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Distance education: An exploration of alternative methods and types of instructional media in teacher education

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DISTANCE EDUCATION: AN EXPLORATION OF ALTERNATIVE METHODS
AND TYPES OF INSTRUCTIONAL MEDIA IN TEACHER EDUCATION

by

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Bachelor of Science
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1996

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A dissertation submitted in partial fulfillment
of the requirements for the

Doctor of Philosophy Degree in Special Education
Department of Special Education
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AND TYPES OF INSTRUCTIONAL MEDIA IN TEACHER EDUCATION

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ABSTRACT

Distance Education: An Exploration of Alternative Methods and Types of Instructional Media in Teacher Education

by

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Universities currently are exploring an array of instructional media to facilitate the delivery of instruction. Consensus from the studies indicates that there is no significant difference in the achievement of students who participate in traditional or online coursework. However, little research has compared traditional learning with the new multimedia online technologies that are becoming more prevalent in distance education.

This study investigated the achievement, student satisfaction, and instructor course evaluations of preservice general education students who participated in three courses in which a variety of instructional media and methods were used. The media used were: (a) a traditional classroom, (b) an online classroom (WebCT), and (c) a class-in-a-box via CD-ROM. The various methods used to deliver the instructional content included PowerPoint notes, lectures, digital videos, and the textbook.

Pretest and posttest scores were analyzed to determine academic performance gains throughout the semester. Descriptive and inferential statistics were used to

compare posttest mean scores for the three conditions to determine if the type of instructional media and method had an effect on the academic performance of the students. Student satisfaction surveys were administered to ascertain if the media of instruction (traditional classroom, the online classroom, or the class-in-a-box) had an effect on student satisfaction in the course. Instructor course evaluations were administered to determine the effect of the media of instruction (traditional classroom, the online classroom, or the class-in-a-box) on instructor course evaluations.

In this study no statistically significant differences were found between the achievement of the students and the media of instruction (traditional classroom, the online classroom, or the class-in-a-box). Descriptive statistics indicated that the pretest scores of the students in the CD-ROM group were the lowest of the three groups while on the posttest the CD-ROM group had the highest scores. Also, no statistically significant differences were found in the student satisfaction of the three groups. They were all satisfied with the media of instruction (traditional classroom, the online classroom, or the class-in-a-box) in which they participated. Finally, the instructor course evaluations completed by the three groups were not statistically significantly different, indicating that the three groups evaluated the instructor and the instructional media used similarly.

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CHAPTER ONE

DISTANCE EDUCATION: AN EXPLORATION OF ALTERNATIVE METHODS AND TYPES OF INSTRUCTIONAL MEDIA IN TEACHER EDUCATION

Historically, numerous terms have been used to describe Distance Education. These include: correspondence study, home study, external studies, independent study, teaching at a distance, off-campus study, and open-learning (Keegan, 1990). Although the terms are varied, each type of distance education has some common elements. For example, the separation of teacher and learner is prevalent in any distance education course. Additionally, a variety of instructional media and methods have been used throughout the evolution of distance education.

Evolution of Distance Education

The following five generations of distance education are described: (a) correspondence, (b) broadcasting, (c) interactive television, (d) online learning, and (d) CD-ROM learning. It is important to understand the evolution of distance education, beginning with correspondence courses in the late 1800s and moving into the 21st century.

Correspondence Courses

Although the terms and definitions vary, distance education as correspondence courses can be traced to the late 1800s (Holmberg, 1986; Garrison & Shale, 1990). As

early as 1871, James Stuart initiated the development of the Extension System at the University of Cambridge (Sherow & Wedemeyer, 1990). Initially, this form of distance education included a traveling circuit of lecturing professors, followed by correspondence studies via the mail system.

During this same time period, Ruskin College in Oxford also provided correspondence courses (Sherow & Wedemeyer, 1990). Students received readings, essay questions, and assignments via the mail. Completed work was returned to tutors who corrected it and returned the assignment back to the students.

In 1885, the Chautauqua Institute offered university correspondence courses (Garrison & Shale, 1990). The Institute mailed worksheets on a weekly basis to students while professors were responsible for course curriculum and administration. The University of Wisconsin offered correspondence courses from 1891 through 1900 (Sherow & Wedemeyer, 1990). Sixty-three courses were offered in which students earned credits towards Bachelors, Masters, or Doctoral degrees. These courses were offered only to students who were unable to attend traditional on-campus courses. Typically, these early correspondence courses were the responsibility of individual faculty and they received little administrative support or university funding.

By 1914, administrative support and funding were available and correspondence courses became a common offering at universities (Garrison & Shale, 1990). During this time period, the vast majority of institutions relied on resident and part-time staff to teach correspondence courses. Some institutions focused on correspondence education with noncredit seeking students while others only provided for-credit courses (e.g., University of Chicago) (Sherow & Wedemeyer, 1990).

Broadcast Courses

As advancements in new technologies were developed, educating learners at a distance grew exponentially. Universities began to explore the use of instructional radio, television, audiotapes, and videocassettes (Tate & Kressel, 1983).

Radio broadcast courses. Numerous examples can be found of institutions using radio to broadcast courses. The University of Iowa, California State University, Florida State University, Indiana State University, and Nebraska State University were the original pioneers in combining correspondence instruction with radio programming (Sherow & Wedemeyer, 1990). For example, in the 1930s, MacDonald College used radio to teach economics in rural areas (1990). In 1956, the University of Illinois-Urbana operated a tape network to provide recordings of educational programs to member stations that belonged to the National Association of Educational Broadcasters (NAEB) (Garrison & Shale, 1990).

By the 1970s, 53% of 3,000 universities surveyed used radio or audio for instructional purposes (Dirr, 1983). However, even with the widespread popularity of this media of instruction, barriers still existed. In a survey of 1,920 students, the barriers cited included: (a) lack of appropriate radio or audio courses, (b) poor radio or audio reception, (c) poor broadcast times, and (d) insufficient notice of broadcast courses (Dirr, 1983).

Television broadcast courses. The technological development of television added an additional media of instruction in distance education. By 1952, 242 national television channels out of 2,053 were reserved for educational groups (Sherow & Wedemeyer, 1990). In 1959, the *Continental Classroom* was broadcast by the University of California

and supplemented by correspondence study (1990). It provided physics and chemistry courses through television broadcasts supplemented by course syllabi.

By the early 1980s, 10,000 for-credit television courses were offered nationally by universities (Tate & Kressel, 1983). The Adult Learning Service of the Public Broadcasting Service (PBS) provided approximately six courses each semester to 500 colleges and universities (Dirr, 1983). Although television was a media of instruction for delivering courses at a distance, research suggested that it could also be used as an on-campus learning tool. Seventy percent of faculty surveyed indicated that they used television in the on-campus setting, while only 29% used it as a tool for off-campus instruction (Dirr, 1983).

The barriers to the use of television as a media of instruction were similar to the barriers cited for radio and audio use. Those cited by faculty included: (a) lack of institutional funds and support, (b) lack of faculty commitment, (c) cost and availability of courses, and (d) lack of trained support personnel. Other concerns revolved around the high student failure rate in these courses, the high dropout rate of students, and the overall poor reputation of the courses (Inglis, Ling, & Joosten, 1999).

Interactive Television Courses

A more recent entry into distance education has been the use of interactive television courses (ITV). This media of instruction in distance education began in the late 1980s and is still prevalent today. Interactive television provides two-way audio and video and has the potential to provide immediate interaction between the student and teacher, similar to the interaction in face-to-face teaching situations. In an interactive television classroom, students at remote sites can see, hear, and interact with students and

instructors at a host site (Minoli, 1996). The development of ITV courses was based on a need to meet the educational needs of off-campus, place-bound adult students (Hardy & Olcott, 1995).

Studies done in ITV learning environments indicate that the achievement of distance learning students and traditional students is comparable (Baker, Hale, & Gifford, 1987; Paulsen, 1997). Although, if given a choice, most students indicated that they prefer traditional face-to-face instruction (Hardy & Olcott, 1995). Disadvantages cited by distance learners in these classrooms were the lack of frequent interaction with fellow students and students at the remote sites not feeling comfortable interacting with the teacher (Paulsen, 1997).

Online Learning Courses

With the advent of newer technologies, universities have begun to focus on web-based instruction (Khan, 1997). Distance education has moved into multimedia-based interactions among teachers, students, and other technology information sources (Keegan, 1996). Currently, online courses are available to learners anywhere and anytime through the Internet.

The number of educational institutions offering complete college degree programs online has increased exponentially over the last five years (NCES, 2003). For example, in 2001-2002, out of 4,130 two-year and four-year institutions surveyed, 56% offered distance education courses (NCES, 2003). The programs range from the World Campus at Penn State University that offers undergraduate and graduate certificates to the University of California Extension (statewide division) that offers degrees in Hazardous Materials Management and Computer Information Systems (Carchidi, 2002).

The Internet affords the flexibility to increase student interaction in the online environment (e.g., class conferencing, discussion groups, virtual chat rooms, and e-mail). In a recent study, Whitworth (1999) found that students enrolled in online courses believed they had more interaction with the instructor and that they were provided more feedback on their assignments than in traditional courses. Students indicated that online courses are desirable because of scheduling convenience and that they are able to learn at their own pace (Navarro & Shoemaker, 2000). However, often students who take an online class are restricted in the areas of time and pace when they are required to adhere to due dates for assignments, quizzes/tests, and other material covered.

As universities and faculty explore online teaching, it is imperative that research identify the types of instructional media and methods that are effective in this environment. A variety of instructional media and methods are now available for use in the online environment that allows the instructor to provide multiple ways for students to access the instructional content. This has the potential to meet the various learning styles and time constraints of the students.

CD-ROM Based Learning

As distance education has evolved, online courses have attempted to mirror traditional classroom instruction (e.g., textbook and lecture via text documents and/or PowerPoint presentations). Currently, newer technologies are used in the traditional classroom and in online education (e.g., video and audio media) that provide for a more robust and interesting learning environment. For example, Navarro and Shoemaker (2000) found that CD-ROM lectures were regarded as an essential component by 83% of

the distance learners and 68% of the students rated the CD-ROM as the most enjoyable learning component of the class.

Typically, instructors use text-based documents and/or slide presentations to deliver distance education content. However, new technological advances in digital video provide instructors with another method that has the potential to help the learner build stronger and more coherent connections in the content area. CD-ROM based lectures provide for the visual and audio stimulation that have been found to be an important part of enhancing the learning process (Moore, 1989). The CD-ROM combined with digital video scenarios provides a media of instruction by which students can be connected to experts in the field. This brings a course closer to the ideal of authentic instruction.

Additionally, stand-alone materials (e.g., CD-ROM) have the potential to maximize time flexibility for students. If students are restricted to accessing all of the course materials online, then the flexibility for access is limited (Moore, 1989). However, CD-ROM access is not bound by or limited to the online environmental time frame.

Student Satisfaction

An issue in distance education that is closely related to student performance and student interaction is the satisfaction of the learners. Biner (1993) maintains that high satisfaction of the learner should result in lower dropout rates and a lower withdrawal rate from classes for nonacademic reasons. Biner also found a positive relationship between students' satisfaction with instruction and their subsequent success in a course (1993). In

examining determinants of student satisfaction, Biner, Dean, and Mellinger (1994) found that attitudes toward the instructor, instruction, the technology used, and the degree of communication were correlated with student satisfaction.

Evaluation of Distance Education Courses

As distance education evolves, a variety of methods have been used to evaluate the quality of the course and the education received by the students. By evaluating the effect of the types of instructional media and/or methods used in distance education, instructors can continually adapt, modify, and improve the access and quality of the education in a course. Advocates for distance learning argue that online education provides students with better and faster access to information, allows for more individualized instruction, accommodates different learning styles, and increases student satisfaction (Baker, Hale, & Gifford, 1997). However, critics view distance education as a depersonalization of the learning process and as empty pedagogy that stresses memorization rather than synthesis and analysis (Navarro & Shoemaker, 2000).

The literature in distance education indicates that instructors must consider a variety of factors such as: (a) teacher-student interaction via asynchronous and synchronous communications, (b) online testing, (c) feedback, and (d) access to course materials (e.g. text documents, PowerPoint lectures) (Navarro & Shoemaker, 2000). Additional factors for consideration include effective instructional design, CD-ROM based lectures, and technical problems.

Statement of the Problem

Universities are currently exploring an array of instructional media to facilitate instructional delivery. Instructors use instructional media to enhance a traditional course, create a hybrid course (combination of online and traditional), or develop a stand-alone online course (Carchidi, 2002). Numerous studies have compared the academic performance of distance learners to that of traditional learners (Paulsen, 1997; Baker, Hale, Gifford, 1997; Schutte, 1998; Diaz, 2000). Consensus from the studies indicates that there is no significant difference in the achievement of student participants in traditional or online coursework. However, few studies have compared traditional learning with the newer, multimedia online technologies that are becoming more prevalent in distance education today (Navarro & Shoemaker, 2000).

The purpose of this study was to investigate the achievement, student satisfaction, and instructor course evaluations of preservice general education students who participated in three courses in which different types of instructional media were used to facilitate the achievement of the students. The media used were: (a) a traditional classroom, (b) an online classroom (WebCT), and (c) a class-in-a-box via CD-ROM. The various methods used to deliver the instructional content included PowerPoint notes, lecture/transcribed lecture notes via text documents, digital videos, and the textbook.

Research Questions

The research questions addressed were:

Research Question One. Does the type of instructional media have a differential effect on the academic performance of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Research Question Two. For test items based on content presented only in the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Research Question Three. For test items based on content presented in lecture, PowerPoint notes, digital video, and the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Research Question Four. Does the type of instructional media have a differential effect on the course satisfaction of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Research Question Five. Does the type of instructional media have a differential effect on the course evaluations of the instructor completed by the students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Significance of the Study

Research indicates that learners are able to learn in distance education environments (Keegan, 1996). However, as different types of instructional media for delivering instructional content through distance education continues to evolve, further

research must be conducted. And, as newer methods are used in online distance education (e.g., PowerPoint notes, digital videos, and online discussion groups), the impact of these methods on student achievement and satisfaction must be explored. Research is needed to compare the efficacy of learning through traditional instruction compared to online learning and instruction via CD-ROM (e.g., class-in-a-box). The types of instructional media and methods warrant further research into their impact on student achievement, student satisfaction, class interaction, and course evaluations in distance education and traditional programs.

Traditional Classroom

In the current study, the traditional classroom was one in which the students attended class weekly on-campus. Different methods were used to deliver the instructional content (e.g., PowerPoint notes, lectures, digital videos, and the textbook). PowerPoint slides, lecture, and digital videos served as the primary method for delivering instructional content. In order to analyze the effectiveness of these methods on student achievement, student satisfaction, and instructor course evaluations, data from the pretest, posttest, student-satisfaction surveys, and instructor course evaluations were used.

Additionally, half of the test items on the pretest and posttest were developed to assess the students' knowledge of test items taken from the textbook and not reinforced anywhere else throughout instruction. The second half of the test items were developed based on instructional content that was presented in lecture, PowerPoint notes, digital videos, and the textbook. By differentiating test items in this manner, data from tests were analyzed to determine the method of instruction that was most effective in the areas of student achievement and student satisfaction.

Online Class

In the online classroom, the students accessed all of the instructional content in the online environment via WebCT. The students were not required to attend class in person except for the first and last class sessions. Students were responsible for taking quizzes and turning in assignments by specified due dates. They were not restricted to time and space for accessing the content.

Different methods were used to deliver the instructional content in the online class (e.g., PowerPoint notes, verbatim transcribed lecture notes, digital videos, and the textbook). In the online learning environment, students relied on PowerPoint notes, transcribed lecture notes, digital videos, and the textbook for instructional content. By adding the additional method of transcribed lecture notes, students received the identical lecture content that was given in the traditional classroom in the form of a text document. The same digital videos also were used to deliver instructional content. In order to analyze the effectiveness of these methods on student achievement, student satisfaction, and instructor course evaluations, data from the pretest, posttest, student satisfaction surveys, and instructor course evaluations were used.

As in the traditional classroom, half of the test items on the pretest and posttest were developed to assess the students' knowledge of the test items taken from the textbook and not reinforced in any other instructional format. The second half of the test items were developed based on instructional content that was presented in lecture, PowerPoint notes, digital videos, and the textbook. By differentiating the test items in this manner, data from tests were analyzed to determine the method of instruction that was most effective in the areas of student achievement and student satisfaction.

Class-in-a-Box

The class-in-a-box students accessed all of the instructional content via CD-ROMs. In this approach, the CD-ROMs stand-alone as a self-contained learning package (Inglis, Ling, & Joosten, 1999). The students were not required to attend class in person except for the first and last class sessions. Students were responsible for taking quizzes and turning in assignments without the constraint of due dates. They too were not restricted by time and space for accessing the instructional content. The students were able to progress through the instructional content of the course at their convenience. It was possible for students to complete the course prior to the end of the course semester. Research in the efficacy of the types of instructional media is still in its infancy and in this study students evaluated the effectiveness of the types of instructional media using student satisfaction surveys and instructor course evaluations.

In the class-in-a-box, different methods were used to deliver the instructional content (e.g., PowerPoint notes, verbatim transcribed lecture notes, digital videos, and the textbook). By adding the additional method of transcribed lecture notes, students received the identical lecture content that was provided in the traditional classroom in the form of a text document. The same digital videos were used to deliver instructional content. In order to analyze the effectiveness of these methods on student achievement, student satisfaction, and instructor course evaluations, data from the pretest, posttest, student satisfaction surveys, and instructor course evaluations were used.

As in the other two conditions, half of the test items on the pretest and posttest were developed to assess the students' knowledge of test items taken from the textbook and not reinforced anywhere else in the course. The second half of the test items were

developed based on instructional content presented in the lectures, PowerPoint notes, digital videos, and the textbook. By differentiating these items in this manner, data from the tests were analyzed to determine the method of instruction that was most effective in the areas of student achievement and student satisfaction.

This type of learning may afford some students more flexibility in terms of where and when they access course content. It may also alleviate technical problems that some students encounter in an online environment (e.g. the server is down, slow connections, internet connections booting students off in the middle of accessing content). This media of instruction may also provide satisfaction information as it relates to student satisfaction and flexible access to content as well as the timeliness of students turning in assignments and completing quizzes.

Comparing Different Types of Instructional Media

In the current study, data from pretests and posttests were analyzed to determine which type of instructional media (e.g., traditional class, online class, and class-in-a-box) was more effective in the area of student academic performance. Data were analyzed to determine if there was a difference in student performance on test items based on content presented only in the textbook among the three types of instructional media. Next, data also were analyzed to determine if there was a difference in student performance on test items based on content that was reinforced in PowerPoint notes, lecture/transcribed lecture notes, digital videos, and the textbook among the three types of instructional media.

Data from student satisfaction surveys and instructor course evaluations were analyzed to determine which type of instructional media and method of instruction was

most effective. Results of the study provide information as to the types of instructional media and methods students identified as effective and satisfying in their educational experience. Additionally, student satisfaction with class interaction provides implications for the design of future distance education courses.

Research concerning the effectiveness of these technologies in distance education is just beginning to be explored (Liao, 1998). An investigation into the effectiveness of transferring traditional instructional methods to an online class and class-in-a-box via CD-ROM contributes to the body of research that currently supports distance education. This study contributes to the research in redefining distance education; specifically the use of CD-ROM based lectures, video, and the elimination of time constraints in online learning. If it is possible to communicate concepts in a manner that includes a variety of instructional media (Paulsen, 1997), it is possible that greater numbers of students in learning environments will be able to comprehend and retain the information being presented (Smith, Smith, & Boone, 2000).

Definition of Terms

The following are terms and definitions used in this study. Precise definition of terms is crucial to understanding the implementation procedures and results of the study.

Class-in-a-Box. Class-in-a-box was the media of instruction by which students accessed course content via CD-ROM (e.g., PowerPoint notes, transcribed lecture notes, and digital videos) at their own pace and in their own space. The students in this media of instruction had the entire semester to complete the course without any due dates for taking quizzes or turning in assignments. They had the option of completing the course

prior to the end of the semester. All information presented to the students was identical to the information presented in the online course via WebCT and the traditional course. The instructional methods used also were the same. Quizzes were taken online while the pretest, posttest, student satisfaction survey, and course evaluation were completed in person on-campus.

Digital Video. Digital video is the term that describes the videos used in this study. The videos were loaded on the WebCT server and viewed by students online or viewed by the students using the CD-ROMs. Students in the traditional classroom viewed the same videos in class.

Online Learning Environment. The online learning environment describes distance education in which students' accessed course content on the World Wide Web (WWW) via WebCT. In the online environment, students viewed PowerPoint notes, videos, transcribed lecture notes, turned in assignments, completed quizzes, and communicated with the instructor. The students adhered to due dates for completion of quizzes and assignments. The pretest, posttest, student satisfaction survey, and course evaluation were completed in person on-campus.

Traditional Classroom. The traditional classroom was the setting in which students attended class on a weekly basis at the same time and same place. Students were responsible for completing quizzes and turning in assignments on the due dates specified in the syllabus. To provide for exact instruction across the three types of instructional media, lectures were audio recorded and used to develop the online class and the class-in-a-box.

WebCT. WebCT was the Internet-based web server/interface used in this study for the online class and class-in-a-box. WebCT was developed by the Department of Computer Science at the University of British Columbia (Inglis, Ling, & Joosten, 1999). All instructional content (e.g., PowerPoint notes, videos, and verbatim transcribed lecture notes) was loaded on the server and organized sequentially by lectures/dates for the students to use.

Limitations of Study

This study has three identified limitations. The first limitation deals with the measurement instruments used in the study. The instruments (pretest, posttest, and student satisfaction surveys) were not normed prior to the study. This may limit generalizability of the results.

The second limitation is that the study is a modified version of distance education. The students in the online environment and the class-in-a-box study were required to attend class to take the pretest and posttest. In a true distance education class, students are not required to attend class to take tests. Because the study attempted to control for learning among the three types of instructional media, it was necessary to have students attend class to take the pretest and posttest, fill out the student satisfaction surveys, and complete the instructor course evaluations.

The third limitation of the study is that students in the online environment and the class-in-a-box classroom were assigned randomly to one of these groups prior to the first month of class. Ideally, in a distance education course, students would be aware of the

types of instructional media available and have the choice of the distance education class in which to enroll based on their personal preference and available technologies.

Summary

Online learning environments are becoming more prevalent in teacher education. Currently, instructors are attempting to emulate traditional instructional methods in the online learning environment as much as possible (Navarro & Shoemaker, 2000). The use of audio and video to provide authentic learning experiences for learners who participate in a variety of distance education situations (e.g., CD-ROM, online via WebCT) is increasing. However, the evaluation of the effectiveness of the types of instructional media and methods is still in its infancy.

This study was designed to compare student achievement, student satisfaction, and instructor course evaluations in which students participated in three types of instructional media (e.g., traditional classroom, online classroom, and class-in-a-box). This study will contribute to the research literature concerning distance education in that it expands the types of instructional media explored and attempts to identify appropriate instructional methods for use in the different types of instructional media classes. This study also provides recommendations for the development and implementation of future distance education courses.

CHAPTER TWO

REVIEW OF THE LITERATURE

INTRODUCTION

Distance Education, using a variety of instructional media and methods, has been used to provide instruction since the late 19th century. This type of instruction eliminated the need to travel to onsite locations, which was important for students in rural areas, students with employment restrictions, and students with physical limitations. Historically, the advantages of distance education include flexibility of course offerings (e.g., instructor, location), time of course offerings, and course design (e.g., online, interactive television, CD-ROM).

Universities currently are exploring an array of different types of instructional media to facilitate instructional delivery via distance education. Instructors use a variety of instructional media to enhance traditional course work, create a hybrid course (e.g., combination of online and traditional), or develop a stand-alone online course (Carchidi, 2002). Numerous studies have compared the academic performance of distance learners to that of traditional learners (Paulsen, 1997; Baker, Hale, & Gifford, 1997; Whitworth, 1999; Diaz, 2000; Navarro & Shoemaker, 2000).

As distance education has evolved, a variety of instructional media and methods have been used to evaluate the quality of the course and the education received by the students (Westbrook, 1997; Whitworth, 1999; Biner et. al, 1997; Navarro & Shoemaker,

2000). Through the evaluation of the types of instructional media and/or methods used in distance education, instructors can continually adapt, modify, and improve the access and quality of the education provided.

Evolution of Distance Education

Historically, distance education can be broken down into five generations: (a) correspondence courses, (b) broadcasting courses via radio and television, (c) interactive television (ITV), (d) online learning, and (e) video learning via CD-ROM. Although the types of instructional media and methods for offering distance education courses have evolved into the digital age, the separation of teacher and learner is evident in all distance education courses. In order to evaluate the effectiveness of current distance education courses, it is important to understand the evolution of distance education, beginning with correspondence courses in the late 1800s and moving into the 21st century.

Correspondence Courses

The use of correspondence courses as the first form of distance education can be traced as far back as the late 1800s. Typically, these were courses that used the mail system to deliver course materials (e.g., syllabus, printed lessons) to the student. The work was completed and returned to the instructor via the mail. The instructor graded and returned the work to the student and the cycle began again (Garrison & Shale, 1990). Individual correspondence courses developed into university extension programs that offered structured correspondence courses (Garrison & Shale, 1990).

Stephens (1979) conducted a study to evaluate student motivation in taking correspondence courses. The participants were 150 students who had taken a variety of

correspondence courses. The students were administered an evaluation at mid-semester and upon completion of the course. The evaluation was not described. Stephens used the mid-semester feedback from the students to adapt the course based on their comments. For example, when students complained about the professor's handwriting, the instructor used a typewriter for comments. Data analyses were not described in the study.

Results from the student evaluations indicated they felt that the final exam was drastically different than the class assignments. They also expressed that the correspondence course lacked human interaction. When asked to provide advice to other students considering taking a correspondence course, the students indicated that a person should begin the coursework immediately and have a planned schedule for completing the work.

Stephens (1979) concluded that self-motivation was the main factor in the achievement of the students in correspondence courses. He maintained that instructors must sustain the interest of participants enrolled in correspondence courses throughout the semester by using various motivational strategies (e.g., encourage rapport, provide rapid feedback, and prepare the student for the final exam). Stephens (1979) also suggested that instructors should include a study schedule and an assignment completion schedule in the syllabus.

Wong and Wong (1979) studied the relationship between assignment completion, attrition, and the achievement of students enrolled in correspondence courses. The completion of a correspondence course was defined as students who took the final exam. Over a two year period 220 (Group A) and 144 (Group B) students participated in the study. Students enrolled in the course were sent six assignments to complete at the

beginning of the course and the assignments had to be completed in sequence. Once the assignments were graded by the instructor, they were returned to the student. However, the grades on the assignments did not count toward the final grade.

The data collected in the study included the number of assignments completed, completion of the final examination, and the grade each student received on the final exam. Data were analyzed using a chi-square test. Results indicated that as the students completed more assignments, the probability of completing the course increased.

Results from the study indicated that, for Group A, 88% of the students who didn't turn in any assignments did not take the final exam. For Group B, 63% of the students who didn't turn in any assignments did not take the final exam. Results also indicated that students who submitted four or more assignments completed the course. For example, 91% of the students in Group A who completed four or more assignments, finished the course. In Group B, it was 97% of the students. Wong and Wong (1979) concluded that as students submitted more assignments, their probability of completing the course increased. In both groups, significant positive correlations were obtained between the number of assignments completed and the final grades for the course.

Wong and Wong (1979) maintained that the practice students received from doing their assignments was useful in helping them to understand the course material. Wong and Wong suggested that instructors of correspondence courses should include a schedule of assignments for students to use as a reference for completing the course.

Leverenz (1981) conducted a study to evaluate student perceptions of correspondence courses. The purpose of the study was to identify student concerns related to student-teacher interaction in the course. Two hundred and seventy-three

students who had taken correspondence courses at nine universities completed a survey that consisted of six statements based on a 5-point Likert scale. Data were analyzed to identify the average mean for each statement.

Results from the survey indicated that students overwhelmingly agreed that instructors answered their questions in a timely manner and that the instructors made helpful suggestions for improvements. For example, 45% of the students strongly agreed that their instructors responded in a satisfactory manner to questions, and 27% agreed generally to this statement. Thirty-eight percent of the students strongly agreed that their instructors made helpful suggestions for improvement, and 27% agreed generally to this statement. Additionally, 41% of the students strongly agreed that their instructors returned the lessons in a timely manner, and 34% agreed generally to this statement. Overall, the survey results indicated that 70% of the students would take another course via correspondence.

Leverenz (1981) concluded that students enrolled in correspondence courses are satisfied with the instructional method. He maintained that the absence of face-to-face contact with the instructor did not negatively impact student perception of correspondence courses or the instructor. Leverenz (1981) maintained that further research was needed to identify the causes of student attrition in correspondence courses.

In a similar study, Pierre and Olsen (1991) analyzed student satisfaction in courses offered for university credit. In this study, correspondence courses were defined as self-pacing courses in which the students received, completed, and sent course material and assignments by mail. Seven hundred students who had taken correspondence courses in a one-year period were selected randomly to participate in the study. A 10-item

student perception questionnaire was used to measure student satisfaction in the areas of feedback, experiential learning, lesson return, communication, course material and content, and personal satisfaction.

Three hundred and thirty-seven questionnaires were returned from the students and analyzed using an analysis of variance and a regression analysis. Results from the demographic information indicated that a majority of the students were employed 40 or more hours per week. Additionally, 75% of the students were pursuing an academic degree. The flexibility of correspondence study was cited as the primary reason for taking the correspondence course rather than the traditional course.

Results from the ANOVA indicated the following: (a) motivation was the most important independent variable influencing student satisfaction, (b) prompt return of lessons at the beginning of the course was more significant than prompt lesson return later in the course, (c) didactic conversations with the instructor contributed significantly to student satisfaction, (d) there was a positive relationship between student satisfaction and the opportunity to apply experiential learning and knowledge, and (e) students who were satisfied with one correspondence course were more likely to take another. The ANOVA also indicated that the relevance of course content and the helpfulness of the course study guide were significant in predicting student satisfaction. The results indicated that interaction between the student and the instructor was a significant factor in predicting student satisfaction.

Pierre and Olsen (1991) concluded that students in the study, regardless of their sex or age, appeared to be satisfied with correspondence study. They suggested that as instructors interact with students, they should consider feedback, communication,

assignment turnaround time, contact, experiential learning, and the nature of the course material. They maintained that these are the primary factors that impact student satisfaction in a correspondence course.

As a result of these findings, Pierre and Olsen suggested that understanding student motives for taking a correspondence course could provide important information for designing the instructional content of a course. Pierre and Olsen believed that further research should be conducted to compare the satisfaction of students who withdraw from correspondence courses and students who complete correspondence courses to identify the factors that differentiate these two groups of students.

Correspondence course research appears to indicate that student satisfaction in correspondence courses is strongly related to various factors: (a) assignment turnaround time, (b) timely feedback, and (c) study guides to assist in studying for exams (Stephens, 1979; Leverenz, 1981; Pierre & Olsen, 1991). These studies also maintain that self-motivation is a very important factor in determining student completion of a correspondence course (Stephens, 1979, Pierre & Olsen, 1991). As instructors design and teach correspondence courses, it is imperative that a variety of factors (e.g., feedback, assignment turnaround time, study guides, schedule/timeline for completing assignments) be considered (Stephens, 1979).

Broadcast Courses

Technological advancements that increased the growth of distance education include the use of instructional radio, television, audiotapes, and videocassettes (Garrisons & Shale, 1990). Broadcast courses consist of preproduced broadcast instructional programs (e.g., radio, television) integrated with print materials such as

syllabi, study guides, textbooks, and tests (Houston & Ryg, 1975). Broadcast courses require students to have common media equipment such as a radio, television, or a videotape player to participate in the course.

Radio broadcast courses. Historically, numerous institutions of higher education have used radio to broadcast courses. The University of Iowa, Florida State University, Indiana State University, and Nebraska State University were pioneers in combining correspondence instruction with radio-based educational programming (Sherow & Wedemeyer, 1990). Between 1920 and 1936 there was a tremendous growth of educational radio stations (e.g., 202 broadcast licenses were granted to educational institutions). However, by the late 1930s there were only 38 educational stations still broadcasting (Sherow & Wedemeyer, 1990).

In the 1970s, Ryerson Open College broadcast its first course by radio (Sherow & Wedemeyer, 1990). In 1979, out of 3,000 institutions surveyed, 53% of them used radio or audio for instructional purposes (Dirr, 1983). However, even with the widespread popularity of this media of instruction, barriers still existed. In a survey of 1,920 students, the barriers cited by students included: (a) lack of appropriate radio or audio courses, (b) poor radio or audio reception, (c) poor broadcast times, and (d) insufficient notice of broadcast courses (Dirr, 1983).

Houston and Ryg (1975) conducted a study to determine student satisfaction with radio courses. The purpose of the study was to determine the effectiveness of radio instruction. Five courses were offered by radio during the spring of 1975 and 104 students were sent a 20-item survey, 51 of the surveys were returned. The survey consisted of four major topics: (a) student demographics, (b) student attitudes and

opinions toward taking radio courses, (c) technical aspects of the radio courses, and (d) additional comments concerning the radio courses.

Results from the survey were analyzed to determine the frequency and percentages for each item. Demographic information indicated that 82% of the students, enrolled in the radio courses to earn a certificate, diploma, or an associate degree. The data also indicated that student course ratings were extremely high in the areas of academic instruction, instructor delivery of material, grading procedures, length of lectures, availability of the instructor, technical quality of the program, and radio reception. Lower ratings were given for course interest and usefulness of the text and supplemental material.

Results from the technical aspects portion of the survey indicated that a large majority (77%) of the students believed that repeat broadcasts were helpful. Also, 53% of the students indicated that they taped the radio broadcasts at home for later review. However, 38% of the students indicated that the broadcast times were not convenient. The most convenient broadcast time cited by most of the students (44%) was after 6:00 p.m. The majority of the students indicated that they listened to the radio broadcasts from their home (70%). Qualitative data gathered from additional student comments included: (a) their willingness to take another course by radio, (b) the convenience of the radio course, (c) their desire to take more radio classes, and (d) their desire to receive more supplemental material.

Comments from the radio instructors indicated that the lack of student feedback and discussion was a difficult adjustment in using this media of instruction. Houston and

Ryg (1975) suggested that instructors of radio courses should schedule monthly on-campus classes and call students to increase the student-teacher interaction.

Houston and Ryg (1975) concluded that radio courses were an effective type of instructional media for offering courses. They also maintained that further research should be conducted to investigate individual courses to provide more information about the quality of instruction and effective learning experiences that occur. They provided several suggestions: (a) radio courses be aligned closely with on-campus courses, (b) the courses should be publicized to maximize enrollment, (c) the courses should be of high quality, and (d) the courses should be evaluated. Houston and Ryg also suggested that the instructors of radio courses be selected carefully to ensure that appropriate course materials are prepared.

During this same time period, short-wave radio broadcasts were used for foreign language instruction. Rorke (1978) conducted a qualitative study that used a combination of radio broadcasts and traditional instruction. The purpose of the study was to evaluate the effectiveness of radio broadcasts as a supplement to traditional instruction. Participants were eight students enrolled in an advanced French course. The students met weekly for four hours on-campus and were required to listen to a live French radio broadcast off-campus. The live French radio broadcasts provided the basis for discussion in the traditional lectures. The purpose of the radio broadcasts was for the students to identify structural content, note familiar and new language usages, and focus on oral communication.

Students were administered a midterm and final exam. Each exam consisted of comprehension questions concerning two radio broadcasts and the students had to orally

imitate the broadcasts. Qualitative data were collected throughout the course and a course evaluation was administered at the end of the course. Findings indicated that students performed well on the comprehensive questions. On the oral exam, the instructor found improvement in pronunciation and articulation for all of the students. Data from the course evaluations indicated that the students believed that the radio broadcasts informed them about events taking place around the world.

Rorke (1978) concluded that carefully edited radio broadcasts were a valuable supplement to language instruction. He also maintained that the radio was a cost effective method for universities to bring the outside world into the university environment.

Radio broadcasts have provided a new media of instruction that faculty used to deliver instructional content (Houston & Ryg, 1975). Research has indicated that radio broadcasts, as a supplement to an on-campus course, bring the outside world into the college classroom (Rorke, 1978). Historically, the barriers to the use of radio included the cost of developing the broadcast, the availability of courses, poor broadcast times, lack of incentives for faculty teaching radio courses, and the lack of student-teacher interaction (Houston & Ryg, 1975).

Television broadcast courses. Television emerged as a media of instruction in distance learning in the 1950s (Garrison & Shale, 1990). By 1979, over 500,000 students were enrolled in more than 6,000 courses offered via television (Dirr, 1983). While television allowed students to see the instructor, rather than just hearing him/her, it lacked the ability to interact with the instructor. Most television courses were created by a production team that consisted of content experts, instructional design experts, and

production personnel (Dirr, 1985). Typically, televised courses included one or two weekly lessons that included the television component, textbook readings, and a course study guide (Dirr, 1985).

Closed circuit television provided a viable media of instruction for delivering teacher education courses. Abel (1960) conducted a study to analyze student achievement in a closed circuit television course. One hundred and forty preservice education students were assigned randomly to seven sections of an education course. The students were assigned to three methods of observation: (a) direct observation in which the students observed in high school classrooms, (b) closed circuit television in which students viewed televised high school classes, and (c) film observation in which the students watched selected educational films. The students made five observations in the course and received grades for their observations. A 95-item pretest, a 69-item midterm exam, and a 180-item final examination were used to measure student achievement in the course. An analysis of variance was used to analyze achievement differences between the groups.

Results from the pretest and the midterm exam indicated that there were no differences between the three groups. There also were no differences between achievement on the final exam and the method of observation. However, results from the laboratory grades indicated that the closed circuit television group had the highest grades while the direct observation group had the lowest grades.

Abel (1960) concluded that the three methods of observation (direct observation, closed circuit television, film observation) were equally effective in providing observational experiences for preservice education students. Abel also maintained that

closed circuit television provided a viable type of instructional media for providing observational experiences and that further research should be conducted to analyze whether closed circuit television is an effective media for delivering course content for preservice education students.

In a comparative study, Levine (1973) studied the achievement of college students instructed by closed circuit television. The purpose of the study was to compare the achievement and student satisfaction of students instructed by closed circuit television versus traditional lecture instruction. One hundred and seventy students enrolled in eight sections of a chemistry course were selected to participate in the study. Eighty-eight students received instruction via closed circuit television and eighty-nine students received instruction via lecture. The courses met three times a week throughout the semester. The closed circuit television (CCTV) group watched televised lectures. Two days a week, the CCTV group watched the televised lectures and one day a week the instructor answered questions, reviewed homework, went over class notes, and introduced the topics for the week. The traditional group received lecture from an instructor throughout the semester.

Students were administered a 26-item pretest and a 64-item final exam. The data were analyzed using an analysis of covariance (ANCOVA). Students were also administered a student satisfaction survey during the first, eighth, and fifteenth week of the course. The survey consisted of 27 items using a 5-point Likert scale. The surveys were analyzed using *t*-tests.

Results indicated that there were no significant differences in the test achievement of the students instructed by closed circuit television and students instructed by the

traditional lecture. Results from the student satisfaction survey indicated that there were no significant differences in the satisfaction of students receiving instruction by closed circuit television and the students in the traditional classroom. Achievement and student satisfaction also were correlated and the results indicated that there was a positive relationship between attitude and achievement for all of the students.

Levine (1973) concluded that instruction via closed circuit television is as effective as traditional lecture. Both groups of students were satisfied with the media of instruction (CCTV, traditional instruction) they received in the course. However, the CCTV group did have access to an instructor once a week throughout the semester and this may have been the key factor in the satisfaction of students instructed using this type of instructional media. Levine maintained that further research should be conducted in a variety of subject areas to ascertain if closed circuit television is equally effective in delivering instruction across content. He also recommended that the relationship between ability level and student satisfaction should be investigated.

Studies that have used television as a media of instruction indicate that television has been an effective media for presenting information and that it has positively impacted student achievement in courses (Abel, 1960; Levine, 1973). However, these studies also indicate that supplementary material should be developed for use in these courses (e.g., follow-up activities, study guides, textbook, and discussion) (Levine, 1973).

Interactive television courses. A recent entry into the distance education areas has been the use of interactive television (ITV). This media of instruction began in the late 1980s and continues to be used today. Interactive television provides two-way audio and video and has the potential to provide immediate interaction between the student and

teacher, similar to the interaction in face-to-face teaching situations. Interactive television can provide different levels of interaction. These include: (a) two-way video and two-way audio, (b) one-way video with two-way audio, and (c) one-way video and one-way audio. In an interactive television classroom, students at remote sites can see, hear, and interact with students and instructors at the host site (Minoli, 1996).

In an attempt to compare student perceptions of distance learning in ITV classrooms, Thomerson and Smith (1996) randomly selected 495 students to complete a survey. The purpose of the study was to compare student-teacher interaction, course structure, the physical learning environment, and overall course enjoyment/satisfaction among three groups of students. The study was conducted during a period of five academic quarters in 1993 and 1994. Three groups of students were selected to participate in the study. The groups included 165 students at the remote site, 165 students at the host site, and 165 students in a traditional classroom.

A survey instrument was developed to collect the data. The four cluster areas contained in the survey were physical learning environment, course structure, enjoyment/satisfaction, and student-teacher interaction. The survey consisted of 21 questions on a 4-point Likert scale, three open-ended questions, and demographic information. Three hundred and fifty-six students returned the survey, for a return rate of 70%. Means and standard deviations were calculated for each question on the survey. In addition, an overall cluster mean was calculated for each of the cluster areas. Data were analyzed using an ANCOVA to determine if significant differences existed between the three groups of students for each of the cluster areas. Age was used as the covariate.

Results indicated that significant differences existed between the physical learning environment and overall course enjoyment. Mean results indicated that students in the traditional classroom rated every statement within the course enjoyment/ satisfaction (3.18) and physical learning environment (3.27) cluster areas higher than students at the remote-site (2.89, 3.14 respectively) and the host-site students (2.86, 3.03 respectively). Significant differences were not found between student-teacher interaction and course structure questions in the three instructional groups (the traditional group, the host-site group, and the remote-site group). Open-ended questions indicated that there had been problems dealing with the technology in the ITV classroom (e.g., loss of class time due to bringing all sites on-line properly and too much down time).

Thomerson and Smith (1996) concluded that the perceptions of distance learning students differed from traditional students. They maintained that strategies are needed to improve the affective aspects of the students' learning experiences at both remote and broadcast site classrooms. They suggested that the broadcast site group should be eliminated when broadcasting a class, so that the instructor can focus on improving the learning experiences of the students at the remote sites.

In another study designed to investigate student satisfaction in interactive television courses, Westbrook (1997) explored the changes in student satisfaction with ITV courses over a semester. In this study, ITV was used to connect three remote locations.

Fifty-four students enrolled in a graduate business course participated in this study. The class consisted of 23 students in the broadcast classroom and 31 students in the three remote site classrooms. Fourteen off-campus students were enrolled at one

remote site, ten at the second remote site, and seven at the third remote site. This was the first ITV course that all of the students had taken.

A survey was administered at the beginning and end of the semester. The survey consisted of items, scored on a seven-point Likert scale, related to student satisfaction with the ITV course. Of the 54 students who participated in the study, 51 students completed both surveys. Data from the surveys were analyzed using an ANOVA.

The results of the study indicated that students reported a higher participation level in classes offered in the ITV broadcast classroom than at the remote sites. Students at the remote sites indicated that they interacted less with the instructors than they did in on-campus courses. The students in the broadcast classroom had higher levels of satisfaction than students at remote sites.

There was a significant difference between the two groups concerning student perceptions of the technology distractions. Students at ITV remote sites reported higher levels of technology distraction than students in the broadcast classroom. This was an interesting finding in that at the beginning of the semester the students in the broadcast classroom perceived that there would be a high level of technology distractions. However, by the end of the semester, students in the broadcast classroom perceived the technology distractions to be less than they had anticipated.

Westbrook (1997) concluded that students in the broadcast classroom had higher levels of both interaction and satisfaction than the students at the remote sites. He recommended that instructors use interactive strategies to involve students at remote sites. He also suggested that instructors originate some of the class sessions from the remote sites to create face-to-face relationships with the students. Westbrook maintained

that ongoing course assessment throughout the semester should be done so that course adaptations can be made to meet the needs of the students.

Paulsen (1997) investigated the use of three types of instructional media (ITV broadcast classroom, receiving ITV classroom, videotaped lectures) to provide instruction to students enrolled in a special education class. The purpose of the study was to investigate the academic achievement and satisfaction of students receiving instruction in one of the three groups. Sixty-seven students participated in the study. Seventeen students were in the broadcast classroom, 17 students were in the remote site classroom, and 33 students were in the videotape lecture classroom.

Students were administered a 65-item pretest and posttest, nine weekly quizzes, a satisfaction survey, and an instructor evaluation survey. The satisfaction survey consisted of questions concerning satisfaction with the media of instruction, willingness to take another course via the same media, and the effectiveness of the type of instructional media. Data were analyzed using a MANOVA (e.g., differences between achievement, differences between student satisfaction, and differences between evaluations of the instructor) and an ANOVA (e.g., quizzes).

Results from the study indicated that achievement was equal, regardless of the media of instruction. In terms of student satisfaction, students in the broadcast class were satisfied with their media of instruction. Students in the ITV class were satisfied with their instruction, but would have preferred a traditional setting. And, students receiving instruction via videotape lectures were dissatisfied with their media of instruction and did not feel that this type of instructional media was effective in increasing their

understanding of the course material. Students in the broadcast class rated their instruction significantly higher than did the students in the ITV or video classes.

Paulsen (1997) concluded that the farther students are removed from the instructor, the more dissatisfied the students become. Additionally, if students do not perceive their media of instruction to be effective, they do not want to take another course via the same media. Paulsen maintained that students do not perceive they are learning when an instructor is not present.

Recommendations made by Paulsen (1997) include increasing communication and interaction methods with students who are separated from the instructor. Additional recommendations included evaluating the effectiveness of the distance education environment and identifying effective teaching behaviors in an ITV classroom.

In an attempt to identify the effect of class size on student satisfaction in an ITV course, Biner et al. (1997) investigated whether the number of individuals in an ITV course was a predictor of student satisfaction. Two hundred and eighty-eight undergraduate students enrolled in 17 interactive television courses participated in the study. The students attended their course at one of 68 remote sites. The number of students at a given site ranged from one to 33. Class sessions were broadcast live (one-way video, two-way audio).

A 33-item attitudinal assessment instrument using a 5-point Likert scale was administered to students. The instrument assessed student satisfaction based on seven course factors (e.g., instructor/instruction, technology, course management, at-site personnel, promptness of material delivery, support services, and out-of-class communication with the instructor). Final course grades and prior college grade point

averages were used to assess student performance. Data were analyzed using simple regression analyses to determine the effect the number of students at each site had on student satisfaction with the course.

Biner et al. (1997) found that there was a significant difference in the satisfaction of students who attended classes with fewer students. For example, students attending ITV class sessions with just a few students reported being more satisfied with all aspects of the course than students attending ITV classes with more students. The students who were alone at their site exhibited the highest levels of satisfaction.

Biner et al. concluded that remote-site group size in an ITV course affects the satisfaction, motivation, and achievement of students. To support this conclusion, the data indicated that the 45 students who attended the ITV course alone at a remote site were the students who exhibited the highest level of satisfaction and achievement in the course.

In a qualitative study, Whitworth (1999) observed an instructor and 33 students as they participated in a science education course via ITV. The purpose of the study was to chronicle the experience of the instructor and students in the ITV classroom. Throughout the semester, the instructor visited four remote sites.

Data were collected from: (a) videotaped classes, (b) informal interviews with the students, (c) student surveys, and (d) instructor and student journals. The instructor and the students made weekly entries into their journals concerning course content and their experiences with the course. Students completed surveys at the beginning of the course, mid-semester, and at the end of the semester. The surveys focused on the degree of

student satisfaction with the course, reasons for taking the ITV course, level of computer literacy, willingness to take another ITV course, and sources of frustration encountered.

Whitworth used a taxonomy analysis of the data (e.g., journal entries, videotapes of recorded classes, student surveys) and identified domains to construct the framework of the study. The data were analyzed for recurring patterns among the sites. Journal entries from the instructor indicated that she felt isolated from the students at the remote sites and that she had to explore a variety of strategies for getting to know the students. In an attempt to get to know the students at the remote sites, the instructor made two visits to each remote site. However, when she returned to the broadcast site the rapport with the broadcast students was affected from her time away from the class.

Additional data from the journal entries indicated that the teacher believed that discussions with the students at the remote sites were harder to initiate. This was compounded by the fact that there was additional wait time between the instructor's questions and student responses. However, throughout the semester the instructor made adjustments. For example, the instructor made a set of notecards with student and site names that she used for calling on students in an attempt to involve students at remote sites in discussions. She also learned to talk more slowly and give additional wait time. Another challenge for the instructor was to learn and utilize the technology in the ITV classroom. However, by the end of the semester the instructor believed that using ITV to reach students at remote sites was worth the time and effort.

Results from the student satisfaction survey indicated that the students at the remote sites believed they had established a close relationship with the students at their site. However, they noted in their journals that they were uncomfortable being on

camera. But, the students still indicated that they would take another distance learning class and would recommend distant learning to other students. Reasons students gave for enrolling in a distance learning class were: (a) close to home or work, (b) availability of courses, (c) working with other students, (d) opportunity to learn new technologies, (e) opportunity to share/learn from other students at different locations, and (f) more involved in their own learning.

The number of students expressing concern about the amount of student-teacher interaction declined as the semester progressed due to the adjustments to improve communication made by the instructor throughout the semester. In terms of student-teacher interaction, students who actively used e-mail to send assignments and correspond with the instructor believed they had more interaction with the instructor and received more feedback on their assignments than students in the traditional classes.

Whitworth (1999) concluded that the instructor believed that the time invested in using the ITV equipment to reach the students at remote sites was worth the effort involved. Whitworth maintained that making adjustments throughout the semester to facilitate communication with students was an important component in distance education.

The research conducted concerning ITV learning environments appears to indicate that the achievement between distance learning students and traditional students is comparable (Baker, Hale, & Gifford, 1987; Paulsen, 1997). Although, if given a choice, most students indicate that they prefer traditional face-to-face delivery of instruction (Hardy & Olcott, 1995; Whitworth, 1997). Disadvantages cited by distance learners include a lack of frequent interaction with fellow students and the fact that

remote site students do not feel comfortable interacting with the teacher (Paulsen, 1997; Whitworth, 1997).

Online Distance Education

Khan (1997) defined Web-based online education as hypermedia-based instruction that utilizes the attributes and resources of the World Wide Web (WWW) to create a meaningful learning environment. Various educational methods used in an online distance education course include: (a) online information, (b) educational activities, and (c) communication. Various online features have been used to increase interaction. These include asynchronous communication tools (e.g., threaded discussion board) and synchronous communication tools (e.g., chat room). The main feature of an online classroom is that it allows students to learn anywhere at any time. Numerous studies have noted the concerns, frustrations, and satisfaction of both teachers and students in the online learning environment (Gunawardena & Zittle, 1997; Diaz, 2000; Thurmond, Wambach, Conners, & Frey, 2002). These include: (a) technical support needed, (b) high drop-out rates, (c) facilitating interaction, (d) immediate feedback, and (e) timeliness of returned work.

Student Satisfaction

Gunawardena and Zittle (1997) investigated the effect of social presence (interaction) as a predictor of learner satisfaction in the online learning environment. Social presence in this study was defined as the degree to which a person was perceived as a real person in computer-mediated communication (CMC). Gunawardena and Zittle hypothesized that social presence was a predictor of overall satisfaction.

Five universities participated in a computer conference called GlobelEd. GlobelEd provided a forum for students to share and discuss research in an online environment. The conference was a class requirement in which 50 students participated. Eight students from San Diego State University, eleven students from Texas A & M University, fourteen students from the University of New Mexico, seven students from the University of Wisconsin-Madison, and ten students from the University of Wyoming participated in the study.

In the course, students were responsible for conducting a research project, sharing the results via web-conferencing, moderating the discussion, and contributing to the discussion. Students also were encouraged to use emoticons to compensate for missing social cues when interacting online.

At the completion of the course the students completed a 52-item questionnaire based on a five-point Likert scale. The questionnaire contained questions related to: (a) social presence, (b) active participation in the conference, (c) attitude toward CMC, (d) barriers to participation, (e) confidence in mastering CMC, (f) perception of having equal opportunity to participate in the conference, (g) adequate training in CMC, (h) technical skills and experience using CMC, and (i) overall satisfaction with the GlobelEd conference. These were the dependent variables.

Data were analyzed using a stepwise regression procedure using the eight dependent variables. Results from the questionnaire indicated that when emoticons were used student satisfaction in the course improved. Conversely, participants who rated social presence as low, rarely used emoticons to express themselves in the online environment. However, a majority of the participants agreed that more social and

personal messages were used toward the end of the course than at the beginning of the course. Gunawardena and Zittle (1997) concluded that social presence is a strong predictor of satisfaction in a text-based computer course. They also maintained that instructors are an integral component for creating social presence in the online environment.

Gunawardena and Zittle (1997) maintained that future research should examine the characteristics (e.g., interactivity, collaboration, and reflectivity) of computer-mediated communication and its relation to students' perceptions of interaction. They suggested that future research investigate social presence as a predictor of cognitive and affective learning outcomes for students.

Diaz (2000) conducted a study to compare student satisfaction between online students and traditional students in a health education class over the course of three semesters. Fifty-six students were enrolled in the distance education sections and 69 students were enrolled in traditional courses. All sections of the course were taught using the same course outline, textbook, lecture material, and tests. The differences between the course sections were the delivery method for the lectures, the method of communication, and the method for turning in assignments.

A student satisfaction survey consisting of eleven statements in the areas of class structure, instructor, class materials, and overall experience was developed and administered to the traditional courses. A student satisfaction survey consisting of thirteen statements was administered to all of the sections. Two additional statements were added to the distance education surveys in which the students rated satisfaction with

the class website and CD-ROM. The student satisfaction surveys were administered to all students during the final exam week of each semester.

Data were analyzed to determine the mean, standard deviations, and percentages for each item on the survey. Results from the student satisfaction surveys indicated that the students enrolled in the online courses were as satisfied or more satisfied than students enrolled in the traditional sections of the course. Students in the distance education course rated the class website high as well. Results from the satisfaction survey also indicated that distance education students were satisfied or very satisfied with their course.

Diaz (2000) concluded that distance education instructors should use surveys and questionnaires to assist in class preparation, and course methods. Diaz maintains that future research should identify student characteristics that are found in successful online students. This should involve the development of a profile of a successful online student to facilitate the success of students taking online courses (Diaz, 2000). He believes that these characteristics may help in lowering the attrition rates of online students.

In a study designed to ascertain the reasons students drop out of online courses, Chyung (2001) analyzed the factors that impact a student's decision to withdraw from a distance education course. One hundred and thirty-four students were administered a learner perception evaluation based on a 5-point Likert scale. The evaluation consisted of eight items dealing with learner perception of the online learning environment. Data were used to identify the mean and standard deviation for each statement in the evaluation.

Results indicated that students perceived online instruction to be motivationally appealing, interesting, and relevant to their interests and goals. Additional data showed that, following the redesign of the courses (e.g., smaller online class size, reduction in the complexity of the online communication system, provision of online technical support, and frequent feedback provided), the attrition rate of students decreased to 15%. Chyung (2001) concluded that the improvements made to the online courses influenced the students to continue to take courses in the online program. Chyung (2001) maintains that using a systematic approach to improving online courses is an integral component in online education.

Thurmond, Wambach, Conners, and Frey (2002) conducted a study to investigate the reason students choose to take online courses and to measure student satisfaction while taking the courses. A total of 120 students enrolled in seven online nursing courses participated in the study. Demographic information indicated that 73 of the students lived in urban areas and 38 lived more than 100 miles from campus.

A 55-item survey was developed to evaluate the online nursing courses. The items contained in the survey addressed student perceptions of the outcomes, educational practices, and use of technology. The survey also contained two open-ended questions on which the students identified the best thing about the course and provided suggestions to improve the course. Data were analyzed using a correlation analysis and a multiple regression. The dependent variable was student satisfaction with the course. Results from the survey indicated that 57 students were satisfied or very satisfied with the online course. Student satisfaction was significantly correlated with students receiving timely comments from the instructor, the instructor offering a variety of methods to assess

student work, and familiarity with the instructor. More than half of the students surveyed indicated that the instructional activities and interaction in the distance education course were very important to their satisfaction with the course.

Thurmond et al. (2002) concluded that student characteristics did not influence the online course or the outcome of student satisfaction in these courses. They maintained that the strongest predictor of student satisfaction with online courses is a student's sense of connection with the instructor and whether or not a student perceives that the instructor was fair in evaluating assignments. Thurmond et al. maintained that students were more satisfied with the course when they felt the instructor used a variety of methods to assess them and when they received timely feedback from the instructor.

Recent studies appear to indicate that students enrolled in online courses are as satisfied or more satisfied than students in traditional courses (Diaz, 2000; Thurmond et al., 2002). The variables identified that impact student satisfaction with online courses are: (a) timely comments from the instructor, (b) a variety of methods to assess student work, and (c) social interaction in the online environment (Gunawardena & Zittle, 1997; Thurmond et al., 2002). Recommendations made by researchers include the need for faculty to attend workshops to better understand the technology and the identification of strategies to facilitate interaction in an online course (Chyung, 2001; Gunawardena & Zittle, 1997).

Student Achievement

Student achievement and performance in an online course has been measured by the grades earned for a course, an assignment, or an exam (Diaz, 2000). Overall, research

has found that the achievement of students enrolled in online courses is comparable to the achievement of students enrolled in traditional courses (Schutte, 1998; Chyung, 2001).

Schutte (1998) examined the effects of online instruction on student achievement in a social statistics course. Schutte maintained that face-to-face interaction was a predictor of student achievement. Thirty-three students were separated randomly into two groups. Seventeen students participated in traditional instruction and 16 students received online instruction. The online class met on-campus the first two weeks of the semester and for the two tests. The students were responsible for generating weekly statistic reports, responding weekly to a discussion topic, turning in weekly homework problems, and participating in a weekly chat with peers. The traditional class met weekly on-campus and turned in weekly assignments.

Students completed a questionnaire at the beginning of the course to determine student demographic information and student experience with computers, math, and statistics. Following completion of the course, the students completed another questionnaire containing items designed to evaluate the degree of their interaction with peers in their class; time spent on the class; perceived degree of flexibility; understanding of the material; and feelings toward the class, computers, and math. Student scores on the midterm and final exam were used to examine achievement in these courses. The exams consisted of four parts: (a) matching, (b) objectives, (c) definitions, and (d) problems. The data were analyzed by tallying questions by question type. Comparisons between the online course and the traditional course were conducted. Results were analyzed and the mean (matching, objectives, definitions, and problems) for each condition was calculated.

Results from the midterm and final exam indicated that scores were significantly higher for the online groups when compared to the traditional class. Online students scored an average of 20 points higher on both tests than the traditional students across all four question types. Data from the questionnaire administered at the end of the course showed marginal significant differences between the two groups. For example, online students communicated more with fellow students. Schutte (1998) attributes this to the student collaboration that occurred in the online class. Online students also perceived that they spent more time on class work than did the traditional students.

Schutte (1998) concluded that student collaboration is integral in an online course to facilitate achievement and increase student satisfaction. Schutte maintains that further research be done to determine the specific online instructional techniques that may impact student achievement in an online course.

Smith, Smith, and Boone (2000) conducted a study to determine whether traditional classroom methods remained effective when transferred to the online environment. In this study, students received both traditional and online instruction. Fifty-eight students were assigned randomly to online and traditional courses. All of the students were preservice elementary and secondary education majors.

Students completed pretests and posttests covering three instructional methods: (a) lecture, (b) guided instruction, and (c) collaborative discussion. Each of these instructional methods was developed into traditional and online (experimental) interventions. The students received traditional and online instruction for each of the three instructional methods (e.g., lecture, guided instruction, and collaborative discussion). Pretests were administered prior to instruction and posttests were

administered following instruction. Data were analyzed using *t*-tests and repeated measures ANOVA for each intervention.

Results from the study indicated that there were no significant differences in academic outcomes among the three methods of instructional delivery (e.g., lecture, guided instruction, and collaborative discussion) for five out of the six interventions. Students receiving online instruction performed as well as students receiving traditional instruction for both the pretests and posttests. However, for one collaborative discussion module, the traditional group outperformed the online group by an average of 2.68 points. Overall, academic improvement between pretest and posttest increased significantly for all six interventions.

Findings of the study indicate that traditional methods of instruction can effectively be transferred to the online environment when appropriate instructional design is used. Smith, Smith, and Boone (2000) concluded that lectures, when presented in an online learning environment, are as effective as lectures presented in a traditional class. They also maintained that guided instruction and collaborative discussion in the online environment are as effective as guided instruction and collaborative discussion in the traditional classroom. Smith, Smith, and Boone (2000) suggest that further research is needed in determining the long term effects of online learning. They recommended that student characteristics that increase student participation in the distance education courses be identified.

Diaz (2000) investigated the achievement of online students enrolled in a health education course. Two hundred and thirty-one students participated in the study. Ninety-six students were enrolled in the online course and 135 students were enrolled in

the traditional course. Both groups of students received instruction using the same course outline, textbook, lecture material, and tests. The online course received instruction via the online environment, turned in assignments online, and communicated with the instructor via e-mail. The traditional classroom met weekly on-campus. The data were analyzed using descriptive statistics (e.g., mean, standard deviation, raw scores, and mean percentages) to compare the achievement of online students and traditional students on four tests.

Results from the study indicated that online students performed somewhat higher than traditional students on the four tests. The average scores on the semester exams were higher for the online group. Also, students in the online course received more grades of an A for the course and fewer grades of D or F than did the traditional students. Diaz concluded that students enrolled in an online course are as successful as students enrolled in a traditional course.

Diaz (2000) maintained that future research should compare the success of online students to that of traditional students. Also, he believes further research should focus on identifying the learning characteristics of successful online students.

In a similar study, Chyung (2001) analyzed the achievement of 134 students enrolled in online courses. The purpose of the study was to evaluate the achievement of students enrolled in online computer education courses over a period of nine academic quarters. The enrollment for the courses ranged from 12 to 20 students. The students received all instruction in the online environment. Pretests were administered prior to instruction, a midterm exam was administered halfway through the semester, and a final exam was administered at the end of the semester. The data from the midterm exam and

the final exam were combined and used as posttest data. Data were analyzed using *t*-tests to determine if there was a difference between the pretest and posttest (midterm exam and final exam) scores. Results from the *t*-test indicate that there was a substantial difference between the pretest and posttest results. Over the course of the nine academic quarters, the *t*-tests indicated that the average posttest scores were significantly higher than the average pretest scores.

Chyung (2001) concluded that students enrolled in an online computer course performed higher on the posttest scores than the pretest scores. Chyung maintained that future research should focus on identifying factors for improving online courses and evaluating the attrition rate of students enrolled in an online course

In summary, it appears that student achievement in the online environment is comparable to student achievement in traditional courses (Shutte, 1998; Diaz, 2000). Research also suggests that online instructional techniques (e.g., collaborative online discussions) and appropriate instructional design of the online course impact student achievement and student satisfaction (Shutte, 1998; Smith, Smith, & Boone, 2000). Research recommendations include the need to identify online instructional techniques and student characteristics that will increase student participation in the online environment (Shutte, 1998; Smith, Smith, & Boone, 2000; Diaz, 2000).

CD-ROM Distance Education

In CD-ROM instruction, students view actual objects, realistic scenes, and perspectives that are difficult or impossible to observe in real life (Navarro & Shoemaker, 2000). CD-ROM instruction is typically a stand-alone course, in which instruction is

contained on a CD-ROM and students progress through the course/content at their own pace (Inglis, Ling, & Joosten, 1999). This media of instruction offers the potential to serve large numbers of students who live in remote areas with limited online access. The research concerning CD-ROM as a form of distance education is in its infancy.

However, researchers have begun to conduct studies to evaluate student achievement and satisfaction with this media of instruction (Navarro & Shoemaker, 2000; Barron & Baumbach, 1990; Bliss & Mazur, 1996; Liaupsin, 2002).

Student Satisfaction

Barron and Baumbach (1990) evaluated student satisfaction with a CD-ROM tutorial that was used to train students on the use of CD-ROMs. One hundred and twenty-seven undergraduate students were assigned randomly into a lecture group and a CD-ROM group. The CD-ROM contained lessons concerning the explanation of how CD-ROMs are read, search techniques, a CD-ROM simulation of the Grolier Electronic Encyclopedia, and CD-ROM applications.

To ascertain attitudes toward the CD-ROM tutorials, the students completed an evaluation form. The specifics of the evaluation form were not described. The results were analyzed using qualitative data. Overall, 95% of the students said they had enjoyed using the CD-ROM. Specific positive areas were: (a) the hands-on capabilities, (b) being able to go back and review, (c) the program was user friendly, and (d) being able to move through the program at their own pace.

Barron and Baumbach (1990) concluded that using CD-ROMs to disseminate information is an efficient and effective media for providing learning material. They

maintained that the use of CD-ROMs for educational purposes must be promoted and the effective implementation of their use be studied.

In order to ascertain the effectiveness of using CD-ROM case studies, Bliss and Mazur (1996) conducted a study using video clip narratives and additional resources (e.g., lesson plans, examples of student work, commentaries by teachers, and full text of articles). The purpose of the study was to explore the use of using video vignettes and CD-ROM cases for the professional development of beginning and experienced history teachers. Six experienced teachers and six student teachers participated in the study.

Criteria used in the development of the video vignettes included: (a) a good narrative structure, (b) a factual authentic case, (c) tangible episodes of good teaching, and (d) aspects of standards-based practice. In addition, the CD-ROM cases included lesson plans, examples of student work, commentaries by teachers, full text of articles, and sets of teacher and student performance standards. Qualitative data were collected. The participants in the study were individually interviewed for 30 minutes.

Results indicated that all of the teachers felt that the video and audio clips made the case being studied realistic. Two teachers noted that the audio comments elaborated the text and were very educational. Another teacher noted that the multimedia format made him focus more closely on the information given because he didn't want to miss anything. Following completion of the study, teachers requested more CD-ROM cases to study. Advantages cited by the teachers for using the CD-ROM cases were immediate access to extensive and vivid details about a story, numerous resources to enhance the study of the case, and opportunities for informal discussions of the case with teachers in their own schools.

Bliss and Mazur (1996) concluded that because teachers could select and focus on topics from a case that were important to them, the CD-ROM cases affirmed their professional judgment. They also maintained that the CD-ROM cases fostered thoughts about risk-taking and change, and that the video and additional resources provided evidence of the potential of CD-ROMs (Bliss & Mazur, 1996).

Navarro and Shoemaker (2000) conducted a study to evaluate student perceptions concerning the use of CD-ROMs as an instructional tool in a distance education course. Two hundred students enrolled in an economics course had the option of attending class in a traditional format or via CD-ROM. Forty-nine students chose to take the class via CD-ROM and 151 students chose the traditional format.

For the CD-ROM group, course content was provided on a CD-ROM that contained 11 separate lectures. Students used the online environment to communicate with the instructor and to communicate with other students via asynchronous or synchronous discussions. Students were required to go to an electronic testing center to take weekly quizzes.

Following completion of the course, a student satisfaction survey was administered to both groups of students (traditional, CD-ROM). Part A of the survey was administered to both groups of students and contained questions relating to distance of commute to the university, access to computers, level of computer skills, and the overall quality of the course. Part B of the survey was administered only to the CD-ROM group and consisted of questions dealing with the evaluation of various instructional technologies (e.g., CD-ROM, electronic testing center). Data were analyzed using descriptive statistics (e.g., mean, standard deviation, and *t*-tests).

Results from the survey indicated that, in terms of student satisfaction with the course, the CD-ROM group was more satisfied than the traditional group. Survey results indicated that 90% of the CD-ROM group believed that the university should offer more online courses, and 83% of the CD-ROM group felt that the CD-ROM lectures were the most beneficial (while 15% cited the textbook). Sixty-eight percent of the CD-ROM group regarded the CD-ROM as the most enjoyable learning component, followed by the electronic bulletin board (14%), the online discussions (11%), the electronic testing center (9%), and the textbook (2%). The most frequent technical problem cited by students in the CD-ROM group was a slow computer server. Results from the traditional group were not reported.

Navarro and Shoemaker (2000) concluded that CD-ROM lectures are as effective as a traditional lecture in delivering instructional content. They maintained that the threaded bulletin board and chat room are valuable components of a distance education course. Navarro and Shoemaker suggest that further research is needed concerning the interaction between and among CD-ROM and online students.

In a similar study, Liaupsin (2002) evaluated learner satisfaction with using a CD-ROM instructional program to develop a functional behavior assessment (FBA). Thirty university students enrolled in a special education course and 18 teachers enrolled in a professional development course participated in the study. The students were separated into three groups: (a) no treatment group, (b) preservice group, and (c) in-service group. The preservice group and in-service group used the CD-ROM instructional program and the no treatment group used a textbook to cover the same

content. The CD-ROM module consisted of six phases through which the participants moved, as well as two case studies that included video clips of students with disabilities.

A survey designed to assess student perceptions of the CD-ROM, content, and case studies was administered to the preservice and in-service groups. The survey measured motivation, participation, and navigation. It also consisted of open-ended questions dealing with the strengths and weaknesses of the CD-ROM program and suggestions for change. The data were analyzed using an ANOVA.

Results from the survey indicated that the in-service group (teachers) were overwhelmingly positive across all survey items (e.g., content of the program; content relevancy; quiz and test items increased understanding; navigation features were sufficient; images, sounds, and movies enhanced the program). The preservice group (university students) rated the CD-ROM program high in some categories (e.g., navigation features were sufficient; confident about conducting a functional behavior assessment; feedback comments were helpful; images, sounds, and movies enhanced the program).

The preservice group did not rate the program high for motivational elements, interest, or relevance. However, students in the preservice group said that they had technical problems with the text and video and that this affected their opinions of the CD-ROM. In contrast, the in-service group had technical assistance available while they used the CD-ROM and they did not encounter the technical problems encountered by the preservice group. However, both groups reported a high level of confidence in their ability to develop a functional behavior assessment following training.

Liaupsin (2002) concluded that self-instructional CD-ROM software is an alternative to the traditional training model. He also stressed the importance of providing technical support for preservice and in-service teachers when using a CD-ROM for instruction. Liaupsin maintained that due to the cost and time associated with editing video for CD-ROMs future research should attempt to determine the degree to which video increases learner understanding. He also recommended that further research be conducted to investigate effective models for designing CD-ROM instruction.

In summary, research concerning student satisfaction with taking a course via CD-ROM is still in its infancy. The research that exists appears to indicate that students who take a CD-ROM course are as satisfied as students who take a traditional course (Navarro & Shoemaker, 2000; Liaupsin, 2002). Further research is needed to ascertain if CD-ROMs are an acceptable alternative or media of instruction for delivery of course materials (e.g., lectures, notes, and video) to university students. However, research must consider the technological barriers students may encounter when participating in a CD-ROM course (Liaupsin, 2002).

Student Achievement

Barron and Baumbach (1990) evaluated the student achievement when a CD-ROM tutorial was used to train students and teachers on the use of CD-ROMs. Students in seven undergraduate classes (127 students) were separated randomly into a control group (lecture group) and an experimental group (CD-ROM group). The CD-ROM instruction consisted of four categories: (a) explanation of how CD-ROMs are read, (b) search techniques, (c) CD-ROM simulation of the Grolier Electronic Encyclopedia, and (d) CD-ROM applications.

The control group (lecture group) completed a pretest, participated in an overview concerning CD-ROM search techniques and applications, and completed a posttest. The experimental group (CD-ROM group) took the pretest, used a CD-ROM tutorial, and completed a posttest immediately after the tutorial. The pretest and posttest consisted of 20 multiple-choice questions. The average mean results indicated that there was a significant increase between pretest (mean score 1.5) and posttest (mean score 15.1) scores for the CD-ROM experimental group. Conversely, the control groups mean indicated that their scores from the pretest (mean score 1.3) to the posttest (mean score .8) decreased.

Barron and Baumbach (1990) concluded that CD-ROMs are a cost efficient and effective type of instructional media to train a large number of people. They maintain that the CD-ROMs used for training purposes must be well designed and evaluated before being disseminated.

In a study using CD-ROM lectures, Navarro and Shoemaker (2000) investigated student academic achievement. The participants were 200 students taking an introductory macroeconomics course. The students had the option of taking the course in a traditional format or via CD-ROM. One hundred fifty-one students chose the traditional format and 49 students chose the CD-ROM format. Throughout the course, students in the traditional format were required to attend three hours of lecture a week. In contrast, students in the CD-ROM course used the textbook and a CD-ROM containing 11 lectures. Students in the CD-ROM course were required to complete weekly quizzes at a testing center, participate in asynchronous discussions, and access a chat room for synchronous discussions.

Data were analyzed using descriptive statistics (e.g., means, standard deviations, and *t*-tests). Students were administered a final exam consisting of fifteen short answer questions. Results indicated that the CD-ROM group performed significantly better on the final exam than the participants in the traditional course. The mean score for the CD-ROM group was 11.3, while the mean score for the participants in the traditional course was 9.9. Navarro and Showmaker (2000) concluded that the incorporation of well-designed CD-ROM lectures is an acceptable substitute for traditional classroom lectures. Navarro and Shoemaker (2000) maintain that further research needs to explore the interaction between students in CD-ROM learning groups.

A multicultural, problem-based CD-ROM module was developed by CASELINK and was field-tested by Ochoa et al. (2001). The purpose of the study was to evaluate the effectiveness of teaching preservice teachers about the special education referral process and the factors to consider when referring a student from a different ethnic background for special education. Participants in the study included 127 preservice special education students enrolled in three courses at two universities.

The preservice students used the CD-ROM simulation to problem solve working with an interactive multidisciplinary team that was referring a Hispanic student with limited English skills for special education assessment. Students worked through the interactive module on the CD-ROM to make a recommendation to the multidisciplinary team. The data were analyzed using means and standard deviations.

Results from the study indicated that students were very motivated to solve the problem presented to them via CD-ROM. Additionally, results indicated that student responses included memorization of educational facts and that they were involved in the

critical thinking process. Conclusions of the study suggest that the multimedia components (e.g., video and audio) and interactivity of the CD-ROM module add a viable media of instruction for instructors to use to enhance a course (Ochoa et al., 2001).

In a comparison study, Liaupsin (2002) explored the effectiveness of a CD-ROM training module concerning the development of a functional behavior assessment (FBA). The participants included three groups: (a) no-treatment group, (b) CD-ROM preservice group, and (c) CD-ROM in-service group. The no-treatment group consisted of 10 university students enrolled in a behavior management class who did not use the CD-ROM instructional program. The CD-ROM preservice group consisted of 30 university students enrolled in a special education course. The CD-ROM in-service group consisted of 18 teachers in a rural school district. The CD-ROM consisted of six phases that the participant progressed through to develop a functional behavior assessment.

Each group completed a 17-item pretest and posttest. Data were analyzed using a one-way ANOVA. Results of the ANOVA indicated that the mean score of the preservice group was higher than the no-treatment group, but not significantly higher. The mean score of the in-service group was significantly higher than the mean score of the no-treatment comparison group.

Liaupsin (2002) concluded that CD-ROM instructional programs can be an effective model for training teachers in professional development situations, as well as teachers in preservice classes. He found that academic achievement was equivocal across the traditional and CD-ROM groups. Liaupsin maintained that further research needs to be conducted to identify the standards for evaluation of instructional CD-ROM software.

A comparison study was conducted by Davis (1993) to evaluate the effectiveness of four types of instructional media used to teach students to use a CD-ROM database. A total of 120 students were separated into four groups (30 in each group). Each group received a different type of instructional media. Group A received a lecture/demonstration of the PsycLIT, CD-ROM system. Group B participated in a lecture/demonstration identical to Group A with the addition of a LCD panel to project the image of the computer screen. Group C viewed an instructional video. And, Group D used a CD-ROM tutorial concerning the PsycLIT system. The lecture and video groups were allowed to ask questions, but group D did not have this opportunity. Following instruction, each student completed a test covering the PsychLIT material.

A one-way ANOVA was used to compare the mean scores of the four groups, followed by a *t*-test. The mean scores ranged from 7.23-8.53. Results indicated that there were no significant differences between the mean scores for the four groups. However, test scores indicated that the students who used the CD-ROM had a significantly higher mean score on the tests than the students who received the lecture/demonstration. The lecture group using the LCD panel and the CD-ROM group had higher mean scores than the group who received the lecture without a LCD panel; however they weren't high enough to be statistically significant.

Davis (1993) concluded that instruction via CD-ROM was an effective media of instruction for teaching students to search the PsycLIT, CD-ROM system. Davis maintains that CD-ROM instruction provides a media of instruction that can be used to accommodate different learning styles. He believes that a CD-ROM can provide instruction that is self-paced.

New CD-ROM technological advances provide instructors with a media of instruction that can be used to help students build stronger and more coherent connections between the content being taught. CD-ROM lectures provide visual and audio stimulation that has been found to be an important part of enhancing the learning process (Moore, 1989). The emerging research base appears to indicate that CD-ROM instruction is as effective as traditional instruction when comparing the achievement of students participating in CD-ROM courses and students taking traditional courses (Barron & Baumbach, 1990; Navarro & Shoemaker, 2000; Liaupsin, 2002).

Summary

Distance education throughout its evolution has provided a variety instructional media and methods through which universities can meet a wide array of learning needs. Early advancements in instructional media included instructional radio, television, audiotapes, and videocassettes (Tate & Kressel, 1983). In the last 15 years, education has embraced multidimensional distance education technologies that enable the learner to interact with the instructor and peers (e.g., ITV classrooms, online courses) (Keegan, 1996). Currently, distance education focuses on multimedia-based interactions among teachers, students, and information sources through the Internet and other multimedia technologies (e.g., CD-ROMs) (Keegan, 1996). The various types of instructional media available allow an instructor to provide multiple ways by which students can access instructional content and interact with one another.

Because the goal of education is to provide authentic instruction and experiences, the incorporation of a variety of technological improvements into distance education

provides educators with richer and more experiential means of instruction. It is important, as new instructional media becomes available, that research continue to explore the most effective and efficient methods of incorporating the instructional media into distance education.

CHAPTER THREE

METHOD

Although various forms of distance education have existed since the late 1800s, university instruction is undergoing a technological revolution. Currently, the Internet is emerging as the most efficient and effective media to deliver distance education (Kahn, 1997). However, research concerning the online environment is still in its infancy. The purpose of this study was to explore student achievement, student satisfaction, and instructor course evaluations in two technology-based courses as compared to a traditional course.

This study compared three different types of instructional media for delivering course content: (a) the traditional classroom, (b) the online environment, and (c) the class-in-a-box. The study compared the achievement, student satisfaction, and instructor course evaluations of preservice general education students who were enrolled in ESP 444 *Special Education Techniques in Regular Settings* using three types of instructional media. The study also compared the use of instructional methods (e.g., PowerPoint notes, digital videos, and lecture/verbatim transcribed lecture notes) to facilitate the achievement of these students.

Research Questions

Data were collected to compare the achievement, satisfaction, and instructor course evaluations of students who received three different types of instructional media (e.g., traditional classroom, online classroom, and class-in-a-box). The following questions were asked.

Research Question One. Does the type of instructional media have a differential effect on the academic performance of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Research Question Two. For test items based on content presented only in the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Research Question Three. For test items based on content presented in lecture, PowerPoint notes, digital videos, and the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Research Question Four. Does the type of instructional media have a differential effect on the course satisfaction of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Research Question Five. Does the type instructional media have a differential effect on the course evaluations of the instructor completed by the students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Participants

The participants in this study were preservice general education students enrolled in ESP 444 *Special Education Techniques in Regular Settings*. The participants included 30 preservice general education students enrolled in the traditional section in the fall of 2003, and 46 preservice general education students enrolled in the distance education section of the course in the spring of 2004. The students in the distance education section were assigned randomly into two groups: (a) the online via WebCT section, and (b) the class-in-a-box section.

Traditional Students

Thirty undergraduate preservice general education students enrolled in ESP 444 *Special Education Techniques in Regular Settings* in the fall of 2003 participated in the traditional classroom (see Table 1). All participants were studying to become general education teachers.

The students participated in the class once a week, over a 15-week period. Demographic information was collected at the beginning of the semester on each student. Each student signed an informed consent form prior to participation in the study (see Appendix A).

Online Students

Forty-six undergraduate preservice general education students were enrolled in ESP 444 *Special Education Techniques in Regular Settings* offered through distance education in the spring of 2004. The 46 students were assigned randomly into two sections: (a) the online environment via WebCT, and (b) the class-in-a-box via CD-ROM. Twenty-five students were the participants in the online course (see Table 1).

Prior to the first week of the spring 2004 course, the students were called and notified of the time to report for the first class meeting. The online class met on-campus for 1 hour and 30 minutes during the first week of class. Over a 16-week period, the students accessed all of the instructional content and weekly quizzes, as well as turned in assignments, in the online environment via WebCT.

Students attended class for the first and last sessions to take the pretest and posttest. Each student signed an informed consent form prior to participation in the study (see Appendix B).

Class-in-a-Box Students

Forty-six undergraduate preservice general education students were enrolled in ESP 444 *Special Education Techniques in Regular Settings* offered through distance education in the spring of 2004 and participated in this section of the study (see Table 1). The forty-eight students enrolled in the spring semester distance education (ESP 444) course were assigned randomly into two experimental settings: (a) the online setting, and (b) the class-in-a-box setting. Twenty-one students were the participants in the class-in-a-box course (see Table 1).

Prior to the first week of the spring 2004 course, the students were called and notified of the time to report for the first class meeting. The class-in-a-box class met on-campus for 1 hour and 30 minutes during the first week of class. Over a 16-week period, the students accessed all of the instructional content via three CD-ROMs. The CD-ROMs contained all instructional content for the course.

The students in this section did not have the time constraint of due dates for assignments and quizzes. They accessed the quizzes in the online environment via

WebCT anytime throughout the semester. Thus, the students had the flexibility to complete the course prior to the end of the semester. Students attended class for the first and last sessions to take the pretest and posttest. However, students who completed the course requirements of the course early had the option of making arrangements with the instructor to take the posttest prior to the end of the semester. Each student signed an informed consent form prior to participation in the study (see Appendix B).

Setting

Three settings were used for this study. The first setting, the traditional classroom, occurred in the fall of 2003. The online environment and the class-in-a-box environment took place in the spring of 2004.

Traditional Classroom

The course, ESP 444 *Special Education Techniques in Regular Settings*, was held at the University of Nevada, Las Vegas (UNLV) in a classroom located on campus. The room was a typical university classroom that contained no windows and was painted white. The room contained an overhead projector, a computer, and one wall of white boards.

Online Classroom

The online version of ESP 444 *Special Education Techniques in Regular Settings* was taught via WebCT. The online course included the course syllabus, instruction via PowerPoint notes, verbatim transcribed lecture notes used in the traditional course from the fall of 2003, eighteen digital videos (e.g., high and low incidence disabilities, law, inclusion), an assignment drop box, and access to an online discussion forum that was

Table 1

Student Demographics

Characteristics	Fall 2003	Spring 2004	Spring 2004
	Traditional n=30	WebCT-Online n=25	Class in a Box n=21
Gender			
Male	6	4	3
Female	24	21	18
Ethnicity			
White	21	22	18
African-American	2	0	0
Asian-American	1	1	0
Hispanic	2	1	0
Biracial	4	1	3
Age			
Mean	24.7	25.2	25.4
Range	19-52	20-37	20-37
Major			
Elementary	15	12	13
Secondary	13	12	6
Other	2	1	2

used to communicate with class peers and the instructor. See Appendix C (Figure 1) for the online WebCT home page that the students in the online course used. The options available on the WebCT home page were: (a) the quizzes with links to take each quiz (see Appendix C, Figure 2), (b) the PowerPoint notes and lecture notes with links for accessing them (see Appendix C, Figure 3), (c) the videos with links to download and view each video (see Appendix C, Figure 4), (d) grades, and (e) options to communicate via a threaded discussion board and e-mail options to communicate with other students and the instructor (see Appendix C, Figure 5).

Class-in-a-Box

The class-in-a-box was instruction in a take-home study format contained on three CD-ROMs. At the beginning of the semester, the students received three CD-ROMs containing all course instructional content (e.g., PowerPoint notes, verbatim transcribed lecture notes from the traditional course from the fall of 2003, and 18 digital videos). See Appendix D (Figure 1) for a visual representation of a CD-ROM used in the course. The content on each CD-ROM was organized in folders describing the topic and lecture number (e.g., Learning Disabilities, Lecture 3). See Appendix D (Figure 2) for a visual representation of the instructional files contained on a CD-ROM. Students in the class-in-a-box used WebCT for online quizzes and to communicate with the instructor. See Appendix D (Figures 3 & 4) for a visual representation of the WebCT home page and the organization of the quizzes for the class-in-a-box course.

Instrumentation

The instruments used in this study included a pretest, posttest, student satisfaction survey, and the Department of Special Education form for the evaluation of the instructor. These instruments were administered during the fall of 2003 and the spring of 2004 to participating students enrolled in ESP 444 *Special Education Techniques in Regular Settings*.

Pretest

A forty-two item pretest (see Appendix E) covering material contained in the course was administered to the students enrolled in the three sections of the course. The forty-two item multiple-choice and true/false test was taken from the test bank that corresponds to the course textbook, *The Inclusive Classroom, Strategies for Effective Instruction* (2004) by Margo A. Mastropieri and Thomas E. Scruggs as well as from course lectures and videos.

Out of the forty-two test questions, twenty-one (three per chapter) were identified as textbook-only questions and were not covered in the lectures, notes, or digital videos. The remaining twenty-one questions (three per chapter) were identified as being covered in the textbook, as well as in the lectures, PowerPoints, and digital videos. Six questions per topic area (e.g., learning disabilities, mental retardation) were selected for the pretest. The pretest was completed by the participants, regardless of class format, in person during the first class session. A scantron machine scored the pretests. Twenty-five percent of the pretests were selected randomly and scored manually to ensure scoring reliability.

Posttest

The posttest was a 98-item test and consisted of multiple-choice, and true/false, questions (see Appendix F). Fourteen questions from each textbook chapter were used. The posttest was comprised of forty-nine test questions dealing with material covered only in the textbook and not reinforced in any other instruction in the course. An additional forty-nine test questions were selected from material that was in the text and also presented in lectures, PowerPoint notes, and digital videos. Test questions were selected from the pretest, quizzes, and the instructor's textbook test bank.

The posttest was administered to all students in person at the conclusion of the course during final exam week. However, students enrolled in the class-in-a-box section, who completed course assignments and quizzes prior to exam week, had the option to schedule a time to take the posttest earlier than exam week. Students contacted the instructor and scheduled a time to meet at the university. All students completed the student satisfaction survey, the instructor course evaluation, and the posttest at that time. All students had two hours to complete the posttest. Students were not allowed to use their notes or textbook during the posttest.

Student Satisfaction Survey

Student satisfaction surveys concerning the media of instruction (e.g., traditional, online, or class in a box) were used in the three classes and completed by each preservice student at the end of the semester (see Appendix G). The survey focused on student satisfaction with the media of instruction (e.g., traditional, online course, class-in-a-box) and the method for presenting the instructional content (e.g., PowerPoint notes, lecture/transcribed lecture notes via text documents, and digital videos). The survey also

covered willingness to take another course via the same instructional media and the effectiveness of the instructional media and method in meeting course objectives.

Instructor Course Evaluations

The instructor course evaluation form used by the Department of Special Education at the University of Nevada, Las Vegas (see Appendix G) was completed by all students at end of the course. The evaluation was based on a 5-point Likert Scale and contained questions focusing on: (a) presentation of the goals and purposes, (b) command of the subject matter, (c) presentation of course material, (d) evaluation methods, (e) opportunities to increase knowledge of the subject, and (f) overall performance in this course.

Materials

The textbook used for the course was *The Inclusive Classroom, Strategies for Effective Instruction* (2004) by Margo A. Mastropieri and Thomas E. Scruggs.

Additional materials used included PowerPoint notes, verbatim transcribed lecture notes, and digital videos.

PowerPoint Notes

In the traditional classroom (fall of 2003), PowerPoint lecture notes were available for the students to copy. The notes were placed in the Curriculum Materials Library in the College of Education. In the online environment (spring of 2004), students logged onto the WebCT server and viewed the PowerPoint notes in a slide show format or in a HTML text format. Students in the online environment had the option to print out the PowerPoint notes. In the class-in-a-box (spring of 2004), students accessed the

PowerPoint notes using the CD-ROMs. They were able to view the PowerPoint lecture notes with *PowerPoint Viewer*. If the students had the software application *PowerPoint* they could print out the notes. Students in the online class and the class-in-a-box also had access to the PowerPoint notes from the online Curriculum Materials Library website on which the notes were available in Adobe Acrobat PDF format for students to download.

Lecture Notes

To ensure that the three sections contained the exact same material, all class lectures were audio recorded in the fall of 2003. The lecture notes were transcribed verbatim into text documents. The transcribed lecture notes were loaded onto the WebCT server for students to download and use in the online WebCT class. The students in the class-in-a-box course accessed the transcribed lecture notes from the CD-ROMs.

Videos

In the traditional classroom, digital videos were shown during the scheduled class time using a Dell Latitude laptop running a Pentium 500 MHZ processor, 256 MB of memory, with speakers. If students were absent, they didn't have access to the videos that they missed. In the online environment, students accessed the videos through the WebCT server. In the class-in-a-box course, students accessed their videos from their CD-ROMs.

Design and Procedure

This study was conducted in four phases. A timeline of phases is contained in Appendix I.

Phase One

Phase one of the study occurred in the fall of 2003. Thirty students enrolled in an on-campus section of ESP 444 *Special Education Techniques in Regular Settings* were asked to participate in the study. All of the students agreed to do so and signed informed consent forms (see Appendix A). The students provided demographic information and completed the 42-item pretest during the first class session. The pretest was given to determine student level of knowledge prior to instruction (see Appendix E).

The students attended a 2 hour 30 minute weekly lecture for 15 weeks. Each lecture began with 30 minutes of organizational business that included previewing previously learned material and completion of the weekly quiz. Then new content was presented for approximately two hours. Each class lecture was audio-recorded to be used in the preparation of the online section and class-in-a-box section. Students in the traditional on-campus section had weekly access to the instructor.

During final exam week, the traditional course students completed the student satisfaction survey, instructor course evaluation, and the posttest. First, students completed a student satisfaction survey (see Appendix G). The survey was designed so that students had the opportunity to evaluate the effectiveness of the media of instruction (e.g., traditional classroom, online classroom, and class-in-a-box) and the effectiveness of the methods for presenting the instructional content (e.g., PowerPoint notes, lectures, digital videos, and the textbook).

Then students completed the Department of Special Education's instructor evaluation form (see Appendix H). The evaluation was used to ascertain student satisfaction concerning the course and the instructor's ability to deliver the course content. The students were administered the 98-item posttest to determine the amount of knowledge gained throughout the semester (see Appendix F). A scantron machine scored the posttests. Twenty-five percent of the posttests were selected randomly and rescored manually to ensure scoring reliability.

Phase Two

Phase two occurred simultaneously with phase one during the fall semester of 2003. This phase included the preparation of the online WebCT class and the class-in-a-box.

Preparation for the online class. Following each traditional class lecture, the audio cassettes were transcribed verbatim into text Word documents so that the exact information could be used in the development of the online course and class-in-a-box. Next, the lecture text documents, digital videos, and related course materials (e.g., PowerPoint notes, syllabus, etc.) were loaded on the WebCT server for the online class. The quizzes were constructed and loaded on the WebCT server for this group. The sequence of the instructional content and the material presented was identical to the fall traditional classroom. See Appendix C (Figures 1-5) for a sample of the online class.

Preparation for the class-in-a-box. The exact material loaded on the WebCT server for the online class (e.g., PowerPoint notes, digital videos, and transcribed lecture notes) was burned onto CD-ROMs for the class-in-a-box course. Thirty sets of CD-ROMs were prepared. All of the content fit on three CD-ROMs and each CD-ROM

was labeled with the topics and lecture numbers. The sequence of the instructional content and the material presented was identical to the fall traditional classroom and the online WebCT section. The quizzes were constructed and loaded on the WebCT server for this group. The quizzes and communication with the instructor were the only online components for this group. See Appendix D (Figures 1-4) for a sample of the class-in-box course.

Phase Three

Phase three included the instruction of the online class and class-in-a-box. This phase began during the spring of 2004.

Online class. Forty-six students enrolled in a Distance Education off-campus section of ESP 444 *Special Education Techniques in Regular Settings* and were assigned randomly into two sections (e.g., online class or class-in-a-box) prior to the first week of class. The twenty-five students in the online section attended the first class session on-campus for 1 hour and 30 minutes during a designated day of the week. The media of instruction (e.g., online class) and methods for the course were explained to the students. Students were given a written description of the study and asked to sign an informed consent form (see Appendix B).

The students in the online section completed the 42-item pretest to determine their knowledge level prior to online instruction (see Appendix E). A scantron machine scored the pretests. Twenty-five percent of the pretests were selected randomly and rescored to ensure scoring reliability.

In order for the media of instruction to be successful, online training was provided to the students. Following the pretest, students were trained on the use of WebCT. The

training included how to: (a) access the WebCT site, (b) select a password and log on the WebCT site, (c) access course content, (d) turn in assignments, (e) access weekly quizzes, and (f) communicate with the instructor and other students. The training lasted an hour. In order to receive instruction via the online classroom, the student needed to connect to the Internet and WebCT. Once access was achieved, the student saw the WebCT home page from which he/she could select various options. See Appendix C (Figures 1-4) for a sample of the options on WebCT.

Throughout the 16-week semester, students in the online class accessed the instructional content via WebCT. The students downloaded and printed out notes as well as viewed digital videos. The students in this section adhered to the due dates on the syllabus for assignments and weekly quizzes. The students were not required to meet at a certain time online each week, however, they were responsible for attending class on-campus the first and last scheduled day of the semester. During these classes, the students completed the pretest and posttest, satisfaction surveys, and instructor course evaluations.

During final exam week, students completed the student satisfaction survey, an instructor course evaluation, and the posttest. The students had two hours to complete the posttest. A scantron machine scored the posttests. Twenty-five percent of the posttests were selected randomly and rescored manually to ensure scoring reliability.

Class-in-a-box. Twenty-one students participated in the class-in-a-box section. The students attended the first class session on-campus for 1 hour and 30 minutes during the first week of class. The media of instruction (e.g., class-in-a-box) and methods of the

course were explained to the students. The students were given a written description of the study and asked to sign an informed consent form (see Appendix B).

The students then completed the 42-item pretest to determine their knowledge level prior to instruction (see Appendix E). A scantron machine scored the pretests. Twenty-five percent of the pretests were selected randomly and rescored to ensure scoring reliability.

In order for this type of instructional media to be successful, students in this learning condition participated in a one-hour training session following the pretest. During the training, the students learned how to: (a) access the WebCT site (see Appendix D, Figure 3), (b) select a password and log on the WebCT site, (c) access quizzes (See Appendix D, Figure 4), (d) turn in assignments via e-mail on WebCT, and (e) view grades. The students also were instructed how to access the instructional content for the class-in-a-box from the CD-ROMs provided (see Appendix D, Figures 1-2). The students could view the PowerPoint lecture notes with *PowerPoint Viewer*. If students had the software application *PowerPoint* they had the option to print out the notes or they could access the PowerPoint notes and lecture notes from the online Curriculum Materials Library website. They were instructed how to download *Quick Time Player 6.3* (Apple Computer, 2003) in order to view the digital movies contained in the lectures.

Throughout the 16-week semester, the students in the class-in-a-box group accessed the instructional content through the CD-ROMs. Students were told to print out the PowerPoint notes and transcribed lecture notes. Students had the entire semester to complete the course content without any timeframes for accessing instructional content, taking quizzes, or turning in assignments. However, the students were required to take

the quizzes sequentially (e.g. Quiz 1, Quiz 2). Quizzes were taken online using WebCT. The students were responsible for attending class on-campus the first and last scheduled day of the semester for the pretest and posttest, to complete the satisfaction survey, and to complete the instructor course evaluation.

During final exam week, students who took the entire semester to complete the course came to the university to take the 98-item posttest. Students who completed course assignments and quizzes prior to exam week could schedule a time with the instructor to take the posttest. During the posttest, students were not allowed to use their notes or textbook. Students had two hours to complete the posttest. A scantron machine scored the posttests. Twenty-five percent of the posttests were selected randomly and rescored manually to ensure scoring reliability.

Phase Four

During phase four, data from the pretests, posttests, student satisfactions surveys, and instructor course evaluations were entered into a SPSS spreadsheet. After all data had been entered, they were analyzed.

Treatment of the Data

Data in the form of pretests and posttests were analyzed to determine academic performance gains throughout the semester. Inferential statistics were used to compare posttest mean scores for the knowledge-based tests for the three conditions to determine if the media of instruction and instructional method had an effect on the academic performance of the students. Pretest scores were used to adjust posttest mean scores before comparison to correct for pre-existing differences.

Data from the student satisfaction surveys were analyzed to determine if the media of instruction and instructional method had an effect on student satisfaction. Data from the instructor course evaluations completed by students were analyzed to determine student satisfaction with the instructor's delivery of the media of instruction and instructional method (e.g., PowerPoint notes, lectures/transcribed lecture notes, and digital videos). The mean and standard deviations were compared across tests, surveys, and instructor course evaluations for each group. This was done in order to classify and summarize the data.

Data from pretests, posttests, student satisfaction surveys, and instructor course evaluations were analyzed to answer the following questions:

Research Question One. Does the type of instructional media have a differential effect on the academic performance of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Analysis: In order to determine if there was a significant effect of the type of instructional media on academic performance (e.g., instruction in the traditional classroom, the online classroom, or the class-in-a-box) an analysis of covariance (ANCOVA) was conducted using pretest scores as a covariate. An alpha level of .05 was set.

Research Question Two. For test items based on content presented only in the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Analysis: In order to determine if there was a significant effect in academic performance on test items from the textbook that were not reinforced elsewhere in the

instruction among the conditions of the traditional classroom, the online classroom, and the class-in-a-box an analysis of covariance (ANCOVA) was conducted on selected posttest items using pretest as a covariate. An alpha level of .05 was set.

Research Question Three. For test items based on content presented in lecture, PowerPoint notes, digital videos, and the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Analysis: In order to determine if there was a significant effect in academic performance on test items reinforced in lecture, PowerPoint notes, and digital videos among the conditions of the traditional classroom, the online classroom, and the class-in-a-box an analysis of covariance (ANCOVA) was conducted on selected posttest items using pretest as a covariate. An alpha level of .05 was set.

Research Question Four. Does the type of instructional media have a differential effect on the course satisfaction of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Analysis: In order to determine if there was a significant effect in the type of instructional media on student satisfaction an analysis of variance (ANOVA) was conducted using data from the student satisfaction surveys administered at the end of the course. An alpha level of .05 was set.

Research Question Five. Does the type of instructional media have a differential effect on the course evaluations of the instructor completed by the students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Analysis: In order to determine if there was a significant effect in the type of instructional media on course evaluations of the instructor completed by the students an analysis of variance (ANOVA) was conducted using data from the course evaluations of the instructor administered at the end of the course. An alpha level of .05 was set.

CHAPTER FOUR

RESULTS

This study was conducted to investigate the impact of three types of instructional media on achievement, satisfaction, and instructor course evaluations of preservice general education students enrolled in ESP 444 *Special Education Techniques in Regular Settings*. The three types of instructional media used were: (a) a traditional classroom, (b) an online classroom (WebCT), and (c) a class-in-a-box via CD-ROM. The methods used to deliver the instructional content included PowerPoint notes, lectures or transcribed lecture notes, digital videos, and the textbook.

Data were collected in five forms: (a) demographic information was collected at the beginning of the semester (e.g., gender, ethnicity, age, and major), (b) a pretest was administered at the beginning of the semester prior to instruction, (c) a posttest was administered at the end of the semester, (d) a student satisfaction survey was completed by all students prior to taking the posttest, and (e) an instructor course evaluation was completed by students prior to taking the posttest. The student satisfaction survey was designed to assess student satisfaction with the media of instruction (e.g., traditional course, online course, class-in-a-box), willingness to take another course via the same media of instruction and method, and the effectiveness of the media of instruction and instructional method.

Demographic Data

Students were asked at the beginning of the course to provide their gender, ethnicity, age, and major. Of the 76 students who participated in this study, 63 students were female and 13 students were male, an approximate ratio of 5:1. This is a required course for general education preservice teachers. Due to the larger proportion of females in the education profession, it is felt that the variability in gender is consistent with the variability of gender in the K-12 settings. The ethnicity of the three groups who participated in the study was: (a) 61 Caucasian students, (b) two African American students, (c) two Asian American students, (d) three Hispanic American students, and (e) eight bi-racial students. The overrepresentation of Caucasian students in the study is representative of teachers in the K-12 settings. The variability of the ages for the students who participated in the study was 19-52, with the mean age for the three groups being 25.

Forty students were elementary education majors, thirty-one students were majoring in secondary education, and five were majoring in degrees outside of education. The distribution of students who indicated their major as elementary and secondary education is an approximate ratio of 4:3 and is an indicator of the variability of students who participated in the study.

Interscorer Reliability

A scantron machine scored the pretests and posttests. In order to ensure that these two instruments were scored correctly, 25% of the pretests and 25% of the posttests were selected randomly and rescored manually. Interval agreement (e.g., $[\text{agreements} \div (\text{agreements} + \text{disagreements})] \times 100 = \text{percent of agreement}$) was calculated using the

point-by-point method (Tawny & Gast, 1984). The interscorer agreement scores were 100%. Individual and overall agreement scores are presented in Table 2.

Table 2

Interscorer Agreement of the Pretest and Posttest

Source	Scantron Machine	Instructor	Percent of Agreement
Pretest	48/48	48/48	$48 \div 48 \times 100 = 100\%$
Posttest	98/98	98/98	$98 \div 98 \times 100 = 100\%$
Overall Interscorer/Agreement 100%			

Knowledge-Based Tests

The quantitative data analyzed in this study included a pretest (see Appendix E) and a posttest (see Appendix F). Thirty students were enrolled in the traditional course in the fall of 2003. Forty-six students enrolled in the same course via distance education in the spring of 2004 were assigned randomly to one of two types of instructional media sections of the course (e.g., online classroom via WebCT or class-in-a-box via CD-ROM).

Question One

The pretests and posttests were analyzed to determine academic performance gains throughout the semester. Descriptive and inferential statistics were used to compare posttest mean scores for the knowledge-based tests for the three conditions to

determine if the type of instructional media and instructional method had an effect on the academic performance of the students (see Table 3).

Table 3

Summary of Means and Standard Deviations for the Pretest and Posttest

Media of Instruction	Pretest			Posttest		
	n	SD	Mean	n	SD	Mean
Traditional	30	3.43	18.87	30	8.394	76.47
Online via WebCT	25	3.10	18.88	25	12.595	79.04
Class-in-a-Box	21	2.39	17.24	21	10.875	81.43

Pretest scores were used to adjust posttest mean scores before comparison to correct for pre-existing differences. The dependent variable for this study was the posttest scores. The independent variable for this study was the media of instruction (traditional, online via WebCT, class-in-a-box via CD-ROM). The pretest scores were used as a covariate. Data from the pretests and posttests were analyzed using an analysis of covariance (ANCOVA) with the Alpha level set at .05 to answer the following question:

Research Question One. Does the type of instructional media have a differential effect on the academic performance of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

A summary of the test results is presented in Table 4. Results from the ANCOVA indicated that there was no statistically significant effect (difference in the media of instruction) between posttest scores of the students instructed by the three different types of instructional media [$F(2,72) = 2.197, p = .119$]. The results of this analysis suggested that all three types of instructional media were equally effective in delivering instructional content to the students. The differences between the groups were not statistically significant.

Table 4

Summary of Analysis of Covariance (ANCOVA) Between Groups on Posttest with Pretest as the Covariate

Source	DF	SS	MS	F	p
Covariate	1	481.758	481.758	4.485	.038
Between Groups	2	472.022	263.011	2.197	.119
Error	72	7733.812			
Corrected Total	75	8524.421			

Note. * $p < .05$ level

Question Two

In order to ascertain if there was a significant effect in academic performance for items that were presented only in the textbook among the three types of instructional media (traditional, online via WebCT, and class-in-a-box via CD-ROM) an analysis of covariance (ANCOVA) was conducted on selected posttest items using the pretest as the

covariate. Data from the selected pretest items that were presented only in the textbook and selected posttests items that were presented only in the textbook were analyzed using an ANCOVA with the Alpha level set at .05 to answer the following question:

Research Question Two. For test items based on content presented only in the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Table 5 summarizes the descriptive statistics for pretest and posttest items that were presented only in the textbook. Table 6 summarizes the ANCOVA for the pretest and posttest items that were presented only in the textbook.

Table 5

Summary of Means and Standard Deviations for the Pretest and Posttest Items Presented only in the Textbook

Media of Instruction	Pretest			Posttest		
	n	SD	Mean	n	SD	Mean
Traditional	30	2.05	8.13	30	4.467	37.67
Online via WebCT	25	2.09	8.72	25	7.182	38.60
Class-in-a-Box	21	1.74	7.33	21	5.325	40.86

Results from the ANCOVA indicated that there was no statistically significant effect (difference in the media of instruction) for test items based on content presented only in the textbook between posttest scores of the students instructed by the three different types of instructional media [F (2,72) = 2.447, $p = .094$] (see Table 6). The results of this analysis suggested that all of the types of instructional media were equally effective for test items from the textbook. The differences between the groups were not statistically significant.

Table 6

Summary of Analysis of Covariance (ANCOVA) Between Groups on Selected Posttest Items only Presented in the Textbook with Pretest as the Covariate

Source	DF	SS	MS	F	p
Covariate	1	55.753	55.753	1.725	.193
Between Groups	2	158.210	79.105	2.447	.094
Error	72	117251.000			
Corrected Total	75	2511.408			

Note. * $p < .05$ level

Question Three

In order to ascertain if there was a significant effect in academic performance for items that were reinforced in lecture, PowerPoint notes, digital videos, and the textbook among the three types of instructional media (traditional, online via WebCT, and class-in-a-box via CD-ROM) an analysis of covariance (ANCOVA) was conducted on

selected posttest items using the pretest as a covariate. An alpha level of .05 was set.

The results were used to answer the following question:

Research Question Three. For test items based on content that was presented in lecture, PowerPoint notes, digital videos, and the textbook, are there differences in performance among the conditions of the traditional classroom, the online classroom, and the class-in-a-box?

Table 7 summarizes the descriptive statistics. Table 8 summarizes ANCOVA for pretests and posttests items that were presented in lecture, PowerPoint notes, digital videos, and the textbook.

Table 7

Summary of Means and Standard Deviations for the Selected Pretest and Posttest Items Presented in Lecture, PowerPoint Notes, Digital Videos, and the Textbook

Media of Instruction	Pretest			Posttest		
	n	SD	Mean	n	SD	Mean
Traditional	30	2.41	10.73	30	4.439	38.77
Online via WebCT	25	2.32	10.16	25	5.670	40.36
Class-in-a-Box	21	1.79	9.90	21	6.055	40.57

Results from the ANCOVA indicated that there was no statistically significant effect (difference in the media of instruction) for test items based on content presented in

lecture, PowerPoint notes, digital videos, and the textbook between pretest and posttest scores of the students instructed by the three different types of instructional media [F (2,72) = 1.227, $p = .299$] (see Table 8). The results of this analysis suggested that all of the types of instructional media were equally effective for test items presented in lecture, PowerPoint notes, digital videos, and the textbook. The differences between the groups were not statistically significant.

Table 8

Summary of Analysis of Covariance (ANCOVA) Between Groups on Selected Posttest Items Presented in Lecture, PowerPoint Notes, Digital Videos, and the Textbook with Pretest as the Covariate

Source	DF	SS	MS	F	p
Covariate	1	54.161	54.161	1.928	.169
Between Groups	2	68.900	34.450	1.227	.299
Error	72	2022.108	28.085		
Total	75	2128.632			

Note. * $p < .05$ level

Student Satisfaction Survey

In order to ascertain if the media of instruction (traditional classroom, the online classroom, or the class-in-a-box) had an effect on student satisfaction in the course, data from the student satisfaction surveys (see Appendix F) were analyzed using a one-way

ANOVA. An alpha level of .05 was set. Data from the student satisfaction surveys that were administered at the end of the course were analyzed to answer the following question:

Research Question Four. Does the type of instructional media have a differential effect on the course satisfaction of students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Table 9 summarizes the descriptive statistics. Table 10 summarizes the ANOVA results for the student satisfaction surveys.

Table 9

Summary of Means and Standard Deviations for the Student Satisfaction Surveys

Media of Instruction	n	SD	Mean
Traditional	30	9.91	73.63
Online via WebCT	25	13.56	68.24
Class-in-a-Box	21	11.06	71.14

Results from the ANOVA indicated that there was no statistically significant effect (difference in the media of instruction) between student satisfaction with the course and the three different types of instructional media [$F(2,73) = 1.492, p = .232$]. All three groups were equally satisfied with the media of instruction in which they participated. The differences between the groups were not statistically significant.

Table 10

Summary of Analysis of Variance (ANOVA) Between Groups for the Student Satisfaction Surveys

Source	DF	SS	MS	F	p
Between Groups	2	396.678	198.339	1.492	.232
Error	73	9706.098			
Total	75	10102.776			

Note. * $p < .05$ level

Instructor Course Evaluations

In order to ascertain if the media of instruction (traditional classroom, the online classroom, or the class-in-a-box) had an effect on instructor course evaluations (see Appendix G), the evaluations were analyzed using an analysis of variance (ANOVA). An alpha level of .05 was set. Data from the instructor course evaluations that were administered at the end of the course were analyzed to answer the following question:

Research Question Five. Does the type of instructional media have a differential effect on the course evaluations of the instructor completed by the students receiving instruction in the traditional classroom, the online classroom, or the class-in-a-box?

Table 11 summarizes the descriptive statistics. Table 12 summarizes the ANOVA results for the instructor course evaluations. Results from the ANOVA indicated that there was no statistically significant effect between the three types of instructional media and the instructor course evaluations completed by the students [$F(2,66) = 1.142$,

$p = .325$]. All three groups were satisfied with the instructor and the media of instruction that was used.

Table 11

Summary of Means and Standard Deviations for the Instructor Course Evaluations

Media of Instruction	n	SD	Mean
Traditional	23	5.36	26.04
Online via WebCT	25	4.71	24.76
Class-in-a-Box	21	3.60	23.95

Table 12

Summary of Analysis of Variance (ANOVA) Between Groups for the Instructor Course Evaluations

Source	DF	SS	MS	F	p
Between Groups	2	49.299	24.650	1.142	.325
Error	66	1424.469	21.583		
Total	68	1473.768			

Note. * $p < .05$ level

CHAPTER FIVE

DISCUSSION

Distance Education, using a variety of types of instructional media and methods, has been used since the late 19th century. This type of education has eliminated the need to travel to onsite locations, which has been important for students in rural areas, students with employment restrictions, and students with physical limitations. With the advent of new technologies, universities are beginning to focus on a variety of technological innovations to provide distance education (Khan, 1997).

Universities currently are exploring an array of types of instructional media to facilitate instructional delivery. Instructors use these types of instructional media to enhance a traditional course, create a hybrid course (combination of online and traditional), or develop a stand-alone online course (Carchidi, 2002). Numerous studies have compared the academic performance of distance learners to that of traditional learners (Paulsen, 1997; Baker, Hale, Gifford, 1997; Diaz, 2000; Schutte, 1998). Consensus from the studies indicates that there is no significant difference in the achievement of student participants in traditional or online coursework. However, few studies have compared traditional learning with the newer, multimedia online technologies (e.g., digital video, CD-ROM) that are emerging as educational entities in distance education today (Navarro & Shoemaker, 2000; Liaupsin, 2002; Baron & Baumbach, 1990).

In CD-ROM instruction, students view actual objects, realistic scenes, and perspectives that are difficult or impossible to observe in real life (Navarro & Shoemaker, 2000). Typically, CD-ROM instruction is a stand-alone course in which instruction is contained on a CD-ROM and students progress through the course/content at their own pace (Inglis, Ling, & Joosten, 1999). This media of instruction offers the potential to serve large numbers of students who live in remote areas with limited online access. While, research concerning CD-ROM as a form of distance education is in its infancy, researchers have begun to conduct studies to evaluate student achievement and satisfaction with this media of instruction (Navarro & Shoemaker, 2000; Barron & Baumbach, 1990; Bliss & Mazur, 1996; Liaupsin, 2002). Through the evaluation of the instructional media and/or methods used in distance education, instructors can continually adapt, modify, and improve the access and quality of the education provided.

The purpose of this study was to investigate the achievement, student satisfaction, and instructor course evaluations of preservice general education students who participated in three types of instructional media that were used to facilitate the achievement of the students. The media used were: (a) a traditional classroom, (b) an online classroom via WebCT, and (c) a class-in-a-box via CD-ROM. The various methods used to deliver the instructional content included PowerPoint notes, lecture/transcribed lecture notes, digital videos, and the textbook.

It was predicted that the students who participated in the online classroom via WebCT and the class-in-a-box via CD-ROM would have comparable performance results to the traditional students. It was also predicted that the online classroom via WebCT and the class-in-a-box via CD-ROM would rely more heavily on the textbook in the absence

of an instructor and the performance of these students on textbook posttest items would be higher than the traditional students on the textbook posttest items. It was also predicted that the online classroom via WebCT and the class-in-a-box via CD-ROM would be more satisfied with the media of instruction due to the flexibility of the online environment (WebCT) and the stand-alone CD-ROMs.

Knowledge-Based Tests

A knowledge-based pretest was given to all participants at the beginning of the study. Following completion of the course, a knowledge-based posttest was administered to all students to ascertain if there was a significant difference in tests scores between the groups from the beginning to the end of the semester. These test scores were analyzed using an analysis of covariance (ANCOVA). This analysis was selected to control for prior knowledge using pretest as the covariate.

Question one dealt with the differential effect of the media of instruction on student academic performance. The data indicated that there were no statistically significant differences between pretest and posttest scores of the students instructed by the three different types of instructional media (traditional classroom, online classroom via WebCT, class-in-a-box via CD-ROM). It appears that all of the types of instructional media were equally effective in delivering instructional content to the students. This finding was expected because all students, regardless of the group (traditional, online, or CD-ROM) had received the same content for the course using the same instructional methods (e.g., PowerPoint notes, lecture/transcribed lecture notes, digital videos, and the textbook). Thus, the original prediction of the study was confirmed.

Although differences were not statistically significant, the mean scores were not identical. The mean scores received by the students on the pretest and posttest indicated that for the pretest the students receiving instruction in the class-in-a-box via CD-ROM had the lowest test scores (17.24) and on the posttest they had the highest test scores (81.43) (see Table 3). The mean scores students received on the pretest and posttest indicated that, for the pretest, the students in the traditional classroom (18.87) scored higher than the class-in-a-box via CD-ROM (17.24) while on the posttest the traditional classroom had the lowest test scores (76.47) of the three groups.

Question two focused on content presented only in the textbook and the differences in the academic performance among the instructional groups (traditional classroom, online classroom, and class-in-a-box) on those test items. The results indicate that there were no statistically significant differences for textbook test items between pretest and posttest scores of the students instructed by the three different types of instructional media (traditional classroom, online classroom, and class-in-a-box). The results of the study indicated that all of the types of instructional media were equally effective in delivering textbook instructional content. It was predicted that students in the distance education sections (online via WebCT, class-in-a-box via CD-ROM) would rely more heavily on the textbook for information in the absence of an instructor. However, the results indicate that all students, regardless of the type of instruction received, performed similarly on the textbook content.

Although the results were not statistically significant, the mean scores were not identical. The mean scores students received on the selected items that were presented only in the textbook for the pretest and posttest indicated that for the pretest, the students

receiving instruction in the class-in-a-box via CD-ROM scored the lowest (7.33), while on the posttest the class-in-a-box had the highest textbook scores (40.86) of the three groups.

Question three dealt with test items based on content from the lectures/transcribed lecture notes, PowerPoint notes, digital videos, and the textbook. The goal was to ascertain if there were any differences in student performance among the conditions of traditional classroom, online classroom, and the class-in-a-box on these test questions. The data indicated no statistically significant differences for test items based on content presented in the lectures/transcribed lecture notes, PowerPoint notes, digital videos, and the textbook between the pretest and posttest scores of students instructed by the three different types of instructional media. The data indicated that all three types of instructional media were equally effective in delivering instructional content using a variety of methods (lecture/transcribed lecture notes, PowerPoint notes, digital videos, and the textbook). This finding was expected because all of the students, regardless of the group, had received the same instructional content via the same methods.

Although the results were not statistically significant, the mean scores were not identical. The mean scores received by students on the selected items that were presented in lecture/transcribed lecture notes, PowerPoint notes, digital videos, and the textbook for the pretest and posttest indicated that for the pretest, the students in the class-in-a-box via CD-ROM scored the lowest (9.90), and on the posttest the class-in-a-box had the highest test scores (40.57). Additionally, the mean scores received by students on the selected test items presented in lecture/transcribed lecture notes, PowerPoint notes, digital videos, and the textbook for the pretest and posttest indicated that, for the pretest, students

receiving instruction in the traditional classroom scored higher than the class-in-a-box via CD-ROM (10.73), while on the posttest the traditional classroom had the lowest test scores (38.77) of the three groups.

Student Satisfaction Surveys

Question four was concerned with the satisfaction of the students concerning the media of instruction in which they participated. Results from the ANOVA indicated that there were no statistically significant differences among the students instructed by three different types of instructional media. All three groups were satisfied with the type of instructional media in which they participated. Although differences were not statistically significant, the satisfaction ratings were not identical. The means for the three groups were: (a) the traditional group mean was 73.63; (b) the online group mean was 68.24; and (c) the CD-ROM group mean was 71.14.

Previous research indicates that students enrolled in online courses are as satisfied or more satisfied than students in traditional courses (Diaz, 2000; Thurmond et al., 2002). Additional research concerning student satisfaction with instructional CD-ROMs found that students perceived the CD-ROMs as the most enjoyable learning component (Navarro & Shoemaker, 2000). The reality is that everyone was equally satisfied and that supports previous research and is supported by previous research.

An interesting finding in this study that may have impacted student satisfaction was the self-pacing of the CD-ROM group. This group was able to progress through the instructional content of the course without the constraint of due dates for taking quizzes or turning in assignments. While the students had 16 weeks to complete the course, 11

students did not begin the course until 8 weeks into the semester, 6 students began the course 12 weeks into the semester, and 4 students completed the course during the last week of the semester. Thus, the majority of these students did not begin the coursework until a significant amount of the semester had passed. While not significantly lower than the other two groups, it is possible that this rush to complete the coursework at the end of the semester might have lowered the satisfaction of this group.

Instructor Course Evaluations

Question five focused on the impact of the media of instruction on the instructor course evaluations completed by students who received instruction in the traditional classroom, the online classroom, or the class-in-a-box. Results from the ANOVA indicated that there was no statistically significant effect between the three types of instructional media and the students' evaluations of the instructor and the course. All three groups were satisfied with the instructor and the structure of the course in which they participated. Descriptive statistics do indicate that the traditional classroom (26.04) rated the instructor and course higher than the students in the online class via WebCT (24.76) and students in the class-in-a-box via CD-ROM (23.95).

Conclusions

Five conclusions may be drawn from this study. They are based on the quantitative data that were collected.

1. The three types of instructional media (e.g., traditional, online class, and class-in-a-box) for delivering instruction are viable for providing content to preservice general education teachers.
2. The students in all three groups instructed by three different media performed equally well on test items taken only from the textbook and not reinforced in any other methods of delivery (e.g., PowerPoint notes, lectures/transcribed lecture notes, and digital videos).
3. The students in all three groups instructed by three different media performed equally well on test items presented through a variety of methods (PowerPoint notes, lecture/transcribed lecture notes, digital videos, and the textbook).
4. No statistically significant differences were found between the student satisfaction and the media of instruction. Students in the three instructional groups were satisfied with the media of instruction used in their course.
5. No statistically significant differences were found between the instructor course evaluations completed by the students and the course. Students in the three instructional groups perceived that the instructor presented the content of the course effectively.

Recommendations for Further Research

The results of the study showed no statistically significant differences between the achievement, student satisfaction, and instructor course evaluations of preservice general education students who were instructed using a variety of types of instructional media (traditional, online classroom, class-in-a-box). All three types of instructional media were equally effective in delivering the instructional content for the course. Also, the students in the three groups were equally satisfied with the instructor, the media of instruction used, and the structure of the course. The following recommendations are made for further study:

1. Follow-up research using CD-ROM as a media of instruction in a structured and unstructured environment is needed. This research is needed to ascertain the instructional components that need to be embedded into CD-ROM instruction to ensure student success.
2. Future research is needed to identify the learning characteristics and attitudes of students participating in CD-ROM stand-alone classes. This research would provide information concerning the characteristics of students who would be prone to be successful in CD-ROM stand-alone classes.
3. Future research should be conducted using distance education evaluation forms. It is possible that different types of distance education should be evaluated using the specific components embedded in the individual course.

4. Research is needed concerning the variety of methods used to communicate in distance education courses. This research is imperative to develop strategies to increase the interaction among students so that they experience less isolation in CD-ROM courses.
5. More research is needed concerning the instructional methods (e.g., digital videos, PowerPoint notes) that are effective in different types of distance education. It may be that certain methods work best with certain types of instructional media.
6. More research is needed that compares the efficacy of learning through traditional instruction compared to online learning and instruction via CD-ROM stand-alone courses. Because the use of CD-ROM stand-alone courses is still in its infancy, additional research is needed to better understand this learning environment as compared to more traditional instruction.
7. Research is needed that examines the use of CD-ROM stand-alone courses with a variety of academic levels of students. This would provide information to identify whether or not CD-ROM courses are best suited in lower level coursework (e.g., with sophomore students) or in more advanced coursework (e.g., with graduate level students).
8. Qualitative research is needed to better understand the use of CD-ROMs in preservice teacher education. In the current study, students in the CD-ROM course were not interviewed, nor were their experiences chronicled over time.

9. Research is needed in investigating the use of CD-ROM stand-alone courses in a variety of instructional formats (e.g., independent study, inservice, workshop). This would provide further information concerning using CD-ROM courses as an alternative media of instruction.
10. Research making use of repeated student attitude surveys needs to be conducted. This would provide information concerning student attitudes over the course of a semester in a distance education course.

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APPENDIX A

INFORMED CONSENT

TRADITIONAL CLASS, FALL 2003

INFORMED CONSENT

General Information:

I am Ashley Skylar, a doctoral student in the Special Education Department at UNLV. I am the researcher on the project, under the advisement of Dr. Kyle Higgins. You are invited to participate in the research study. The study is designed to assess the effectiveness of the instruction in ESP 444 *Special Education Techniques in Regular Classrooms*.

Procedures:

If you volunteer to participate in this project, you will be asked to do nothing out of the ordinary. It involves you attending class and completing course assignments. I am requesting that you allow me to analyze the data from your tests and quizzes taken. Additionally, class lectures will be audio recorded and analyzed for future reference.

Benefits of Participation:

The benefits to you involve being exposed to several methods of educational technology and the opportunity to work together with other educators. Additionally, data collected may provide implications for improving instruction of ESP 444: *Special Education Techniques in Regular Classrooms*.

Risks of Participating in:

You may experience cognitive fatigue in completing tests, quizzes, and course assignments.

Contact Information:

If you have any questions about the study or if you believe you may have experienced harmful effects as a result of participation in this study, please contact Ashley Skylar or Dr. Kyle Higgins at 895-3205. For questions regarding the rights of research subjects, you may contact the UNLV Office of Sponsored Programs at 895-2794.

Voluntary Participation:

Your participation in this study is voluntary. You may refuse to participate in this study and data collected from your tests, quizzes and assignments will not be analyzed. You are encouraged to ask questions about the study.

Confidentiality:

I assure you that all information and data collected will be kept strictly confidential and that you will not be identified by name. No reference will be made in written or oral materials that could link you to this study. All information collected will be stored in a locked facility at UNLV for at least three years after completion of this study. After the storage time, the information gathered will be destroyed.

Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

Signature of Participant

Date

Participant Name (Please Print)

APPENDIX B

INFORMED CONSENT

ONLINE AND CLASS-IN-A-BOX, SPRING 2004

INFORMED CONSENT

TITLE OF STUDY: Distance Education: An Exploration of Alternative Methods and Ms of Instruction in Teacher Programs
INVESTIGATOR/S: Ashley Skylar

Purpose of the Study:

You are invited to participate in a research study. The purpose of this study is to assess the effectiveness of the instruction in ESP 444, *Special Education Techniques in Regular Classrooms*.

Participants:

You are being asked to participate in the study because you are taking this course via distance education in 2004 spring semester.

Procedures:

If you volunteer to participate in this study, you will be allowing me to analyze the data from your tests, satisfaction survey, and course evaluation and use the results of the analysis in a research study. The tests, satisfaction survey, and course evaluation will be completed during the two on-campus class meetings required in this class. You will be asked to do nothing out of the ordinary.

Benefits of Participation:

There may be no direct benefits to you as a participant in this study. The results of the study may have implications for improving instruction in future sections of this course.

Risks of Participation:

There are risks involved in all research studies. In this study, the risks are minimal. You may experience cognitive fatigue in completing tests, course assignments, a satisfaction survey, and a course evaluation.

Cost /Compensation:

There will be no financial cost to you to participate in this study. The study will not involve time in addition to regular class requirements. You will not be compensated for participation in the study. The University of Nevada, Las Vegas may not provide compensation or free medical care for an unanticipated injury sustained as a result of participating in this research study.

Contact Information:

If you have any questions or concerns about the study, you may contact either myself, Ashley Skylar, or my doctoral advisor, Dr. Kyle Higgins the 895-3205. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact the UNLV Office for the Protection of Research Subjects at 895-2794.

Voluntary Participation:

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality:

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study. After the storage time the information gathered will be destroyed.

Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

Signature of Participant

Date

Participant Name (Please Print)

APPENDIX C

FIGURES FOR THE ONLINE COURSE

Figure 1. Sample of WebCT home page for the online class.

Special Education Techniques in Regular Settings

A survey of special education emphasizing accommodating students with disabilities in the General classroom including: legal mandates and regulations, characteristics and educational needs of students with disabilities, and instructional techniques which can be used with these students in the General classroom.







 <u>Communication Tools</u>	 <u>Quizzes</u>
 <u>My Grades</u>	 <u>Video Lectures</u>
	

Figure 2. Sample of the organization of quizzes on WebCT for the online class.

Title	Availability	Duration	Grade	Attempts
<u>Quiz 1-Lecture 1</u>	From: January 23, 2004 8:00am To: January 29, 2004 8:30pm	10 minutes	/ 10	<u>Completed:</u> 0 <u>Remaining:</u> 1
<u>Quiz 2-Lecture 2</u>	From: January 30, 2004 8:00am To: February 5, 2004 8:30pm	10 minutes	/ 10	<u>Completed:</u> 0 <u>Remaining:</u> 1
<u>Quiz 3-Lecture 3</u>	From: February 6, 2004 8:00am To: February 12, 2004 8:30pm	10 minutes	/ 10	<u>Completed:</u> 0 <u>Remaining:</u> 1

Figure 3. Sample of the PowerPoint notes and lecture notes on WebCT for the online class.

<p>Table of Contents</p> <ul style="list-style-type: none">▼ 1. Lecture 1 Content<ul style="list-style-type: none">▼ 1.1. Chapter 1, PowerPoint Notes<ul style="list-style-type: none">1.1.1. <u>Chapter 1 PowerPoint Slides</u>1.1.2. <u>Chapter 1 PP text saved in html</u>▼ 1.2. Chapter 1, Lecture Notes<ul style="list-style-type: none">1.2.1. <u>Lecture Notes-Chapter 1 saved in Word</u>1.2.2. <u>Lecture Notes-Chapter 1 saved as a pdf</u>1.3. <u>Quiz 1-Lecture 1</u>

Figure 4. Sample of the organization of the digital videos on WebCT for the online class.

<p style="text-align: center;"><i>Video Lectures</i> <i>ESP 444</i></p> <p><u>Lecture #1: Inclusion</u> <u>Lecture #1: Inclusion/Transition Panel</u> <u>Lecture #1: Special Education Law</u> <u>Lecture #2: Collaboration Consultation Panel</u> <u>Lecture #3: Physical & Occupational Therapists</u> <u>Lecture #4: Speech and Language Impairments</u> <u>Lecture #4: Learning Disabilities</u> <u>Lecture #5: Mental Retardation</u> <u>Lecture #5: Serious Emotional Disturbance</u> <u>Lecture #6: Visual Impairments</u> <u>Lecture #6: Hearing Impairments</u> <u>Lecture #7: Physical Disabilities</u> <u>Lecture #7: Autism</u> <u>Lecture #8: Section 504 - Vocational Rehabilitation Act</u> <u>Lecture #8: Gifted Education</u> <u>Lecture #9: Bilingual Special Education</u> <u>Lecture #10: Assessment</u> <u>Lecture #11: Assistive Technology</u></p>

Figure 5. Sample of the communication tools available on WebCT for the online class..



APPENDIX D

FIGURES FOR THE CLASS-IN-A-BOX COURSE

Figure 1. Sample of a CD-ROM used in the class-in-a-box course.



Figure 2. Sample of the instructional files contained on the CD-ROMs.

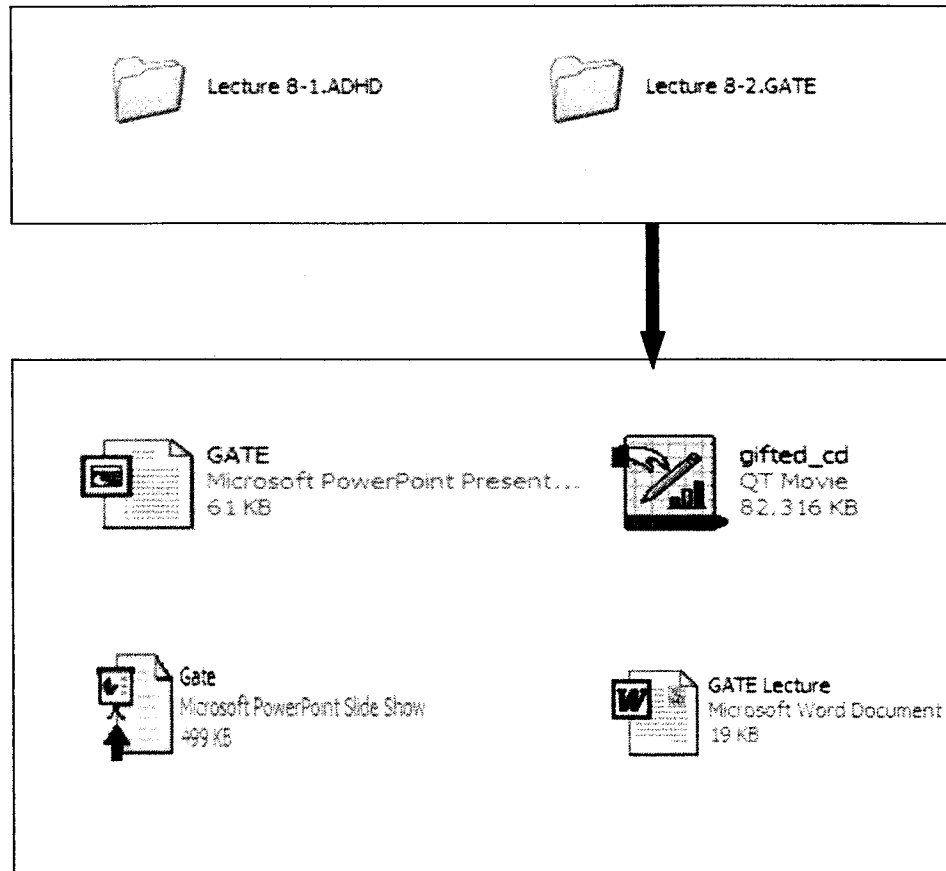




Figure 3. Sample of the WebCT home page for the class-in-a-box course.

Welcome to ESP 444, Section 211

Special Education Techniques in Regular Settings

A survey of special education emphasizing accommodating students with disabilities in the General classroom including: legal mandates and regulations, characteristics and educational needs of students with disabilities, and instructional techniques which can be used with these students in the General classroom.

 [Quiz](#)

 [My Grades](#)


 [Mail](#)

Figure 4. Sample of the organization of the WebCT quizzes for the class-in-a-box course.

Title	Availability	Duration	Grade	Attempts
<u>Quiz 1-Lecture 1</u>	From: January 22, 2004 10:00pm To: May 13, 2004 6:00pm	10 minutes	10	<u>Completed:</u> 0 <u>Remaining:</u> 1
<u>Quiz 2-Lecture 2</u>	From: January 22, 2004 10:00pm To: May 13, 2004 6:00pm	10 minutes	10	<u>Completed:</u> 0 <u>Remaining:</u> 1
<u>Quiz 3-Lecture 3</u>	From: January 22, 2004 10:00pm To: May 13, 2004 6:00pm	10 minutes	10	<u>Completed:</u> 0 <u>Remaining:</u> 1

APPENDIX E

DEMOGRAPHIC INFORMATION AND PRETEST

Name _____

Demographic Information:

Ethnic Origin: _____ Sex: _____ Age: _____ GPA: _____

Major/Minor: _____

ESP 444-PRETEST

42 Test Items

Multiple Choice:

1. Which is NOT one of the disability categories included and served under Individuals with Disabilities Education Act (IDEA)?
 - a. Communication disorders
 - b. Students at-risk for school failure
 - c. Hearing Impairments
 - d. Orthopedic Impairments

2. Common Characteristics of students with visual impairments include:
 - a. Some delay in hearing
 - b. Outstanding musical abilities
 - c. Reliance on tactile and auditory senses
 - d. Difficulties with speech

3. Token systems, contracting, attributions, and level systems are examples of:
 - a. Informal behavior management systems
 - b. Formal behavior management systems
 - c. Less intensive behavior management systems
 - d. Assertive discipline

4. Which statement is NOT true of performance assessments?
 - a. Students construct their own responses, rather than selecting or identifying correct responses
 - b. Teachers can observe student performance on tasks reflecting real-world or authentic requirements
 - c. Student responses can be easily scored by computer
 - d. All of the above are true

5. In the 1980's, what movement was initiated to provide a model for educating students with disabilities-particularly those students with mild and moderate disabilities-totally within the general education environment?
 - a. The Full Inclusion Movement
 - b. Regular Education Initiative
 - c. Least Restrictive Environment
 - d. The Special Education Movement

6. Which assessment is a collection of students' products and other relevant information collected over time?
- Performance assessment
 - Curriculum-based measurement
 - Portfolio assessment
 - Curriculum-based assessment
7. Due process refers to
- the prereferral process
 - the IEP process
 - how conflicts between parents and schools are resolved
 - how a student's vocational or employment training needs will be addressed
8. An older child who says "Wabbits are fuwwy animals" is an example of a problem with:
- Voice
 - Articulation
 - Fluency
 - All of the above
9. Which is NOT an example of a lower-incidence disability?
- Visual impairments
 - Learning disabilities
 - Hearing Impairments
 - Autism
10. Derek deliberately spilled his soup and smashed his sandwich on the floor, and as a result he was required to clean the entire cafeteria floor. This is an example of:
- Overpunishment
 - Excessive discipline
 - Overcorrection
 - Suspension
11. The purpose of the general education prereferral intervention team is to:
- Determine the need for educational interventions
 - Prepare the student for special education
 - Initiate formal testing
 - All of the above
12. Which of the following is one of the principles of The Individuals with Disabilities Education Act (IDEA)?
- For students with disabilities to receive the best possible educational services
 - For students with disabilities to receive a free and appropriate education
 - To educate students with disabilities in the general education setting
 - To encourage every student to graduate high school regardless of ability

13. "Matching" test formats can be made easier for students with special needs to use by:
- Increasing the number of items
 - Matching the number of items in each column
 - Placing the test on several pages
 - Writing clues to help eliminate guessing
14. Approximately _____ of students with ADHD qualify for special education services under IDEA.
- 22%
 - 50%
 - 72%
 - 95%
15. Which is true of curriculum-based measurement (CBM):
- CBM compares a student's scores with a larger population
 - CBM focuses on short-term curricular goals
 - Test domains can remain constant throughout the year
 - All of the above
16. Which is NOT a responsibility of a paraprofessional?
- Record keeping
 - Classroom behavior management
 - Developing IEP goals/objectives
 - Supervising
17. Acceleration means all of the following EXCEPT:
- Allowing a child to skip grade levels
 - Allowing a child to construct his or her own curriculum
 - Allowing a child to test out of classes
 - Allowing a child to be admitted to school early
18. Which is an effective modification employed on teacher-made tests?
- Prepare typewritten rather than handwritten tests
 - Space items sufficiently to reduce interference
 - Provide items in a predictable hierarchy
 - All of the above
19. Which of the following is a required component of an IEP?
- Statement of any individual modifications in state assessment procedures
 - Student's self-evaluation of self-evaluation of school functioning
 - Statement of transition services for all students
 - All of the above

20. When the observer tallies the number of times a particular behavior occurs, this is an example of
- event recording
 - duration recording
 - interval recording
 - time sampling
21. According to the DSM-IV, which statement is false of ADHD?
- A child must be seven years of age
 - Symptomatic behaviors must persist of two years
 - Inattention and hyperactivity must be observed across settings
 - A child must display six out of nine characteristics
22. _____ is a childhood disorder characterized by severe impairments of social, emotional, and intellectual functioning.
- Autism
 - Tourette syndrome
 - Conduct disorder
 - William's syndrome
23. An "A-B-C" chart refers to:
- After, Before, Continuing
 - Antecedent, Behavior, Consequence
 - Alterable, Behavioral, Consecutive
 - Answering, Behaving, Co-existing
24. _____ evaluation refers to testing that takes place at frequent intervals throughout the school year to evaluate the progress of the learner.
- Standardized
 - Summative
 - Norm-referenced
 - Formative
25. Which of the following educational placements represent an example from the "Continuum of Services?"
- Vocational placement in an area school district
 - School suspension, either at the school or at home
 - General education classroom with resource room services
 - Tutoring, including peer and cross-age
26. Higher-incidence disability areas comprise approximately _____ of students served under IDEA.
- 10%
 - 25%
 - 50%
 - 90%

27. Orthopedic impairments involve damage to the:
- Nervous system
 - Skeletal system
 - Circulatory system
 - All of the above
28. Which condition does the federal definition of learning disabilities NOT include:
- Brain injury
 - Dyslexia
 - Minimal brain dysfunction
 - Mental retardation
29. Students with moderate mental retardation represent a range of functioning represented by IQ scores between about:
- 35 to 54
 - 45 to 65
 - 55 to 70
 - Below 20
30. Individuals with _____ comprise one of the smallest disability areas, accounting for only about 0.5% of individuals with disabilities classified under IDEA.
- hearing impairments
 - visual impairments
 - physical and other health impairments
 - severe and multiple disabilities
31. _____ is a common neurological disorder that causes permanent disorders of movement and positions.
- Cerebral palsy
 - Spina bifida
 - Muscular dystrophy
 - Epilepsy
- True/False:
32. A major disadvantage of school wide discipline systems is that they may not effectively address the specific needs of all individual students.
- True
 - False
33. Boys outnumber girls in the category of serious emotional disturbance by approximately 3 to 1.
- True
 - False

34. Today, nearly seventy-five percent of students with disabilities are served primarily in general education classrooms.
- True
 - False
35. An individualized education program includes a statement explaining the extent to which a student may not be participating with children without disabilities.
- True
 - False
36. Students who do not meet requirements under IDEA may qualify for services under Section 504.
- True
 - False
37. Attribution training, timeout, and level systems are examples of formal effective behavior management.
- True
 - False
38. The individualized family service plan (IFSP) replaces the individualized education plan (IEP) when other family members also need special services.
- True
 - False
39. Overrepresentation may be attributed in large part to inappropriate identification and assessment procedures.
- True
 - False
40. Fewer than half (about 45%) of students with mental retardation have mild or moderate disabilities.
- True
 - False
41. Living in poverty is not associated with risk for school failure.
- True
 - False
42. The prereferral intervention process is a part of the special education IEP process
- True
 - False

APPENDIX F

POSTTEST

Name: _____

Posttest

1. The purpose of the general education prereferral intervention team is to:
 - e. Determine the need for educational interventions
 - f. Prepare the student for special education
 - g. Initiate formal testing
 - h. All of the above

2. Which involves a systematic and organized collection of a student's work?
 - a. Norm-referenced assessment
 - b. Criterion-referenced assessment
 - c. Performance assessment
 - d. Portfolio assessment

3. In the 1980's, what movement was initiated to provide a model for educating students with disabilities-particularly those students with mild and moderate disabilities-totally within the general education environment?
 - a. The Full Inclusion Movement
 - b. Regular Education Initiative
 - c. Least Restrictive Environment
 - d. The Special Education Movement

4. Identification of a learning disability requires a discrepancy between:
 - a. Grades and classroom behavior
 - b. Ability and achievement
 - c. Age and grade level
 - d. All of the above

5. Which of the following is one of the principles of The Individuals with Disabilities Education Act (IDEA)?
 - a. For students with disabilities to receive the best possible educational services
 - b. For students with disabilities to receive a free and appropriate education
 - c. To educate students with disabilities in the general education setting
 - d. To encourage every student to graduate high school regardless of ability

6. Curriculum-based measurement can be very effective in improving the achievement of:
 - a. Students with disabilities
 - b. All low-achieving students
 - c. Normally-achieving students
 - d. All students in inclusive classrooms

7. _____ refers to working jointly with others, sharing goals, problem solving, and sharing the achievement of goals.
- Team Teaching
 - Cooperative learning
 - Collaboration
 - Co-teaching
8. Token systems, contracting, attributions, and level systems are examples of:
- Informal behavior management systems
 - Formal behavior management systems
 - Less intensive behavior management systems
 - Assertive discipline
9. Information often submitted with a formal prererral intervention request includes:
- Documentation of observations
 - Student work samples
 - Disciplinary actions
 - All of the above
10. Affective characteristics include:
- anxiety
 - depression
 - phobias
 - All of the above
11. In Clark County, multidisciplinary team meetings are convened within _____ school days after parents sign the permission to evaluate.
- 5
 - 25
 - 45
 - 65
12. It is estimated that _____ of individuals with autism may never develop language.
- 10%
 - 25%
 - 50%
 - 75%
13. Objectives/Benchmarks are:
- measurable
 - limited and precise
 - must specify the condition, behavior, and criteria
 - All of the above

14. Which condition does the federal definition of learning disabilities NOT include?
- Brain injury
 - Dyslexia
 - Minimal brain dysfunction
 - Mental retardation
15. Lipping is an example of _____.
- Voice disorder
 - Articulation disorder
 - Fluency disorder
 - Language disorder
16. Which of the following is a required component of an IEP?
- Statement of any individual modifications in state assessment procedures
 - Student's self-evaluation of school functioning
 - Statement of transition services for all students
 - All of the above
17. Language disorders may involve difficulties with:
- Phonology or articulation
 - Morphology
 - Syntax or fluency
 - All of the above
18. Which is a common potential problem experienced by students with disabilities during an oral presentation?
- The presenter is unknown
 - The pace of the instruction is too rapid
 - Physical gestures of the presenter
 - All of the above
19. The educational evaluation team includes all of the following EXCEPT:
- General education teacher
 - School administrator
 - Special education teacher
 - School psychologist
20. An "A-B-C" chart refers to:
- After, Before, Continuing
 - Antecedent, Behavior, Consequence
 - Alterable, Behavioral, Consecutive
 - Answering, Behaving, Co-existing

21. Which of the following educational placements represent an example from the “Continuum of Services?”
- Vocational placement in an area school district
 - School suspension, either at the school or at home
 - General education classroom with resource room services
 - Tutoring, including peer and cross-age
22. The major cause of ADHD has been identified as:
- Food additives
 - Prenatal factors
 - Neurological factors
 - No single cause has been identified
23. Which historical educator coined the term “learning disabilities”?
- William Kruckshank
 - Newell Kephart
 - Samual Kirk
 - Horace Mann
24. Mild mental retardation is commonly associated with IQ scores of between:
- 86-100
 - 70-85
 - 55-70
 - 35-54
25. Which is NOT one of the disability categories included and served under Individuals with Disabilities Education Act (IDEA)?
- Communication disorders
 - Students at-risk for school failure
 - Hearing Impairments
 - Orthopedic Impairments
26. Commonly described characteristics of emotional disturbance include:
- Significantly above average intellectual functioning
 - Responds inappropriately to discipline
 - Normally-achieving academically
 - All of the above
27. _____ refers to the process by which conflicts are resolved between parents and schools regarding the student’s evaluation.
- Mediation
 - Collaboration
 - Referral
 - Prereferral

28. _____ is the process of taking a large task or assignment and breaking into sub-component smaller tasks, and estimating task completion for each sub-component.
- Task analysis
 - Short-term planning
 - Long-term planning
 - Self-monitoring
29. Orthopedic impairments involve damage to the:
- Nervous system
 - Skeletal system
 - Circulatory system
 - All of the above
30. Individuals with _____ comprise one of the smallest disability areas, accounting for only about 0.5% of individuals with disabilities classified under IDEA.
- hearing impairments
 - visual impairments
 - physical and other health impairments
 - severe and multiple disabilities
31. Health conditions referred to as Other Health Impairments include:
- Asperger's syndrome
 - Maternal rubella
 - Allergies and asthma
 - All of the above
32. What term means no child with a disability can be excluded from public education?
- Open education
 - Full inclusion
 - Zero reject
 - Least restrictive environment
33. _____ is a common neurological disorder that causes permanent disorders of movement and positions.
- Cerebral palsy
 - Spina bifida
 - Muscular dystrophy
 - Epilepsy
34. An older child who says "Wabbits are fuwwy animals" is an example of a problem with:
- Voice
 - Articulation
 - Fluency
 - All of the above

35. A common characteristic of autism is:
- Orthopedic impairments
 - Stereotypic behavior
 - Early language development
 - All of the above
36. Biological causes of serious emotional disturbance may include all of the following EXCEPT:
- Autism
 - Brain factors
 - Tourette's syndrome
 - Attention deficit hyperactivity disorder
37. Common characteristics of students with visual impairments include:
- Some delay in hearing
 - Outstanding musical abilities
 - Reliance on tactile and auditory senses
 - Difficulties with speech
38. _____ is not the best modification to make to a teacher made test.
- Providing models
 - Allowing verbal responses
 - Allowing more time
 - Using frames
39. Common characteristics associated with mental retardation include:
- Violent or aggressive behavior
 - Unusual musical or artistic ability
 - Lack of age appropriate social skills
 - All of the above
40. Many reports indicate the _____ of the population is gifted and talented:
- 3-5%
 - 8-12%
 - 15-22%
 - 25-34%
41. According to the DSM-IV, which statement is FALSE of ADHD?
- A child must be seven years of age
 - Symptomatic behaviors must persist for two years
 - Inattention and hyperactivity must be observed across settings
 - A child must display six out of nine characteristics

42. Which is NOT a responsibility of a paraprofessional?
- Record keeping
 - Classroom behavior management
 - Developing IEP goals/objectives
 - Supervising
43. "Matching" test formats can be made easier for students with special needs to use by:
- Increasing the number of items
 - Matching the number of items in each column
 - Placing the test on several pages
 - Writing in clues to help eliminate guessing
44. Approximately _____ of students with ADHD or ADD qualify for services under IDEA:
- 22%
 - 50%
 - 72%
 - 95%
45. Overrepresentation of some groups in special education may be due in part to:
- Cultural misunderstandings
 - Unfamiliar examiners
 - Inappropriate assessment procedures
 - All of the above
46. Which of the following are resources for potential identification of students at risk?
- Special education personnel
 - Psychologists
 - Social workers
 - All of the above
47. Which of the following IEP objective includes a condition, behavior and criteria?
- Johan will learn division this year on grade level.
 - Johan will answer 10 3rd grade comprehension questions.
 - Johan will read 80 words per minute with fewer than 3 errors per minute.
 - Given 30 single digit multiplication problems, Johan will solve 25 out of 30 correctly
48. The second largest ethnic category with identified students in special education is:
- American Indian
 - Asian
 - Black
 - Hispanic

49. It is estimated that ___ of students with disabilities in inner-city schools districts also have limited English proficiency.
- 1%
 - 5%
 - 8%
 - 15%
50. Standardized means:
- All students take the test under the same conditions
 - Students' scores are compared to their previous performance
 - Scores are compared to a criterion or standard
 - All of the above
51. Classroom adaptations for students from culturally and linguistically diverse backgrounds include:
- Teaching study skills
 - Completing a referral for special education services
 - Create an open, accepting classroom environment
 - All of the above
52. Students with ADHD who do not meet the requirements for services under IDEA may qualify under:
- The Civil Rights Act for students with ADHD
 - Section 504 of the Vocational Rehabilitation Act
 - The Perkins Act
 - The Regular Education Initiative
53. All of the following assistive technology devices are good to use with students who have motor impairments except:
- Dragon speaking software
 - keyguards
 - single switches
 - enlarged screen
54. When the observer tallies the number of times a particular behavior occurs, this is an example of:
- event recording
 - duration recording
 - interval recording
 - time sampling
55. Performance assessment is particularly useful for students with disabilities because:
- The standards are lower than on other assessments
 - Students can receive help from others or their teachers
 - Students can demonstrate what they know on "real" tasks
 - All of the above

56. Which is NOT true of gifted, talented, or creative students?
- Come from all cultural and ethnic backgrounds
 - May be underachievers
 - May not score high on standardized tests
 - All of the above are true
57. Section 504 of the _____ is a civil right law that prevents discrimination against individuals with disabilities in all institutions that receive federal funds.
- Americans with Disabilities Act
 - Individuals with Disabilities Education Act
 - Vocational Rehabilitation Act
 - Horace Mann Act
58. In _____ testing, student performance is compared with the performance of other students.
- Criterion-referenced
 - Curriculum-based assessment
 - Norm-referenced
 - Portfolio assessment
59. Which of the following is NOT a co-teaching model?
- Alternative teaching
 - Complementary instruction
 - Cooperative learning
 - All of the above
60. _____ evaluation refers to testing that takes place at frequent intervals throughout the school year to evaluate the progress of the learner.
- Standardized
 - Formative
 - Norm-referenced
 - Summative
61. Approaches to identifying gifted and talented children and youth include:
- Class elections
 - Prereferral interventions
 - Talent pool searches and nominations
 - All of the above
62. Which is an effective modification employed on teacher-made tests?
- Prepare typewritten rather than handwritten tests
 - Space items sufficiently to reduce interference
 - Provide items in a predictable hierarchy
 - All of the above

63. Today, nearly seventy-five percent of students with disabilities are served primarily in general education classrooms.
- True
 - False
64. The individualized family service plan (IFSP) replaces the individualized education plan (IEP) when other family members also need special services.
- True
 - False
65. The prereferral intervention process is a part of the special education IEP process
- True
 - False
66. Students with Down Syndrome can learn to read and write.
- True
 - False
67. One function of a multidisciplinary team (MDT) is to determine the need for educational interventions to assist individual students who are struggling to succeed at school.
- True
 - False
68. A major disadvantage of schoolwide discipline systems is that they may not effectively address the specific needs of all individual students.
- True
 - False
69. Statement of long-term goals is a required component of an IEP.
- True
 - False
70. Boys outnumber girls in the category of serious emotional disturbance by approximately 3 to 1.
- True
 - False
71. Transition services are not mandated as part of student's IEP, but may be appropriate beginning at 14 years of age.
- True
 - False

72. Individuals are classified as legally blind if their visual acuity is less than 20/100 with corrective lenses.
- True
 - False
73. Services that are necessary to help students with disabilities benefit from special education services, such as physical therapy, are referred to as related services.
- True
 - False
74. Semantics refers to the meaning of words used in language.
- True
 - False
75. While most students with learning disabilities have difficulty learning to read, students with learning disabilities rarely exhibit difficulties learning mathematics.
- True
 - False
76. Individuals with mental retardation are functioning 1 or more standard deviations below typical peers.
- True
 - False
77. Giving a gifted child independent work on a topic of his or her interest is an example of enrichment.
- True
 - False
78. Articulation disorders represent the largest category (about 75%) of communication disorders.
- True
 - False
79. In the co-teaching “alternative teaching,” teachers teach similar content but may use different approaches depending on student needs.
- True
 - False
80. Most students with serious emotional disturbance function within the average range academically.
- True
 - False

81. Section 504 is an important part of the Individuals with Disabilities Education Act (IDEA) :
- a. True
 - b. False
82. Exposing a baby to rubella during prenatal development can cause mental retardation.
- a. True
 - b. False
83. Individuals classified as hard of hearing can hear speech tones when wearing hearing aids.
- a. True
 - b. False
84. Stuttering is a common articulation disorder.
- a. True
 - b. False
85. Full inclusion is the practice of serving students with disabilities “entirely” in the general education classroom.
- a. True
 - b. False
86. Traumatic brain injury is not a separate category under IDEA.
- a. True
 - b. False
87. Research has identified food additives and sugar as the most likely causes of ADHD.
- a. True
 - b. False
88. Admitting a child to school early, or skipping grades, are some examples of acceleration programs.
- a. True
 - b. False
89. Occupational therapy is a related service that deals with gross motor skills.
- a. True
 - b. False
90. The referral to special education is the same as the prereferral process by the general education team.
- a. True
 - b. False

91. In complementary instruction, teachers teach the same information simultaneously to two smaller groups within the same classroom.
- True
 - False
92. Schools and teachers have the responsibility to report any signs of child abuse without notifying the parents/guardians of their intent.
- True
 - False
93. There are a total of 10 disability categories served under IDEA (Individuals with Disabilities Education Act).
- True
 - False
94. Timeout refers to the removal of a student for a specified number of school days.
- True
 - False
95. The best way to modify grades for students with disabilities is to inflate them so they do not feel badly.
- True
 - False
96. Essay question can't easily be modified, since the student does most of the writing.
- True
 - False
97. Reliability and validity are necessary for all types of tests.
- True
 - False
98. According to IDEA, children from age 2-17 are entitled to a free and appropriate education.
- True
 - False

APPENDIX G

STUDENT SATISFACTION SURVEY

Student Satisfaction Survey

Please rate the following questions on a scale of 1 to 5

1=strongly disagree 2=disagree 3=neutral 4=agree 5=strongly agree

1. The material in this course was presented effectively

1	2	3	4	5
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2. Videotaped scenarios of experts, teachers, students and parents was an effective way to present the course material.

1	2	3	4	5
---	---	---	---	---

3. PowerPoint presentation of course material was an effective way to present the course material.

1	2	3	4	5
---	---	---	---	---

4. Course lectures were an effective way to present the course material.

1	2	3	4	5
---	---	---	---	---

5. The textbook selected for this course was beneficial in learning the content of the course.

1	2	3	4	5
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6. The media of instruction (e.g., traditional class, online class, or class-in-box) used in this course was enjoyable.

1	2	3	4	5
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7. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course facilitated my learning.

1	2	3	4	5
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8. I would be willing to take another course using the same media of instruction (e.g., traditional class, online class, or class-in-a-box) that was used in this course.

1	2	3	4	5
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9. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the history of special education (e.g. court cases, special education laws).

1	2	3	4	5
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10. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of basic definitions used in special education (e.g. LRE, REI, inclusion).

1	2	3	4	5
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11. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the Individualized Education Plan (IEP) and my role in participating in the IEP.

1	2	3	4	5
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12. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the Student Intervention Process and the identification and eligibility of students with disabilities.

1	2	3	4	5
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13. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the 504 Plan and my obligations to provide individualized accommodations/modifications for these students not eligible for special education.

1	2	3	4	5
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14. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the different types of collaboration models used in providing instruction for students with disabilities in the general education setting.

1	2	3	4	5
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15. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the instructional techniques, strategies, and content modifications frequently used with students who have disabilities and are placed in the general education classroom.

1	2	3	4	5
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16. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the 13 disabilities and I am able to name them, list characteristics of each disability, and name common modifications and adaptations that are effective for each disability.

1	2	3	4	5
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17. The media of instruction (e.g., traditional class, online class, or class-in-a-box) used in this course increased my understanding of the different types of assistive technologies that are used with students with disabilities.

1	2	3	4	5
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Comments:

APPENDIX H

INSTRUCTOR COURSE EVALUATION

COE INSTRUCTOR EVALUATION FORM

Instructor _____ Term _____ Course _____ Section _____

Please rate your experience with this instructor on each of the following six statements.

	SUPERIOR			INFERIOR	
1. The instructor's presentation of the goals and purposes of the course was.....	5	4	3	2	1
2. The instructor's command of the subject matter was.....	5	4	3	2	1
3. The instructor's presentation of the course material was.....	5	4	3	2	1
4. The instructor's evaluation methods were.....	5	4	3	2	1
5. The instructor's provision of opportunities to increase student's knowledge of the subject was.....	5	4	3	2	1
6. Overall, I would rate this instructor's performance in this course as.....	5	4	3	2	1

Additional Comments

APPENDIX I

TIMELINE OF THE PHASES

Timeline of the Phases

<i>Phase 1 Fall 2003</i>	<i>Phase 2 Fall 2003</i>	<i>Phase 3 Spring 2004</i>	<i>Phase 4 June 2004</i>
Traditional class: Students met for 15 weeks on campus.	Preparation of online class and class-in-a-box	Online class and class-in-a-box sections took place over the duration of 15 weeks.	Instructor entered data from pretest, posttest, satisfaction surveys, and course evaluations.
Week 1: Students took the pretest, sign informed consent forms, and completed demographic information.	Weeks 1-15: Transcribed verbatim audio recorded lectures into text documents.	Week 1: Online class and class-in-a-box met in person for the first class at the designated time and took the pretest, completed demographic information, and received one hour of instruction for accessing course content.	Instructor analyzed data from pretest, posttest, satisfaction surveys, and course evaluations.
Weeks 2-14: Students attended class weekly, took quizzes, and turned in assignments.	Weeks 1-15: Prepared 30 sets of CD-ROMs with course content and loaded course content on WebCT.	Weeks 2-14: Online class and class-in-a-box accessed course content, took quizzes, and turned in course assignments.	
Week 15: Students took a posttest, and completed satisfaction surveys and course evaluations.	Prior to the spring semester: (a) students in the ESP 444 distance education class were assigned randomly into two sections: online class and class-in-a-box, and (b) the instructor contacted each student to schedule the first session on campus.	Week 15: Online class and class-in-a-box took the posttest, satisfaction surveys, and course evaluations; class-in-a-box had the option to take the posttest prior to week 15.	

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