 38(3), 132-140.

Howles, L.(2002). Streaming Media Tutorial. Wisconsin University, Do It web site. Retrieved May 4, 2002 from http://pocahontus.doit.wisc.edu.

Jaffee, D. (1998). Institutionalized Resistance to Asynchronous Learning. <u>Journal of Asynchronous Learning Network.</u> 2(2), 40-43.

Kolb, D. A. (1985). Learning Style Inventory. Boston, MA: McBer and Company.

Knee, R., Musgrove, A., Musgrove, J. (2000). Learning and Leading with Technology Lights, Camera Action! Streaming Video on Your Web Site. <u>Learning and Leading with Technology.</u> 28(1), 50-53.

Landis, M. (2001). A Comparison of Interaction in AV-based and Internet -based Distance Courses. Eductational Technology and Society. 4 (2), ISSN 1436-4522. Retrieved May 4, 2002 from http://ifets.ieee.org/periodical/vol_2_2001/landis.html

Massy, W and Zemsky, R. (1995) Using Information Technology to Enhance Academic Productivity. Retrieved January 5, 2002, from http://www.educause.edu/nlii/keydocs/massy.html.

McLuhan, M., (2001). The Medium is the Message. Retrieved November 12, 2001, from http://www.nwlink.com/~donclark/hrd/media.html.

Montag, M.. Simson. M.R. & Maurer. M. (1984). Manual for the Standardized Test of Computer Literacy and the Computer Anxiety Index, Iowa State University Research foundation, Inc., Ames.

Nowaczyk, R., Santos, L., and Patron, C. (1998). Student Perception of Multimedia in the Undergraduate Classroom. International Journal of Instructional Media. Vol 25 (4), 367 - 379.

Perry, T., Perry, L. (1998). University Student's Attitudes Towards Multimedia Presentations. British Journal of Educational Technology. 29(4), 375-377.

Rogers, E. (1995). *Diffusion of Innovations*. New York, New York.

Smith, S., Woody, P. (2000). Computers in Teaching. Teaching of Psychology. Vol 27 (3), 220-223.

Strom, J. (2001). Streaming Video: A Look Behind the Scenes. Cultivate Interactive. Retrieved May 27, 2002 from http://www.cultivate-int.org/issue4/scenes/

Surry, D.W. (1997). Diffusion Theory and Instructional Technology. Retrieved November 12, 2001, from http://intro.base.org/docs/diffusion/.

Takacs, J., Reed, W., Wells, J., Dombrowski, L. (1999). Journal of Research on Computing in Education. 31(4), 341-350.

Tooth, T. (2000). The Use of Multi Media in Distance Education. Retrieved May 4, 2002, from http://www.col.org/Knowledge/ks_multimedia.htm .

U.S. Congress, Office of Technology Assessment, *Teachers and Technology: Makin the Connection,* OTA-HER-616 (Washington, DC: U.S. Government Printing Office, April 1995).

Van Horn, R. (2001). Streaming Video and Rich Media. <u>Phi Delta Kappan</u>, 82 (7), 561-2.

Vrtacnik, M., Sajovec, M., Dolnicar, D., Pucko-Razdevsek, C., Glazar, Al, Brouwer, N. (2000). An Interactive Multimedia Tutorial Teaching Unit and its Effects on Student Perception and Understanding of Chemical Concepts. <u>Westminister Studies in Education</u>. 23(1), 91-100.

Webopedia. Retrieved May 4, 2002, from <u>www.webopedia.com</u>.

APPENDIX A: PILOT INSTRUMENT

Research #_____ This number is for research purposes only. It will be used to keep track of information. Please use the first 4 digits of your phone number.

Directions. This study encompasses three parts: participant background, participant beliefs and values,and other comments. Use the scantron sheet provided and a #2 pencil to answer the following statements on the scantron. Please write the research number on the scantron sheet.

Listed below are a number of statements that will allow you to express the degree of attitude you have toward each statement. Many of the statements use the term, "**internet delivered media.**"

Internet delivered media integrates two or more kinds of media including text, graphic, motion video, still video, voice recognition, animation and sound. (Beckman, 1991)

Part I: Background information

1. I feel comfortable using the computer.
   A. True
   B. False

2. I enjoy playing games on the computer.
   A. True
   B. False

3. I have experience using the computers:
   A. less than 1 year.
   B. 1 - 2 years
   C. 2 - 5 years
   D. more than 5 years

4. Ethnic Origin:Choose the ethnic origin that best describes your predominant ethnic background.
   A. American Indian or Alaskan Native
   B. Black Non-Hispanic
   C. Asian or Pacific Islander
   D. Hispanic
   E. White Non-Hispanic

5. Gender
   A. Female
   B. Male

Part II: My Beliefs and Values

If you **agree** with the statement select **A**. If you **disagree** with the statement select **B**.

6.Internet delivered media is an effective format for learning.   Agree   Disagree
7.The use of Internet delivered media in the classroom enhances learning. Agree   Disagree
8. Internet delivered media is so complicated it distracts from learning.   Agree   Disagree

9. Internet delivered media instruction enhances the learning process.   Agree   Disagree
10. Learners like to learn at times convenient to them.   Agree   Disagree
11. Internet delivered media instruction is as effective as lecture instruction.   Agree   Disagree
12. Students enjoy Internet delivered media video.   Agree   Disagree
13. I am eager to learn through Internet delivered media.   Agree   Disagree
14. Internet delivered media is an effective method of education.   Agree   Disagree
15. I have negative expectations about learning through Internet
     delivered media.   Agree   Disagree
16. I believe it will be difficult to learn through using Internet delivered media.   Agree   Disagree
17. Novelty of learning is important to me.   Agree   Disagree
18. Internet delivered media learning is not effective.   Agree   Disagree
19. Active student participation is important to learning.   Agree   Disagree
20. I like learning small "chunks" of information rather than a complete lecture. Agree   Disagree
21. When learning on the Internet, I like to have menu choices for
     controlling information.   Agree   Disagree
22. Internet based interaction with my professor is important.   Agree   Disagree
23. Even if there is a short down load time, I prefer Internet delivered media
     learning to traditional learning.   Agree   Disagree
24. I am fearful about learning through Internet delivered media.   Agree   Disagree
25. Internet delivered media is not an effective method of education.   Agree   Disagree
26. I found this information confusing to use.   Agree   Disagree
27. I found this information to be entertaining.   Agree   Disagree
28. I prefer to have an instructor present the information.   Agree   Disagree
29. I want to learn through streaming media.   Agree   Disagree
30. I will tell others about courses with Internet delivered media.   Agree   Disagree
31. This information helped me analyze relationships between
     concepts about streaming media.   Agree   Disagree
32. I value person-to-person contact.   Agree   Disagree
33. I value pictures.   Agree   Disagree
34. I prefer to attend a class that utilizes Internet delivered media.   Agree   Disagree
35. I believe the instructor can cover (and I can comprehend) more
     material with Internet delivered media.   Agree   Disagree
36. I feel class is more interesting with Internet delivered multimedia.   Agree   Disagree
37. I think I learn better with Internet delivered multimedia.   Agree   Disagree
38. It is easier for me to understand difficult concepts with Internet delivered
     media.   Agree   Disagree
39. I think I retain course material better when the instructor
     uses Internet delivered media.   Agree   Disagree
40. I get nervous when I think that I am going to study
     lessons with Internet delivered media.   Agree   Disagree
41. In general, learning to use Internet based media was good experience.   Agree   Disagree
42. I had the feeling, that the time to finish this material would never
     get to its end.   Agree   Disagree

Part III: My Opinion

43. I believe Internet delivered media is important because...

44. I believe Internet delivered media is not important because...

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45. The strengths of Internet delivered media are:

46. The weaknesses of Internet delivered media are:

47. My exact age is _____ (Exact age is needed for statistical purposes only.)

Your answers are very valuable for the success of this study.
Thank you for agreeing to participate in this study.

APPENDIX B: Examples of Illustrated Audio

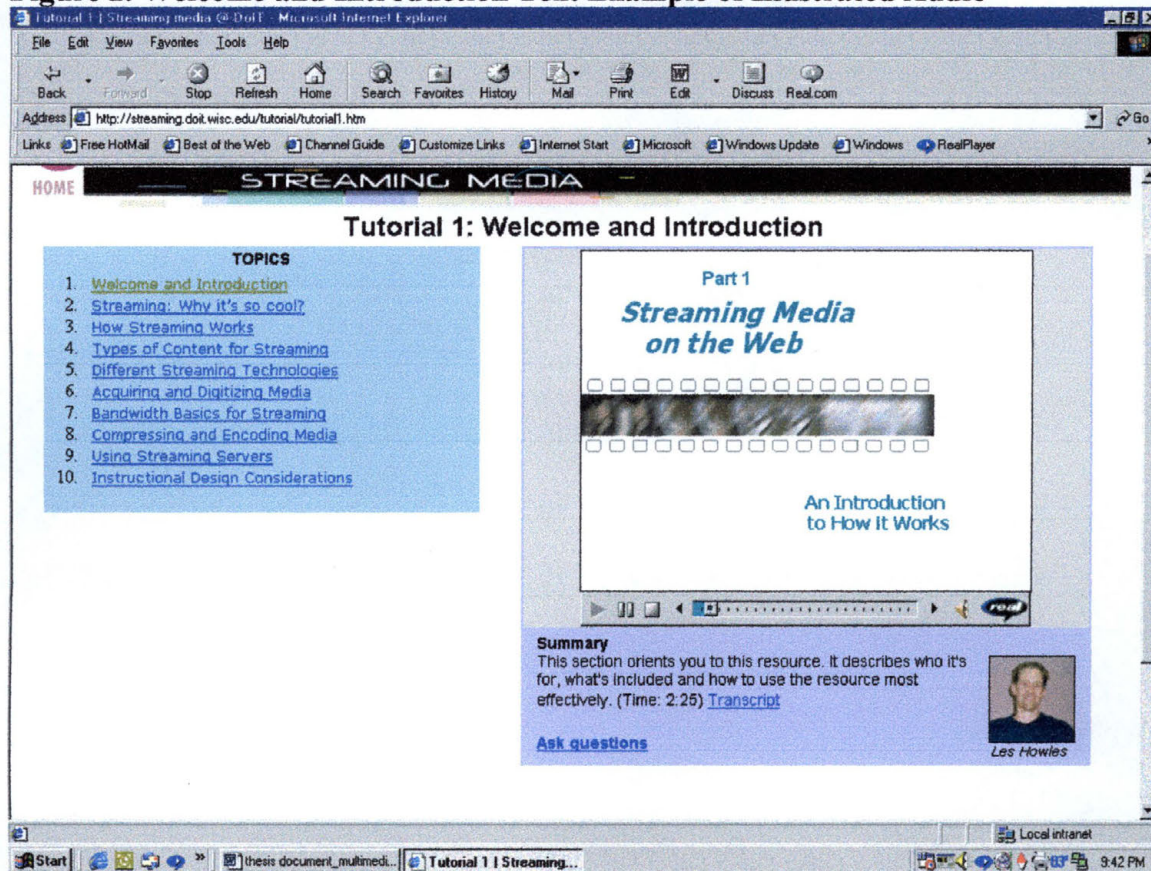**Figure 2. Welcome and Introduction Text Example of Illustrated Audio**

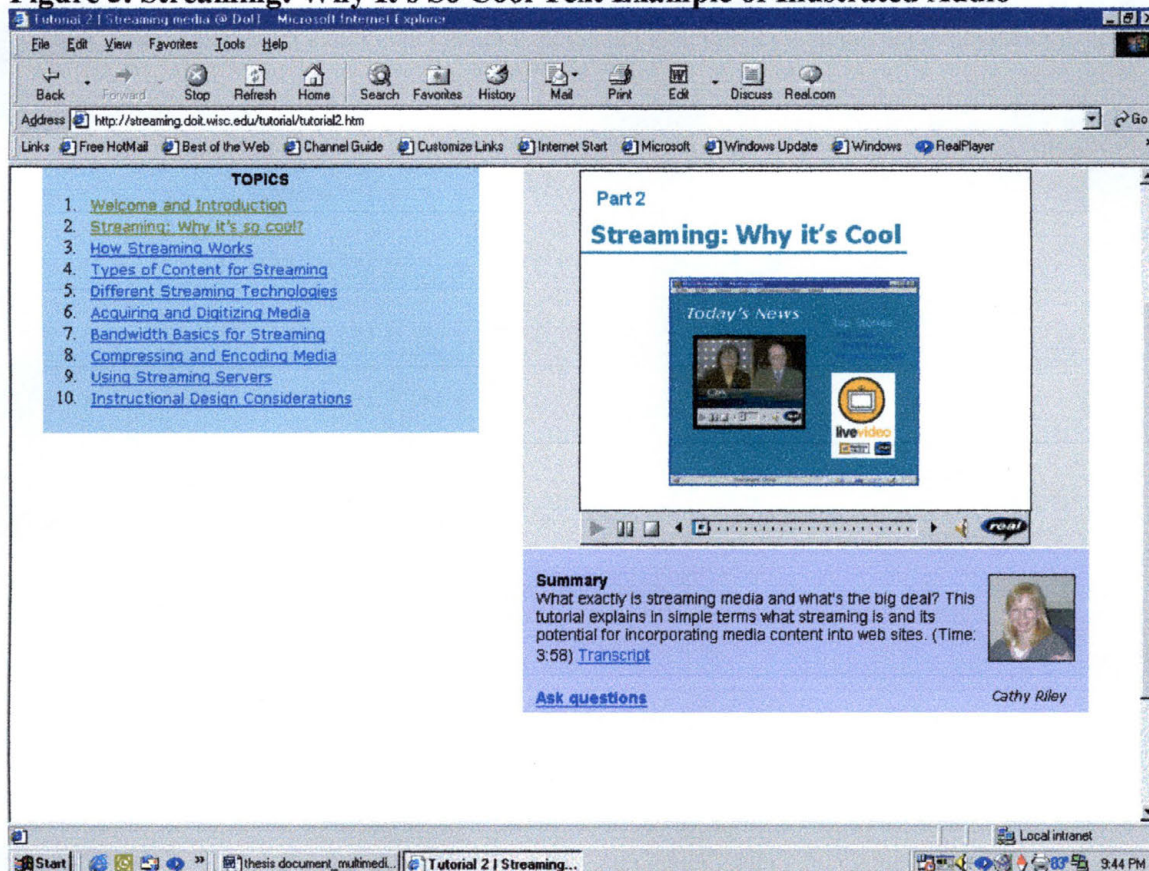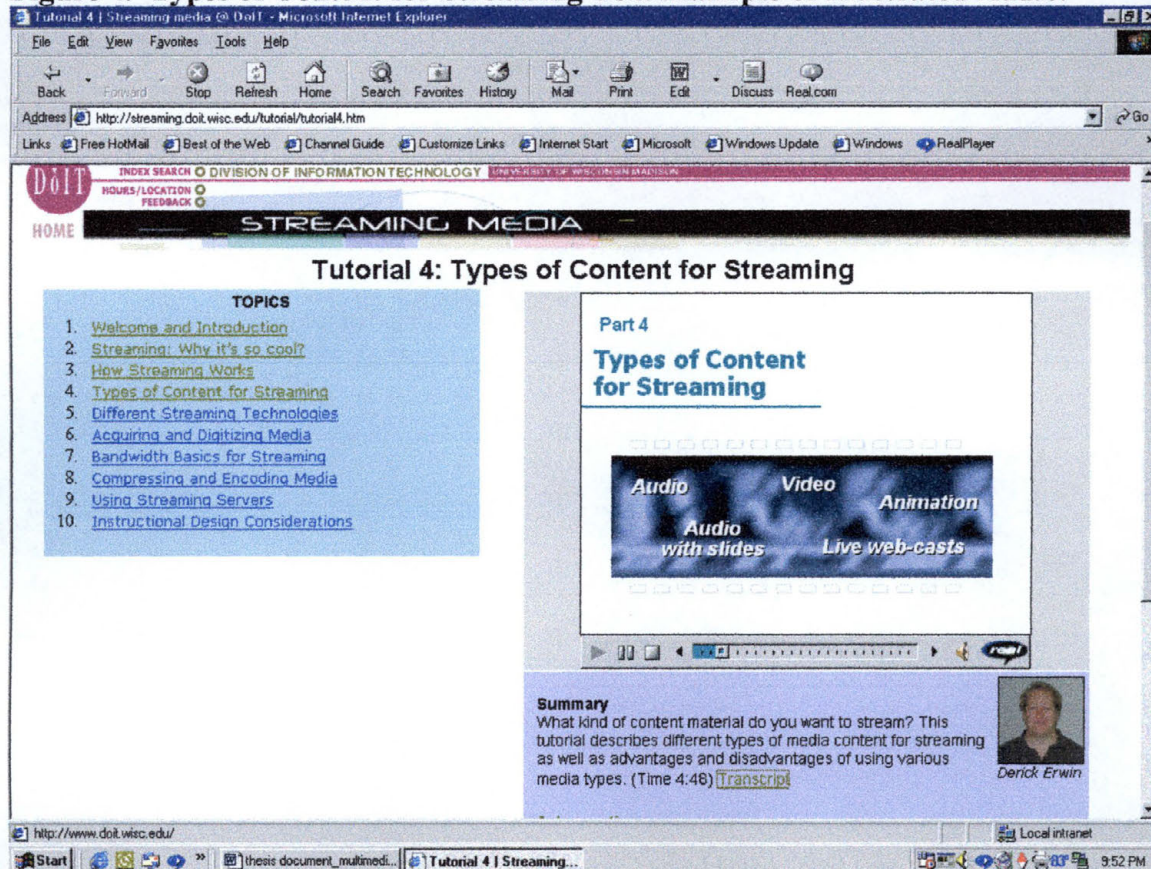**Figure 3. Streaming: Why It's So Cool Text Example of Illustrated Audio**

Figure 4. Types of Content for Streaming Text Example of Illustrated Audio.

APPENDIX C: PRE-TEST INSTRUMENT

Pre-Test Instrument
Introduction

Research #_____ This number is for research purposes only It will be used to keep track of information. Please use the first 4 digits of your phone number

Directions. This study encompasses three parts participant background, participant beliefs and values, and participant opinions This survey wants to find out your feelings and views about Internet delivered media instruction. Your responses to the statements will be kept strictly confidential. Please take your time and answer the questions by choosing the letter that best represents your opinion or feelings towards each of the statements below and fill in the appropriate circle on the SWT answer sheet provided with a #2 pencil. (For example, I choose A, fill in the circle A)
Please write the research number on the SWT answer sheet in the COURSE ID space.

The term, "**Internet delivered media**" is defined as

> **Internet delivered media integrates two or more kinds of media including text, graphic, motion video, still video, voice recognition, animation and sound. (Beckman, 1991)**

Part I: Background information

1. I feel comfortable using the computer.
    A True
    B False

2. I have experience using the computer·
    A Less than 1 year.
    B 2 - 5 years
    C. 5 -10 years.
    D. 10 or more years.

3. Ethnic Origin: Choose the ethnic origin that best describes your predominant ethnic background.
    A. American Indian or Alaskan Native
    B. Black Non-Hispanic
    C. Hispanic
    D. Asian or Pacific Islander
    E. White Non-Hispanic

4. Gender
    A. Female
    B. Male

Part II: My Beliefs and Values
If you **strongly agree** with the statement select **A**. If you **agree** with the statement select **B**. If you **disagree** select C. If you **strongly disagree** select **D**.

	(A)	(B)	(C)	(D)
5. I believe an Internet delivered media is an effective format for learning.	SA	A	D	SD
6. I am eager to learn through an Internet delivered media.	SA	A	D	SD
7. I believe Internet delivered media instruction enhances the learning process.	SA	A	D	SD
8. I like to learn at times convenient to me.	SA	A	D	SD
9. I believe the Internet delivered media classes are confusing	SA	A	D	SD
10. I believe Internet delivered media instruction is as effective as lecture instruction.	SA	A	D	SD
11. I enjoy learning through Internet delivered media video.	SA	A	D	SD
12. I am fearful about learning through Internet delivered media	SA	A	D	SD
13 I prefer Internet delivered media courses, even if there is a short down load time.	SA	A	D	SD

14. I believe it is difficult to learn using an Internet delivered media.   **SA   A   D   SD**
15. I prefer to take classes that utilize Internet delivered media.   **SA   A   D   SD**
16. I believe Internet based interaction with my professor is important   **SA   A   D   SD**
17. I believe the Internet delivered media classes are more interesting   **SA   A   D   SD**
18. I believe Internet delivered media is not an effective method for learning.   **SA   A   D   SD**
19 I value person-to-person contact   **SA   A   D   SD**
20. I believe I retain course material better with Internet delivered media.   **SA   A   D   SD**
21. I believe Internet delivered media helps me grasp difficult topics.   **SA   A   D   SD**
22. I prefer to have an instructor present the course materials.   **SA   A   D   SD**
23 I believe active student participation is important for learning.   **SA   A   D   SD**
24. I am excited to learn using Internet delivered media.   **SA   A   D   SD**
25. I will tell others about courses that use Internet delivered media.   **SA   A   D   SD**

Part III: My Opinion

26 I believe Internet delivered media is important because…

27 I believe Internet delivered media is not important because…

28. The strengths of Internet delivered media are:

29. The weaknesses of Internet delivered media are·

30. My years in age _____ (Example: 24) (Exact age is needed for statistical purposes only. Please write your answer on the SWT answer sheet in the **TEST FORM** space)

Your answers are very valuable for the success of this study.
Thank you for agreeing to participate in this study.

APPENDIX D: POST-TEST INSTRUMENT

Introduction

Research #_____ This number is for research purposes only. It will be used to keep track of information. Please use the first 4 digits of your phone number.

Directions. This study encompasses three parts: participant background, participant beliefs and values, and participant opinions This survey wants to find out your feelings and views about Internet delivered media instruction. Your responses to the statements will be kept strictly confidential. Please take your time and answer the questions by choosing the letter that best represents your opinion or feelings towards each of the statements below and fill in the appropriate circle on the SWT answer sheet provided with a #2 pencil (For example, I choose A, fill in the circle A)
Please write the research number on the SWT answer sheet in the COURSE ID space.

The term, "**Internet delivered media**" is defined as

> **Internet delivered media integrates two or more kinds of media including text, graphic, motion video, still video, voice recognition, animation and sound. (Beckman, 1991)**

Part I: My Beliefs and Values

If you **strongly agree** with the statement select **A**. If you **agree** with the statement select **B**. If you **disagree** select C. If you **strongly disagree** select **D**.

		(A)	(B)	(C)	(D)
1	I believe an Internet delivered media is an effective format for learning	SA	A	D	SD
2.	I am eager to learn through an Internet delivered media.	SA	A	D	SD
3.	I believe Internet delivered media instruction enhances the learning process.	SA	A	D	SD
4.	I like to learn at times convenient to me.	SA	A	D	SD
5	I believe the Internet delivered media classes are confusing.	SA	A	D	SD
6.	I believe Internet delivered media instruction is as effective as lecture instruction.	SA	A	D	SD
7.	I enjoy learning through Internet delivered media video.	SA	A	D	SD
8.	I am fearful about learning through Internet delivered media.	SA	A	D	SD
9.	I prefer Internet delivered media courses, even if there is a short down load time.	SA	A	D	SD
10.	I believe it is difficult to learn using an Internet delivered media.	SA	A	D	SD
11.	I prefer to take classes that utilize Internet delivered media	SA	A	D	SD
12	I believe Internet based interaction with my professor is important	SA	A	D	SD
13.	I believe the Internet delivered media classes are more interesting.	SA	A	D	SD
14.	I believe Internet delivered media is not an effective method for learning.	SA	A	D	SD
15.	I value person-to-person contact	SA	A	D	SD
16	I believe I retain course material better with Internet delivered media.	SA	A	D	SD
17.	I believe Internet delivered media helps me grasp difficult topics.	SA	A	D	SD
18.	I prefer to have an instructor present the course materials.	SA	A	D	SD
19.	I believe active student participation is important for learning.	SA	A	D	SD
20.	I am excited to learn using Internet delivered media	SA	A	D	SD
21.	I will tell others about courses that use Internet delivered media.	SA	A	D	SD

Part II: My Opinion

22 I believe Internet delivered media is important because

23. I believe Internet delivered media is not important because...

24. The strengths of Internet delivered media are

25 The weaknesses of Internet delivered media are.

26. My years in age _____ (Example· 24) (Exact age is needed for statistical purposes only   Please write your answer on the SWT answer sheet in the **TEST FORM** space)

Your answers are very valuable for the success of this study.
Thank you for agreeing to participate in this study.

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VITA

Donna D'Laine Crockett Gardner was born in El Paso, Texas, on October 14, 1967, the daughter of Ron and Sandy Crockett. Following graduation from J.M. Hanks High School, El Paso, Texas, in 1985, she attended Angelo State University for a short time before moving to San Marcos and enrolling in Southwest Texas State University. In 1989 she completed an associate of applied sciences degree in respiratory therapy and in 1990 a bachelor of science degree in health professions with a concentration in hospital administration. On November 23, 1990 she married Bryon L. Gardner in El Paso, Texas where they resided for 9 years. While in El Paso she worked as a registered respiratory therapist in two of the local hospitals in the intensive care units. In 1993, she became the Clinical Education Director of the respiratory therapy, associates of applied sciences program at Dona Ana Branch Community College (DABCC) in Las Cruces, New Mexico. While teaching at DABCC, she became an honorary member of Phi Theta Kappa and received the Extra Mile Award. She assisted with obtaining the respiratory therapy program's first accreditation. She also developed various didactic and clinical course materials for the program. While at DABCC she served as a member of the Professional Development and Institutional Standards college committees. In January of 1999, she became the respiratory therapy and phlebotomy supervisor at Rio Vista Rehabilitation Hospital. In August her family moved to New Braunfels, Texas, to join the Southwest Texas State University respiratory therapy program clinical instructor faculty for a short time. In September of the same year she joined the University of Texas Health Science Center at San Antonio Department of Respiratory Care faculty. In, January 2000 she entered the graduate school of Southwest Texas State University, San Marcos, Texas.

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This thesis was typed by Donna D. Gardner.