GRADUATE STUDENTS' PERCEPTIONS OF THE EFFECTIVENESS OF A TWO-WAY AUDIO/VIDEO DISTANCE LEARNING SESSION AND OF ITS EFFECTS ON GRADUATE STUDENTS' COMFORT LEVEL

DISSERTATION

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirement

For the Degree of

DOCTOR OF PHILOSOPHY

By

Savanee Bangpipob, B.BA., M.S.
Denton, Texas
December, 1995
GRADUATE STUDENTS' PERCEPTIONS OF THE EFFECTIVENESS
OF A TWO-WAY AUDIO/VIDEO DISTANCE LEARNING
SESSION AND OF ITS EFFECTS ON GRADUATE
STUDENTS' COMFORT LEVEL

DISSERTATION

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirement

For the Degree of

DOCTOR OF PHILOSOPHY

By

Savanee Bangpipob, B.B.A., M.S.
Denton, Texas
December, 1995
Bangpipob, Savanee, Graduate students’ perceptions of the effectiveness of a two-way audio/video distance learning session and of its effects on graduate students’ comfort level. Doctor of Philosophy (College Teaching), December, 1995, 121 pp., 25 tables, references, 138 titles.

The purposes of this study were to (a) determine graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system, (b) determine graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the teacher, (c) determine graduate students’ level of comfort with the delivery system and their level of comfort with the teacher, (d) determine differences in graduate students’ ratings of the effectiveness of the delivery system before a distance education session and after a distance education session, and (e) determine differences in graduate students’ level of comfort with the teacher before a distance education session and after a distance education session.

Ninety students and 2 faculty members participated in this study. Five hypotheses were investigated. Statistical procedures included frequency distribution, Pearsons’ product-moment correlation coefficient, and paired t tests. There were positive relationships between graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system. There were positive relationships between graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the teacher.
There were positive relationships between graduate students’ level of comfort with the delivery system and their level of comfort with the teacher. There were no significant differences in graduate students’ ratings of the effectiveness of the delivery system before a distance education session and after a distance education session. There were no significant differences in graduate students’ level of comfort with the teacher before a distance education session and after a distance education session.
ACKNOWLEDGMENTS

The author gratefully acknowledges and gives special thanks to Dr. Gerald A. Knezek, who volunteered to teach distance education sessions and permitted his students to be subjects in this study. Also, the author gratefully appreciates Dr. Jon I. Young for his cooperation in letting his students participate in this study.
TABLE OF CONTENTS

ACKNOWLEDGMENTS ................................................................. iii
LIST OF TABLES ........................................................................... vi

Chapter

1. INTRODUCTION ......................................................................... 1
   Statement of the Problem
   Purposes of the Study
   Hypotheses
   Significance of the Study
   Delimitations of the Study
   Basic Assumptions
   Definition of Terms
   Organization of the Study

2. REVIEW OF RELATED LITERATURE .................................. 16
   Introduction to Distance Education
   History of Distance Education
   Advantages of Distance Education
   Disadvantages of Distance Education
   Delivery Media in Distance Education
   Affective Domain
   Human Comfort
   Students’ Attitudes Toward Teacher Interaction and Feedback
   Students’ Attitudes Toward Two-way Audio/Video Telecommunication Delivery Systems
   Summary

3. PROCEDURES FOR COLLECTION OF DATA .................... 37
   Subjects
   Instrumentation
   Instrument Validation
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piloy Study Procedures Analysis of Data</td>
<td></td>
</tr>
<tr>
<td>4. PRESENTATION AND ANALYSES OF DATA</td>
<td>51</td>
</tr>
<tr>
<td>5. SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS</td>
<td>80</td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>A: Questionnaire for Pilot Study</td>
<td>94</td>
</tr>
<tr>
<td>B: Instrument</td>
<td>99</td>
</tr>
<tr>
<td>C: Student Interview Questionnaire</td>
<td>104</td>
</tr>
<tr>
<td>D: Teacher Interview Questionnaire</td>
<td>106</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>108</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Questionnaire Categories</td>
<td>43</td>
</tr>
<tr>
<td>2.</td>
<td>Details for Instructors A and B and Classes 1, 2, 3, 4, 5, 6, and 7</td>
<td>45</td>
</tr>
<tr>
<td>3.</td>
<td>Class Schedule Details for Class 1/Instructor A and Class 2/Instructor A</td>
<td>47</td>
</tr>
<tr>
<td>4.</td>
<td>Class Schedule Details for Class 3/Instructor A, Class 5/Instructor B, and</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Class 6/Instructor B</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Class Schedule Details for Class 4/Instructor B and Class 7/Instructor B</td>
<td>49</td>
</tr>
<tr>
<td>6.</td>
<td>Frequency Distribution of Students by Gender</td>
<td>52</td>
</tr>
<tr>
<td>7.</td>
<td>Frequency Distribution of Students by Age</td>
<td>53</td>
</tr>
<tr>
<td>8.</td>
<td>Frequency Distribution of Students by Required Course</td>
<td>54</td>
</tr>
<tr>
<td>9.</td>
<td>Frequency Distribution of Students by Subject Interest</td>
<td>54</td>
</tr>
<tr>
<td>10.</td>
<td>Frequency Distribution of Students by ADA Registration</td>
<td>55</td>
</tr>
<tr>
<td>11.</td>
<td>Frequency Distribution of Students by Learning Disability</td>
<td>55</td>
</tr>
<tr>
<td>12.</td>
<td>Frequency Distribution of Students by Typing Problems</td>
<td>56</td>
</tr>
</tbody>
</table>
Table | Page
---|---
13. | Frequency Distribution of Students by Hearing Problems | 56
14. | Frequency Distribution of Students by Speech Problems | 57
15. | Frequency Distribution of Students by Visual Problems | 57
16. | Means, Standard Deviation, and Results of Pearson’s Product-moment Correlation Coefficient Between Delivery System Effectiveness and the Level of Comfort With the System | 58
17. | Means, Standard Deviation, and Results of Pearson’s Product-moment Correlation Coefficient Between Delivery System Effectiveness and the Level of Comfort With the Teacher | 60
18. | Means, Standard Deviation, and Results of Pearson’s Product-moment Correlation Coefficient Between the Level of Comfort With the System and the Level of Comfort With the Teacher | 61
19. | Results of Paired Differences of Mean, Standard Deviation, and Standard Error of Mean and Results of Paired t tests Between Effectiveness of Delivery System Before and After a Distance Education Session | 62
20. | Results of Paired Differences of Mean, Standard Deviation, and Standard Error of Mean and Results of Paired t tests Between Level of Comfort With the Teacher Before and After a Distance Education Session | 63
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>Students' Responses Concerning Why They Liked or Did Not Like Being Students in a Distance Education</td>
<td>64</td>
</tr>
<tr>
<td>22.</td>
<td>Students' Responses Concerning Whether or Not They Had Problems With the Delivery System While Participating in the Distance Education Session</td>
<td>66</td>
</tr>
<tr>
<td>23.</td>
<td>Students' Responses Concerning How They Felt While Participating in the Distance Education Session</td>
<td>68</td>
</tr>
<tr>
<td>24.</td>
<td>Students' Responses Concerning How They Compare Their Participation in the Distance Education Session to a Regular Classroom Setting</td>
<td>69</td>
</tr>
<tr>
<td>25.</td>
<td>Students' Responses Concerning the Classroom Environment</td>
<td>73</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

Technology has been an important part of education for many years. Information and communication technologies are being used in many areas, such as in homes, businesses, schools, and universities (Ely, Foley, Freeman, & Scheel, 1992; Hakes, Sachs, Box, & Cochenour, 1993; Leeds, 1994; Morgan, 1994). Barker (1992), Ely et al.(1992), Hakes et al. (1993), Leeds (1994), Watkins (1994), and Willis (1994) pointed out that the trend toward using telecommunications in distance education increases every year because many students are faced with major barriers to education and training.

Among the barriers that students face are on-campus residency requirements, inconvenient class schedules, the unavailability of courses, home and job responsibilities, commuting problems, distance from campus, child care, physical handicaps, and fear of competing against younger students in a classroom. With the use of telecommunication in distance education, some of these barriers may be eliminated (Barker, 1992; Barker & Taylor, 1993; Carlson, 1989; Grace, 1994; Hayduk, 1994; Laaser, 1987; Leeds, 1994; Mabus, 1991; Sachs, Wilkinson, & Murphy, 1993; Texley, 1993; UNESCO, 1987; Von Prummer, 1994; Watkins, 1994; Willis, 1994).

In distance education, telecommunication media such as telephone, radio, television, satellite, or cable are used to deliver education to students in remote areas (Brownell, 1992; Bruder, 1991; Leeds, 1994; Oliver,
Such technology can be used to provide education to students who are physically separated from their teachers (Brownell, 1992; Keegan, 1986; Leeds, 1994; Rutherford & Grana, 1994; Watkins, 1994; Willis, 1994). Ely et al. (1992), Leeds (1994), Rutherford and Grana (1994), and Watkins (1994) reported that many distance education programs offer complete courses, and many instructors use distance education sessions to introduce students to new telecommunication delivery media.

Many types of delivery media are available for use in telecommunication for distance education, such as computers, satellites, telephones, radio broadcasting, television broadcasting, one-way audio/video communication, two-way audio one-way video communication, and two-way audio/video communication. In distance education, it is often an economic decision which vehicle is appropriate. The more interactive the delivery media, the higher the cost of the system will be (Garrison, 1989; Rutherford & Grana, 1994; Willis, 1993).

According to Ehrmann (1990), telecommunication conversational models are divided into four groups: (a) direct instruction, (b) real-time conversation, (c) time-delayed conversation, and (d) learning by doing. Garrison (1989) stated that “education is a special kind of learning concerned with the integration of differing and seemingly opposing views and ideas; not the fragmentation of learning that leads to narrow ideological and dogmatic views of life and living (p. 12).”

In distance education, teachers and students are physically separated (Garrison, 1989; Keegan, 1986; Rutherford & Grana, 1994; Sachs et al,

With the use of new telecommunication technologies, distance education can provide two-way communication so that teachers and students who are physically separated can communicate interactively (Cochenour, Rezabek, & Burton 1993; Keegan, 1986; Leeds, 1994; Mabus, 1991; Oliver, 1994; Rutherford & Grana, 1994; Watkins, 1994). In the teaching/learning process, teachers and students need responses and feedback from each other. This interaction can help teachers to determine how much students can accomplish, and it allows students to ask questions when they do not understand a topic (Atkins, 1993; Charron & Obbink, 1993; Garrison, 1989; Kaufer & Carley, 1994; Oliver, 1994; Parker, 1994; Pelias, 1991; Peters, 1966; Rutherford & Grana, 1994; Texley; 1993; Watkins, 1994).

In an educational transmission, a telecommunication system should support adequate feedback, because the quality of teaching and learning process depends on teacher-student interactions. Atkins (1993), Charron and Obbink (1993), Garrison (1989), Kaufer and Carley (1994), Parker
Pelias (1991), Peters (1966), Sewart (cited in Garrison, 1989), and Texley (1993) suggested that an effective delivery system should support two-way communication. Since 1991, the term interactive has received increased attention in distance education from schools, universities, colleges, and business firms (Garrison, 1989; Hakes et al., 1993). Electronic mail, computer conferencing, and two-way audio and video conferencing have become popular choices for communication in distance education (Ely et al., 1992; Hakes et al., 1993; Leeds, 1994).

According to Holmberg (1986) and Willis (1993), distance education can be used to motivate students to participate in the teaching/learning process, as in a traditional educational setting, and to enhance their learning enjoyment through the use of telecommunication delivery media. Unlike a traditional classroom setting, distance education may be designed to suit students’ needs and to solve specific problems, such as (a) on-campus residency requirements, (b) more convenient class times, (c) greater availability of courses, (d) commuting problems, (e) distance from campus, (f) child care, (g) physical handicaps, and (h) fear of competing against younger students in a classroom (Barker, 1992; Barker & Taylor, 1993; Carlson, 1989; Charron & Obbink, 1993; Grace, 1994; Laaser, 1987; Leeds, 1994; Rutherford & Grana, 1994; UNESCO, 1987; Von Prummer, 1994; Watkins, 1994; Willis, 1994).

In a two-way communication educational setting, distance education can be used to foster teachers’ and students’ interaction, communication, and feedback through the use of delivery media such as print, telephones, computers, televisions, microphones, and electronic mail. The need for
student motivation and teaching/learning effectiveness appear to be very important in distance education (Charron & Obbink, 1993; Garrison, 1989; Grace, 1994; Oliver, 1994; Rutherford & Grana, 1994; Watkins, 1994; Willis, 1993). Charron and Obbink (1993), Grace (1994), Howard (1987), Mabus (1991), Miller, McKenna, and Ramsey (1993), and Willis (1993) noted that teacher-student feedback is also critical to students in distance education.

One of the leading concerns in distance education is that students are at a greater risk for dropping courses (Parker, 1994; Timmins & Williams, 1990). A second major problem in distance education is the lack of interaction between students and between students and teachers (Charron & Obbink, 1993; Grace, 1994; Howard, 1987; Mabus, 1991; Miller et al., 1993; Parker, 1994; Schlageter, Six, Stern, & Unger, 1986; Willis, 1993). Researchers found that many students in distance education failed to complete courses because they lacked communication with their teachers (Miller et al., 1993; Parker, 1994; Timmins & Williams, 1990). In the teaching and learning process, for both traditional and distance education, students need opportunities to discuss problems with their teachers (Charron & Obbink, 1993; Grace, 1994; Howard, 1987; Mabus, 1991; Miller et al., 1993; Schlageter et al., 1986). Gastkemper (1986) agreed with Schlageter et al. that one-way verbal information is not sufficient in the learning process.

Many students need personalized feedback. It is very important for students to discuss their activities and learning achievements with their classmates and teachers (Charp, 1986; Charron & Obbink, 1993; Grace,
1994; Howard, 1987; Mabus, 1991; Miller et al., 1993). In distance education, where students are physically separated from some of their classmates and teacher (Rutherford & Grana, 1994; Timmins & Williams, 1990; Watkins, 1994; Willis, 1994), the teacher and course material are often the major sources of information, encouragement, or stimulation for students via the telecommunication delivery media (Fallick & DeVilliers, 1986). Interaction and the ability to interact are important to students. Moreover, the opportunity to communicate is psychologically important to both teachers and students. Especially in distance education, a high level of interaction plays a crucial role in the encouragement of students to complete their courses (Parker, 1994; Rutherford & Grana, 1994; Watkins, 1994; Williams, 1987).

Another concern in distance education is students’ attitude toward the distance education system. Allport (1967) described attitude as a powerful subconscious predominance upon an individual’s feedback to all related objects and events. Positive and negative attitudes can cause behavior that is rapacious or loath, favorable or unfavorable, indubitable or disapproving toward the related objects. According to Doob (1967), attitude is defined as a social influence that is crucial to an individual’s society. Attitude strongly dominates and stimulates individuals’ responses to related objects and situations. Like both Allport (1967) and Doob (1967), Thurstone (1967) used attitude to describe humans’ preference, emotions, bias, beliefs, concepts, suspicions, intimidations, and philosophy toward someone or something.
For distance education, Gordon (1970), Rutherford and Grana (1994), and Watkins (1994) found that students' attitudes toward an interactive television system (ITV) depended upon the frequency of teacher interaction, students' attitudes toward live versus remote teachers, students' interests in ITV lessons, students' perspective toward TV, and technical distractions. Students' attitudes toward interaction with teachers and toward the delivery system used are especially important in distance education. Numerous researchers have studied teaching and learning, student attitudes, and teacher-student interaction in distance education. Most of these previous studies involved undergraduate students and high school students.

The studies, which most often concerned student achievement in distance education, revealed positive correlations between student attitudes and teacher and student interaction in distance education. Besides Britton (1992), Gee (1990), and Keinath (1991), very few studies involved graduate students. Therefore, graduate students' perceptions of the effectiveness of a two-way audio/video distance education session and of its effect on graduate students' comfort level were examined in this study.

Statement of the Problem

The problem addressed in this study was graduate students' perceptions of the effectiveness of a two-way audio/video distance education session and of its effect on graduate students' comfort level. This study compared students' experiences when a teacher physically taught in a classroom and when a teacher taught a session from a remote location via a two-way audio/video telecommunication delivery system.
Purposes of the Study

The purposes of this study were to (a) determine graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system, (b) determine graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the teacher, (c) determine graduate students’ level of comfort with the delivery system and their level of comfort with the teacher, (d) determine differences in graduate students’ ratings of the effectiveness of the delivery system before a distance education session and after a distance education session, and (e) determine differences in graduate students’ level of comfort with the teacher before a distance education session and after a distance education session.

Hypotheses

In order to carry out the purposes of this study, the following hypotheses were tested for students participating in two-way audio/video telecommunication class sessions with a teacher at a remote site:

H₀₁: There will be no relationship between graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system.

H₀₂: There will be no relationship between graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the teacher.

H₀₃: There will be no relationship between graduate students’ level of comfort with the delivery system and their level of comfort with the teacher.
H₀⁴: There will be no significant difference in graduate students’ ratings of the effectiveness of the delivery system before a distance education session and after a distance education session.

H₀⁵: There will be no significant difference in graduate students’ level of comfort with the teacher before a distance education session and after a distance education session.

Significance of the Study

Numerous researchers have studied teaching and learning, student attitudes, student achievement, tutors, and teacher-student interaction in distance education. However, the results of their studies suggest the need for further research (Foster, 1993; Fulford & Zhang, 1993; Gee, 1990; Keinath, 1991; Learmont, 1990; Willis, 1993). Previous research has involved students at host sites as well as at remote sites. In previous studies, students saw and heard their teachers only on television. Students in some studies had opportunities to talk with their teachers or tutors through microphones or telephones, and others could communicate with their teachers or tutors only through computer electronic mail.

Most of these previous studies involved undergraduate students and high school students who were divided into groups of students who took high school classes and who took college freshmen courses. Besides those of Britton (1992), Gee (1990), and Keinath (1991), very few studies involved graduate students. The studies, which most often concerned student achievement in distance education, revealed positive correlations between student attitudes and teacher and student interaction in distance education.
The study was conducted at the University of North Texas in Denton, Texas and at Cowart Elementary School in Dallas, Texas. The University of North Texas classroom was used as the remote site and did not have a teacher in the room. Cowart Elementary School, in the Dallas Independent School District, was used as the host site and had a teacher in the room. The telecommunication delivery system that was used in this study was completed and ready for operation on October 1, 1992. The telecommunication delivery system at the University of North Texas and Cowart Elementary School is a “real-time,” fully interactive audio/video and computer network.

Each classroom was set up to provide instructors with a minimum number of controls and to provide full interactive instruction to remote sites. Overhead projection was provided via video camera. Computer displays by both Apple Macintosh and IBM were sent through a scan converter and were displayed in each classroom via television. Every two students were provided with a microphone and access to a computer to converse and interact with persons and the teacher at remote sites. Each site has a room capacity for 24 students and an instructional area for one or two instructors.

Reasons for pursuing this study include the following:

1. Additional research is needed in two-way audio/video telecommunication delivery technology (Bland & Ross, 1992; Britton, 1992; Foster, 1993; Rutherford & Grana, 1994; Watkins, 1994; Willis, 1993).
2. Many researchers have suggested the need for further studies (Britton, 1992; Foster, 1993; Fulford & Zhang, 1993; Gee, 1990; Keinath, 1991; Learmont, 1990; Rutherford & Grana, 1994; Watkins, 1994; Willis, 1993).

3. Students were graduate students, whereas students in many other studies were high school and undergraduate students (Britton, 1992; Gee, 1990; Keinath, 1991; Learmont, 1990).

4. Two tests were utilized with one test before and the other after a distance education session, whereas only posttest research has been used in other studies (Keinath, 1991; Learmont, 1990; Starr, 1993).

5. The group of subjects had experience as students in a face-to-face classroom environment setting and as students at a remote site with the same teacher.

6. The relationships were explored between (a) graduate students' perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system, (b) graduate students' perception of the effectiveness of the delivery system and their level of comfort with the teacher, (c) graduate students' level of comfort with the delivery system and their level of comfort with the teacher, (d) the differences in graduate students' ratings of the effectiveness of the delivery system, and (e) graduate students' level of comfort with the teacher before a distance education session and after a distance education session.

Delimitations of the Study

There are a few delimitations in this study:
1. Each participating class involved a 3-hour telecommunication session.

2. Because of conflicts between the telecommunication delivery system classroom schedule and the class schedules, the number of volunteer participants was limited to 2 faculty members and 97 students.

3. The students involved in the study were those who were taking courses in the Department of Technology and Cognition and who were technology literate.

Basic Assumptions

The following criteria were assumed for this study:

1. All respondents would thoughtfully and honestly answer the questions in the instrument.

2. The delivery system would function and work properly.

3. The study was conducted in the middle of the semester to allow the teachers and their students to know each other and students to be able to honestly answer certain questions on the questionnaire.

Definition of Terms

The following definitions are provided for terms used in this study:

Affective domain of learning refers to the development of attitudes, interests, and values. It involves the feelings of students. An attitude is an internal state that affects an individual’s positive or negative reaction toward some object, person, or event (Doob, 1967; Krathwohl, Bloom, & Masia, 1964a; Ramachandran, 1984).
Attitude is a powerful subconscious predominance upon the individual’s feedback to all related objects and events. Positive and negative attitudes can cause behavior that is favorable or unfavorable, approving or disapproving toward related objects (Allport, 1967; Krathwohl, Bloom, & Masia, 1964a).

Comfort is (a) a feeling of having relief, encouragement, or consolidation, or (b) satisfaction and enjoyment. Slater (1985) defined comfort as “a pleasant state of physiological, psychological and physical harmony between a human being and the environment (p. 4).” Slater concluded that comfort is an internal state involving feeling about satisfaction and security.

According to Hiemstra and Sisco (1990) and Pines and Maslach (1980), students who are comfortable with their teachers and in their classrooms participate more in classroom activities and have more positive attitudes toward their teachers and classroom activities than do those who are less comfortable. Fallick and DeVilliers (1986), Robinson (1984), Schlageter et al. (1986), and Willis (1993) found that teachers can increase students’ level of comfort by providing encouragement, interaction, and feedback.

Distance education refers to a type of education in which the teacher is geographically separated from students (Garrison, 1989; Holmberg, 1977; Keegan, 1986; M. G. Moore, 1973; Rutherford & Grana, 1994; Srisa-an, 1986; Timmins & Williams, 1990; UNESCO, 1987; Watkins, 1994). Communication and interaction between teachers and students in this type of education can be delivered through media such as print,
electronic, mechanical devices, telephone, television, radio, or computer (Keegan, 1986; M. G. Moore, 1973; Rutherford & Grana, 1994; Srisa-an, 1986; UNESCO, 1987; Watkins, 1994; Whiting, 1987). The theoretical and empirical evidence indicates that special attention should be given to the delivery and feedback processes when one designs a distance course (Garrison, 1989; Morgan & Morris, 1994; Rutherford & Grana, 1994; Watkins, 1994).

Effectiveness is (a) the capability to reach an intended goal, (b) the ability to produce a desired impression, or (c) the capacity to achieve a desired result. In education, it can be referred to success of the teaching/learning process (Brown & Atkins, 1988). The teacher should monitor student performance during class time, recognize students’ accomplishment, provide proper feedback, and follow up on student assignments (Troisi, 1983).

Telecommunications allow electronic point-to-point communications between individuals and groups with the use of existing telephone lines, dedicated lines, and cable and satellite transmissions. Some connections are two-way communications, such as electronic mail (E-mail), computer conferences, and two-way audio and video conferences; and some are one-way communications, such as television directed to classrooms through cable and satellite systems. However, telecommunications does not include broadcast radio and television (Ely et al., 1992).

A two-way audio/video telecommunication delivery system is a delivery system that allows a geographically separated teacher to see and hear students, and vice versa, via television (Garrison, 1989; Oliver, 1994).
Organization of the Study

This study report is divided into five chapters. Chapter 1 contains an introduction to the study, the problem, purposes, hypotheses, significance of the study, delimitations of the study, assumptions, and definitions of terms. Chapter 2 includes a review of literature related to the history, advantages, and disadvantages of distance education, delivery media in distance education, affective domain, human comfort, students' attitudes toward teacher interaction and feedback, students' attitudes toward two-way audio/video telecommunication delivery system, and summary. In Chapter 3, the methodology and instrument used to collect the data are presented. An analysis of the results is presented in Chapter 4. A summary of the findings, conclusions, and implications of the conclusions for further research study and practice are provided in Chapter 5.
CHAPTER 2

REVIEW OF RELATED LITERATURE

This chapter is divided into the following ten sections:
(a) introduction to distance education, (b) history of distance education,
(c) advantages of distance education, (d) disadvantages of distance
education, (e) delivery media in distance education, (f) affective domain,
(g) human comfort, (h) students' attitudes toward teacher interaction and
feedback, (i) students' attitudes toward two-way audio/video
telecommunication delivery systems, and (j) summary.

Introduction to Distance Education

Distance education refers to a type of education in which the teacher
is geographically separated from students (Garrison, 1989; Holmberg,
1977; Keegan, 1986; M. G. Moore, 1973; Rutherford & Grana, 1994;
Srisa-an, 1986; Timmins & Williams, 1990; UNESCO, 1987; Watkins,
1994; Willis, 1994). Communication and interaction between the teacher
and students in this type of education can be through delivery media such as
print, electronic devices, mechanical devices, telephone, television, radio,
or computer (Barker, 1992; Brownell, 1992; Keegan, 1986; M. G. Moore,
1973; Oliver, 1994; Rutherford & Grana, 1994; Srisa-an, 1986; UNESCO,
1987; Watkins, 1994; Whiting, 1987).

According to the theoretical expectation and empirical evidence,
special attention should be given to the delivery and feedback processes

In a traditional classroom environment, the teacher and students share their thoughts and understanding through immediate feedback, interaction, and communication. Learning can occur during this teacher-student interaction and feedback (Charron & Obbink, 1993; Garrison, 1989; Grace, 1994; Klinger & Connet, 1992; Mabus, 1991; Miller et al., 1993). As in a traditional learning environment, a distance education environment “is all of the physical surroundings, psychological or emotional conditions, and social or cultural influences affecting the growth and development of an adult engaged in an educational enterprise” (Hiemstra, 1991, p. 8).

Charron and Obbink (1993), Garrison (1989), Grace (1994), Klinger and Connet (1992), Mabus (1991), Miller et al. (1993), M. Moore (1986), Rutherford and Grana (1994), and Watkins (1994) pointed out that the interactions of students, teachers, subjects, and communication are the major elements of effective distance education. According to Moore, communication between a teacher and students involves two-way communication. Therefore, in order for effective teaching/learning to take place in distance education, teachers should encourage students to
communicate and participate and should provide students with feedback (Golen & Keller, 1988; Rutherford & Grana, 1994; Watkins, 1994).

History of Distance Education

Distance education, which has been in existence for more than 150 years, was first called correspondence education (Holmberg, 1986; Keegan, 1986). In the latter half of the 19th century, formal correspondence programs were first established in Europe (Young, 1984), where distance education concentrated on individual and independent study. Students in this distance education process had to interact with print materials (Garrison, 1989). By 1910, when the number of correspondent schools reached 200, “significant early developments in correspondence education took place in the United States” (Young, 1984, pp. 12-13). Garrison (1989) noted that this growth in correspondence education toward the end of the century helped to improve the socioeconomic situation of urban society. MacKenzie and Christensen (1971) pointed out that, in North America, correspondence schools were established before free public education systems.

William Rainey Harper, the father of correspondence education, instituted the Correspondence School of Hebrew in 1881. Not long after this, he was involved in an identical correspondence program at Chautauqua University. In 1892 he became president of the University of Chicago. He pursued his interest in correspondence education by establishing the first university correspondence program in the Extension Division (MacKenzie et al., 1968).
The British Open University, which was the first large-scale public correspondence education institution, emphasized new media methods to deliver education to its students. More than 10 additional universities similar to the British Open University were formed in the 1970s. At present, more than 20 universities around the world, both large and small, offer study centers with or without tutors. Among these public and private institutions are those in Australia, Canada, China, the Federal Republic of Germany, France, the German Democratic Republic, Hungary, India, Indonesia, Ireland, Italy, the Netherlands, Pakistan, South Africa, Sri Lanka, Thailand, the United Kingdom, and the United States of America. These institutions range from primary and secondary level institutions to open universities (Daniel & Stroud, 1981; Fallick, & DeVilliers, 1986; Keegan, 1986; Kirk, 1979; Schlageter et al., 1986; Timmins & Williams, 1990; UNESCO, 1989).

At its 12th conference of the International Council for Correspondence Education in 1982, members voted to rename the organization the International Council for Distance Education to acknowledge changes in distance education delivery during the previous decade. Open universities were now offering full degree programs and new delivery media, providing programs to scattered students (Holmberg, 1986).

Advantages of Distance Education

Why do we need distance education? New technology is linked to transformations in individuals’ lives, jobs, hopes, and dreams (Apple, 1991; Garrison, 1989; Jackson, 1994; Leeds, 1994; Power, 1993; Prain & Booth,
Distance education allows anyone to have an education, even those who are poor, geographically isolated, socially disadvantaged, in poor health, institutionalized, or otherwise unable to attend an educational institution (Garrison, 1989; Grace, 1994; Hakes et al., 1993; Mabus, 1991; Martinelli-Zaun, 1993; Mountain, 1993; Rutherford & Grana, 1994; Sachs et al., 1993; UNESCO, 1987; Von Prummer, 1994; Watkins, 1994; Wedemeyer, 1971; Willis, 1994).

Many students in traditional and distance education are faced with major barriers in education or training, such as (a) on-campus residency requirements, (b) inconvenient class times, (c) unavailability of courses, (d) home and job responsibilities, (e) commuting problems, (f) nontransferable credits from previous schools, (g) distance from campus, (h) child care, (i) physical handicaps, and (j) fear of competing against younger students in a classroom. Distance education can be enhanced with the use of delivery media and may be eliminate some of these barriers (Carlson, 1989; Grace, 1994; Hakes et al., 1993; Laaser, 1987; Mabus, 1991; Martinelli-Zaun, 1993; Mountain, 1993; Rutherford & Grana, 1994; Sachs et al., 1993; UNESCO, 1987; Von Prummer, 1994; Watkins, 1994; Wedemeyer, 1971; Willis, 1994).

Advantages of distance education presented by UNESCO (1984) include: (a) vast numbers of students are reached; (b) problems related to limited teaching resources and staff/facilities are overcome in relation to the distance/isolation, poor transportation, and lack of economic resources; (c) it provides immediacy of learning; and (d) it allows multiplication of
the best (a single teacher can teach thousands of students through radio or television). Distance education systems can provide a number of alternatives for meeting students' needs (Garrison, 1989; Rutherford & Grana, 1994; Texley, 1993; UNESCO, 1987, 1988; Watkins, 1994; Willis, 1994).

Grósz and Forgács (1986), Martínez, Maté, and Pazos (1986), Sevast’Yanenko (1994), and Srisa-an (1986) found that, with the use of distance education in developing countries, it was possible to greatly improve the quality of individuals' lives. Mabus (1991), Pelle and Sobieski (1986), Sachs et al. (1993), and Texley (1993) found that distance education can also alleviate the problem of teacher shortages. In relation to cost effectiveness, Davies and Preece (1986), Hayduk (1994), and Sachs et al. (1993) found that distance education can reduce the cost of the teaching/learning process by sharing limited resources, because a large number of students can be reached at the same time with only one teacher.

Charp (1986), Grace (1994), and Von Prummer (1994) noted that distance education can deliver education to students with handicaps and students who have family responsibilities, others who missed an opportunity to go to school when they were younger, and those who cannot participate in a traditional classroom environment. Laaser (1987), Rutherford and Grana (1994), and Watkins (1994) found that travel costs and time were the major barriers preventing students from attending traditional classes at institutions.

Some institutions cannot offer some classes because of a lack of instructors (Mabus, 1991; Morgan, 1994; Rutherford & Grana, 1994;
Sachs et al., 1993; Watkins, 1994). If it is possible, institutions may offer
distance education classes to their students from other institutions where
there are available instructors. In this case, students do not have to transfer
to other schools, and they can thus meet their on-campus residency
requirements. In the university, there are economic advantages to a larger
number of students being taught with fewer instructors. As the cost of this
type of technology drops, more areas can be reached (Jones & Simonson,
1993; Leeds, 1994). This will make it possible for students to take courses
from multiple colleges or universities. On the other hand, although the
cost of setting up, producing, and transmitting of a distance education
course is tremendously reduced, it is still very expensive for many
educational institutions (Bates, 1984; Garrison, 1989; Laaser, 1987).

Disadvantages of Distance Education

Some disadvantages of distance education exist. First, unlike
traditional education, distance education students greatly depend on their
teacher and course materials as their major sources of information,
encouragement, or stimulation via the telecommunication delivery media
(Fallick & DeVilliers, 1986). Interaction and the ability to communicate
with their teacher and separated classmates are crucial for students to
continue and complete their courses (Parker, 1994; Rutherford & Grana,
1994; Watkins, 1994; Williams, 1987).

A second disadvantage is an inability to listen effectively. Poor
listening skills prevent effective communications. Therefore, remote site
facilitators must encourage students to listen attentively and carefully to
host site teachers (Golen & Keller, 1988). Third, students tend to pay less
attention to class when instruction is delivered via a telecommunication delivery system because the teacher is not physically present in the room. As a result, teachers should encourage students to be more involved in class activities (Golen & Keller, 1988).

Finally, the cost of setting up, producing, and transmitting of a distance education course has decreased in recent years. The current expenditures can be justified by the positive correlation between the teacher-student interaction and the cost of delivery system setup, producing, and transmission of a distance education course (Bates, 1984; Garrison, 1989; Laaser, 1987).

Delivery Media in Distance Education

There are many types of delivery media in distance education. These types are printed materials, radio and television broadcasting, audio and video cassettes, computer-assisted instruction, slides, film strips, movie films, telephone, and video teleconferencing. Each delivery medium has advantages and disadvantages (Barker, 1992; Brownell, 1992; Garrison, 1989; UNESCO, 1988).

Print

In England, correspondence education began at the same time the postage stamp was introduced to the public. In those early days, distance learners had to depend solely upon printed materials. Today, printed materials are still used as fundamental media in the teaching/learning method; however, other telecommunication delivery media, such as telephones, televisions, and computers play a greater role in teacher-student
interaction (Garrison, 1989; Whiting, 1987). The advantages of printed materials are that they are incomparable duplicate materials and everlasting references. The disadvantages are literacy requirements, nonsensational presentation, impersonal interactions, and delivery and understanding problems (UNESCO, 1984).

Radio Broadcasting

Although radio was invented in the 1920s, radio broadcasting was first used to deliver correspondence education to students in the early 1970s (Garrison, 1989). Radio broadcasting can reach large numbers of students, can be recorded to play back later, and costs less than other more complicated telecommunication delivery media; however, it cannot be used as a medium to teach everything, and it is a one-way communication delivery medium (Garrison, 1989; UNESCO, 1984, 1988). In spite of its disadvantages, radio broadcasting is considered the most appropriate medium for delivering social science subject matters (UNESCO, 1989). During the 1980's radio broadcasting continued to be used heavily for delivering distance education to students at the British Open University (Grundin, 1984).

Television Broadcasting

Although television broadcasting, like radio broadcasting, can reach large numbers of students, it is not suitable for teaching every subject and it is only a one-way communication delivery medium. Unlike radio broadcasting, television broadcasting allows students to both hear and see the teacher; however, the cost of television broadcasting is 10 times greater
than the cost of radio broadcasting (UNESCO, 1988). The British Open University also uses television broadcasting to deliver education to its students (Bates, 1984). Bates noted that the production cost of television broadcasts tends to be high and, that, as a medium for instruction, television broadcasting is unsuitable for a number of educational functions and is less effective than videocassettes.

Audio Cassettes

Audio cassettes are more convenient than radio broadcasting. They can be used to record programs and can also be used with print materials. Moreover, audio cassettes enable students to record messages to send to the teacher (UNESCO, 1988).

Video Cassettes

The use of video cassettes is similar to the use of audio cassettes, except that students can see and hear the teacher (UNESCO, 1988).

Computer-assisted Instruction

Computer-assisted instruction software applications allow students to answer questions and receive immediate feedback on their choices (UNESCO, 1988).

Slides, Film Strips, and Movie Film

Use of these media requires that they must be sent to each remote site ahead of time so that they will be ready to present to students (UNESCO, 1988).
Telephone

Although the telephone was first used in distance education in the 1930s, its use has become more involved in distance education in the last decade (Garrison, 1989). The telephone is now the most common form of telecommunication (Timmins & Williams, 1990). As a two-way communication delivery medium, the telephone allows teachers and students to communicate verbally and helps to reduce students’ sense of isolation, which is often a problem in distance education (Robinson, 1984). Although the telephone delivery method is less effective than face-to-face methods, its major advantage is that it provides immediate feedback (Laaser, 1987).

Video Teleconferencing

Video teleconferencing is a part of teleconferencing. Olgren and Parker (1983) described teleconferencing as two-way electronic communication that allows communication between two or more scattered groups of people through the use of audio, audiographics, video, and computer systems. In this study, only video teleconferencing was used. For the study, video teleconferencing is referred to as two-way audio/video telecommunication.

Unlike other types of distance education delivery media, two-way audio/video telecommunication imitates teacher-student interaction in a traditional classroom. It allows immediate interaction and feedback from the teacher to students and vice versa, and it allows teachers and students to see and hear each other (Charron & Obbink, 1993; Cochenour et al., 1993; Garrison, 1989; Mabus, 1991; Morgan, 1994; Oliver, 1994; Rutherford &
Grana, 1994; Watkins, 1994). Mabus (1991), Oliver (1994), and Williams (1987) reported that one advantage of using two-way audio/video telecommunication is that one teacher can initiate eye-to-eye contact with all students at the same time by looking straight into the camera. Each student feels that the teacher is engaging in personal eye contact with him or her. Charron and Obbink (1993), Cochenour et al. (1993), Hakes et al. (1993), Laaser (1987), Mabus (1991), and Oliver (1994) all concluded that a two-way audio/video telecommunication system is an excellent medium to be used as a delivery system in distance education because of its audio and video abilities.

Affective Domain

The affective domain of learning refers to the development of attitudes, interests, and values. It involves the feelings of students. An attitude is an internal state that affects an individual’s positive or negative reaction toward some object, person, or event (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956; Doob, 1967; Gagné, 1985; Gagné, Briggs, & Wager, 1988; Krathwohl, Bloom, & Masia, 1964a, 1964b; Ramachandran, 1984). The five major classifications of behavior in the affective domain of learning are (a) receiving—awareness, willingness to receive, and controlled or selected attention; (b) responding—acquiescence in responding, willingness to respond, and satisfaction in response; (c) valuing—acceptance of value, preference for a value, and commitment; (d) organization—conceptualization of a value and organization of a value system; and (e) characterization by a value or value complex—generalized
Human Comfort

Like an attitude, psychological comfort is an internal state that involves feelings about satisfaction and security. It is difficult for an individual to describe the meaning of comfort to others because the term is so subjective. Therefore, one can only say that an individual feels more comfortable with a person, a situation, or an environment than with another, but not that one feels twice as comfortable. The level of comfort depends significantly on the environment around an individual. Comfort can be stretched to the point where it involves safety and the level of comfort can drop if an individual feels unsatisfied, insecure, afraid, shy, or unfamiliar with a person, a situation, or an environment. Lack of comfort can cause an individual to lose interest in someone or something (Slater, 1985).

In the worst situation, lack of comfort can cause students to experience burnout (Pines & Maslach, 1980). According to Pines and Maslach, burnout includes three degrees: first-, second-, and third-degree burns. At the first stage, students are easily exhausted, tired, and frustrated with their academic activities. At the second level, students gradually and negatively change their attitudes toward their classroom activities and teachers. At the final stage, students develop physical discomforts, such as migraine headaches, and conflicts with their teachers, friends, and families.

When experiencing psychological comfort, students can perform to the best of their abilities academically. Therefore, in a classroom situation,
teachers should originate and provide psychological comfort so that students feel secure and able to learn and are willing to participate in class activities. If students feel that they do not fit in with their classrooms, classmates, or teachers, they often experience mental discomfort (Apps, 1989; Cribben, 1972; Rutherford & Grana, 1994; Sisco, 1991; Slater, 1985; Watkins, 1994). Hiemstra and Sisco (1990) and Rutherford and Grana (1994) suggested that to increase students' level of comfort, it is very critical for teachers to help students to establish positive attitudes toward their subjects, teachers, and instructional process. Teachers should also allow enough time for students to understand what is being taught before going on to the next topic (Kasambira, 1984; Rutherford & Grana, 1994; Watkins, 1994; Willis, 1993).

Garcia and Pintrich (1994), Grossnickle and Thiel (1988), Kasambira (1984), McDaniel (1987), Meece (1994), Pintrich and Schrauben (1992), and Willis (1993) suggested guidelines for teachers to use to help their students develop comfort with teachers and the teaching/learning environment: (a) be a trustworthy person, (b) help students to conquer their weaknesses, (c) try to find causes for students' insecurities, (d) help students understand and try to change their discomforts, (e) treat students as individuals, (f) treat students as adults, (g) help students get ready for substantial changes, (h) create pleasant teaching-learning environments and situations, (i) give positive feedback to students when they do well, and (j) always encourage students to participate in classroom activities. These researchers also all recommended
that teachers use stimulus and reinforcement to increase students' level of comfort.

Brookfield (1990), Jones (1985), Kasambira (1984), Knowles (1980), Knox (1986), Riddle (1990), Rutherford and Grana (1994), Watkins (1994), and Willis (1993) agreed that teachers should encourage students to participate in classroom activities, motivate students, create pleasant teaching-learning environments and situations to maximize students’ physical and psychological comfort, and increase students’ trust and reduce their insecurities with the teachers themselves. Brookfield added that teachers should pay serious attention to their students by listening carefully to their interests, apprehensions, or problems. Knox and Willis also recommended that teachers provide informal communication with students and build supportive and active learning environments in their classrooms.

In distance education, teachers try to comfort their remote students by imitating traditional classroom teacher-student interaction. With the use of two-way audio/video telecommunication, teachers and students can establish immediate audio and visual interaction and feedback with each other (Garrison, 1989; Willis, 1993). Fallick and DeVilliers (1986), Robinson (1984), Schlageter et al. (1986), and Willis (1993) found that teachers can help students reduce their feelings of isolation in distance courses, as in traditional education, by providing encouragement, interaction, and feedback. Oliver (1993) and Williams (1987) found that two-way audio/video telecommunication provides teachers with opportunities to encourage students to participate in class discussions, to ask
and answer questions, to have personal interaction with students, and to give feedback.

Students' Attitudes Toward Teacher Interaction and Feedback

Teaching is an instructional process that involves implementing strategies designed to lead students to the achievement of learning goals. These strategies involve communication (verbal interaction), leadership, motivation, control (discipline or management), and interpersonal interaction (Lefrancois, 1988; MacKay, 1982). Motivation is an important part of the learning process for students (Rowntree, 1975; UNESCO, 1988, 1989). Miner (1992) and Willis (1993) concluded that students have positive attitudes toward the learning process when teachers minimize psychological and physical distances and increase personalization and motivation.

One of the major problems in education is that teachers do not show enough interest in their students or motivate them enough, especially in large classes (Kasambira, 1984). Kasambira (1984), Pilgrim (1991), and Willis (1993) advised teachers to pay more attention to their students' comfort and to encourage students to participate in classroom activities through interaction and feedback. Charron and Obbink (1993), Kendall and Oaks (1992), and Willis (1993) found that, in distance education, one of the major concerns for many teachers in their teaching process is a loss of active interaction and feedback with students.

An important human need is to comfortably communicate and interact with others (Pilgrim, 1991; Slater, 1985; Willis, 1993). True
communication—potent and insistent feedback—provides opportunities for students to learn and understand more about the subject matter. According to several sources (Classroom Management, 1987; Keegan, 1986; Pilgrim, 1991; Willis, 1993), feedback facilitates better communication between teachers and students and helps students to clarify misunderstandings. Therefore, students can feel more confident in learning new information and can overcome previous negative attitudes toward education (Garrison, 1989; Keegan, 1986; Pilgrim, 1991; Rutherford & Grana, 1994; UNESCO, 1984, 1988; Watkins, 1994; Willis, 1993).

Charron and Obbink (1993) and Hale (1988) described interactive distance education as a combination of the use of technology to deliver the teaching-learning process and interaction between the teacher and students. Because the nature of feedback is very important in distance education, several researchers (Charron & Obbink, 1993; Garrison, 1989; Keegan, 1986; UNESCO, 1984) have offered the same conclusion—that the internal educational, or cognitive aspects are the outcome of communication and feedback between a teacher and students. Charron and Obbink (1993), Moore and McLaughlin (1992), Morgan and Morris (1994), Rutherford and Grana (1994), and Watkins (1994) found that communication, interaction, and feedback between teachers and their students are the most important elements in the success of distance education.

From their studies, Gee (1990), Pelle and Sobieski (1986), Srisa-an (1986), and Willis (1993) concluded that the relationship between teachers and students is the most significant factor in the teaching-learning environment. Srisa-an also noted the following about distance teaching:
[It] involves the communication of knowledge, attitudes, and skills to the learner in such ways as to enable them to acquire and extend them into the conduct of their everyday lives. Ideally, an effective distance teaching system should ensure that the students find the learning experiences stimulating, interesting, enjoyable, and relevant to their aspirations and lifestyles. (Srisa-an, 1986, p. 128)

From a study with approximately 300 respondents, Stoffel (1987) found that most students had positive attitudes toward correspondence programs when they felt that their tutors provided feedback, encouraged and assisted them, and were punctual. Like Stoffel, Moore (1987) found that students in distance education need teachers with a sensitive manner, guidance, active interaction, feedback, and general assistance. However, Bell et al. (1987) concluded that students in distance education need to be active learners who like to search for new information and should not be individuals who only receive information from the teacher and never respond to a question or participate in any communication or interaction.

Schlageter et al. (1986) warned that a lack of interaction between students or between students and teachers seems to be the most influential obstacle in distance education. Charron and Obbink (1993), Gee (1990), and Timmins and Williams (1990) suggested that institutions should provide a face-to-face teaching-learning environment for part of a course in order to enhance the teaching-learning process. Riddle (1990) also found strong agreement among students that “it is critical to see the teacher first before having a distance delivered segment in order to establish a rapport with the instructor. That would allay fears about the unusual delivery system (p. 5).” Bland and Ross (1992), Charron and Obbink (1993), Rutherford and Grana (1994), and Watkins (1994) also
recommended that institutions provide a telecommunication delivery method for remote students so that they are able to interact with the teacher.

Students’ Attitudes Toward Two-way Audio/Video Telecommunication Delivery Systems

In traditional face-to-face teaching-learning methods, teachers and students can interact freely. However, in very large classes, this may not hold true. This interaction helps teachers to know how much students can accomplish and to allow students to communicate with the teacher when necessary to clarify a topic. In distance education, the interaction and communication between teachers and students can be provided through the use of telecommunication delivery media (Barker, 1992; Brownell, 1992; UNESCO, 1988). Students in this learning environment need to pay closer attention, spend more time and energy, and accept more responsibility for what they are learning via a telecommunication delivery media. Students must prepare themselves to learn in such an environment (Keegan, 1986; UNESCO, 1988).

With the use of two-way communication delivery media, students can interact with the teacher (Barker, 1992; Brownell, 1992; Keegan, 1980; Rutherford & Grana, 1994; Watkins, 1994). Riddle (1990), Rutherford and Grana (1994), Texley (1993), and Watkins (1994) noted that two-way audio/video delivery systems allow teachers and remote students to have eye-to-eye contact, which makes remote students feel less isolated in distance education courses. According to Bland and Ross (1992), Charron and Obbink (1993), Rutherford and Grana (1994), and Watkins (1994),
students strongly agreed that it is critical for students in the
教学-learning process in distance education courses to be able to see,
hear, communicate, receive and give feedback, and interact with their
teachers and their peers at various sites.

Charp (1986) and Grósz and Forgács (1986) noted that
communication in distance education facilitates teacher-student and
student-student interaction. Charp also found that students were excited to
be in distance education classes, to participate in class discussions, and to
communicate with the teacher. Riddle (1990) recommended that teachers
establish warm personal contact with their students and help their students
to want to learn and to feel comfortable learning through the distance
delivery system. Martinez et al. (1986) reported that warmth helped, and
close feelings from teachers led to less offensive attitudes of students
toward telecommunication delivery systems. Fallick and De Villiers
(1986), Gordon (1970), Robinson (1984), and Schlageter et al. (1986)
found that by providing encouragement, interaction, and feedback, teachers
were able to help students reduce their objections to distance education
delivery systems.

In a study of a live interactive two-way video, voice, and data
between sites at the University of Northern Colorado, Riddle (1990) found
that students experienced a positive attitude shift about the means of class
delivery from the beginning to the end of a distance-delivered segment.
From a study of classes offered by interactive instruction television systems
at four community colleges in Iowa, Stahmer, Smaldino, Hardman, and
Muffaletto (1992) determined that most students considered interactive
instructional television to be an effective method for offering college classes and were willing to take additional courses offered through distance education.

Summary

Distance education was established more than 150 years ago. The telecommunication delivery systems have played important roles in distance education. They deliver education to students and allow students and teachers to communicate with each other. With the use of these systems students and teachers can have immediate comments in distance education. However, the more immediate responses, the higher cost of the delivery systems would be.

In distance education, teachers encourage students to participate in class activities and provide students with comments more often than in a traditional education. Students have to pay more attention and concentrate in their distance education class than in their traditional class. Charron and Obbink (1993), Gee (1990), Riddle (1990), and Timmins and Williams (1990) suggested that institutions should provide a face-to-face teaching-learning environment before separating students and teachers into different locations. As a result, students may feel more comfortable with their teachers, and more willing to communicate with their teachers and to participate in class activities through delivery systems.
CHAPTER 3

METHODOLOGY

An instrument was developed and distributed to students who had experience in a classroom environment in which teaching in the classroom and from a remote location via a two-way audio/video telecommunication delivery system were alternated. The results showed the students' perceptions of the effectiveness of a two-way audio/video distance education session on graduate students' comfort level.

The primary independent variables for this study were students' level of comfort with the delivery system and students' level of comfort with the teacher. The key dependent variable was students' perceptions of the effectiveness of the distance education system. Twenty-six randomly selected students from the 90 subjects who participated in the study were interviewed in a group and in person with the questions in Appendix C. The two faculty members who were involved in the study were interviewed individually with the questions in Appendix D.

Subjects

Graduate students from seven classes in four different technology-related areas were included. Six of these classes had the same teacher. All classes met for a 3-hour class session 1 night per week for a 14-week semester. Five classes were lecture-oriented and hands-on
computer classes, whereas two classes were lecture-oriented and used case studies.

Each student who agreed to participate by answering the questionnaire was asked to sign a minimum-risk letter. The first test was administered before the session began, and the second test, after the session was over. However, students who chose not to be involved in the study did not answer the questionnaire and left after the session was over. The number of subjects was 90. Later, 26 randomly selected participant students were interviewed in a group and in person with the questions in Appendix C. The two faculty members who were involved in the study were interviewed individually with the questions in Appendix D.

Instrumentation

The instrument used in this study consists of 36 questions. Items 1 through 4 and 11 through 21 were adapted from an instrument in Learmont’s (1990) study. Learmont studied the affective differences between host-site and remote-site distance learners who participated in two-way interactive television classrooms for high school course credit. Items 5 through 10 and 22 through 36 of the instrument were developed especially for the present study.

The instrument was used to determine (a) graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system, (b) graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the teacher, (c) graduate students’ level of comfort with the delivery system and their level of comfort with the teacher, (d) differences in graduate
students' ratings of the effectiveness of the delivery system before a
distance education session and a distance education session, and
(e) differences in graduate students' level of comfort with the teacher
before a distance education session and after a distance education session.

Students were asked to indicate their level of agreement or
disagreement on a Likert type scale, with responses ranging from 1 to 6.
One indicates strong disagreement, and 6 represents strong agreement. A
neutral choice was not provided for students to select.

Instrument Validation

Items 1 through 17 of the pilot study questionnaire had reliabilities
ranging between .774 and .932. These items were then combined with the
rest of the questionnaire. Three experts from the Department of
Technology and Cognition at the University of North Texas individually
reviewed the questionnaire to verify its content validity. One of the
experts specializes in telecommunications and distance education; the other
two have expertise in statistics and research design.

The experts made suggestions for simplifying the questions,
removing some unrelated questions, and modifying some questions so that
they were related to the hypotheses in this study. The questionnaire was
then amended and used in the pilot study.

Pilot Study

In the spring 1994 semester, a pilot study was conducted to
determine the reliability of the questionnaire and to determine which items
needed to be changed, removed, or left to be used as an instrument in this
study. Twenty-four students who were attending a class at the University of North Texas in a remote environment and two host-site students were selected to participate in the pilot study. On the day of the pilot study, the instructor taught from the Cowart Elementary School (host site) in Dallas, Texas while his students in the classroom at the University of North Texas (remote site) in Denton, Texas learned via a two-way audio/video telecommunication delivery system by watching their teacher on a television monitor and on IBM computer monitors. The teacher watched and heard students on a television monitor. The teacher and students spoke with each other through microphones that were placed in front of them.

At the end of the distance education session, students were asked to answer a pilot study questionnaire. Only 24 students of 26 attended students answered the questionnaire: 22 remote students and 2 host-site students. At the remote site, one student had to leave in the middle of the class, and a second did not answer the questionnaire. The statistical procedures were used to find the reliability of the questionnaire. The Cronbach’s Alpha (internal consistency Alpha) determined for the pilot study questionnaire was .71.

After the pilot study was completed, several changes were made to simplify the questionnaire and to make questions easy to understand and answer. Some questions were added to conform with the Americans with Disabilities Act (ADA). “I am an ADA registered student. (1) yes (2) no; I have a learning disability. (1) yes (2) no; I have a problem in typing. (1) yes (2) no; I have a hearing problem. (1) yes (2) no; I have a speech problem. (1) yes (2) no; I have a visual problem. (1) yes
Some questions were also deleted to make the questionnaire less complicated to answer.

The following revisions were made in the pilot study questionnaire. Item 2 was changed from “Age _______” to “Age: (1) under 24 (2) 25 to 29 (3) 30 to 34 (4) 35 to 39 (5) 40 to 44 (6) 45 or older.” Item 3, “How often is the teacher physically in your class? (1) never (2) rarely (3) sometimes (4) often (5) always,” and Item 5, “What grade do you expect in this course? (1) A (2) B (3) C (4) D (5) F (6) don’t know,” were removed. Item 6 was changed from “Indicate your prior level of interest in this subject” to “How much interest do you have in this subject?” Item 11 was changed from “I feel I do not know the teacher” to “I feel uncomfortable with the teacher.” Item 14 was changed from “The other students get more feedback from the teacher than I do” to “Other students get more feedback from the teacher than I do.” Item 15, “I never know how I am progressing in this class,” was changed to “I am unable to determine how I am progressing in this class.” Item 16 was changed from “The teacher has never told me what is good or bad about my work” to “The teacher has told me what is good or bad about my work.” Item 19, “This course has made me decide against taking any future lecture classes which use two-way interactive television,” was changed to “I will not take any classes which use two-way interactive television in the future.” Item 26, “The absence of an instructor physically present in the two-way interactive television classroom was detrimental to students’ learning of the course content,” was changed to “The absence of an instructor physically present in the two-way interactive television classroom was
detrimental to my method of learning the course content.” Item 27, “I believe this class session was easier for students receiving instruction by the two-way interactive television system than for students in the regular campus classroom,” was changed to “I believe this class session was easier for me to receive instruction by the two-way interactive television system than a regular campus classroom.”

For Items 29 through 35, revisions were on questions rating scales and for simplification. The rating scale of Items 29 through 33 was from 0 (lowest) to 100 (highest) and for Item 34 was (1) yes, (2) undecided, or (3) no. Both rating scales were changed to a rating from 1 to 6 (strongly disagree to strongly agree) to make the questions on the questionnaire consistent. One represented strongly disagree and 6 indicated strongly agree.

Words in Item 29 were changed from “How comfortable do you feel with the instructor of this class?” to “I feel comfortable with the instructor of this class.” Item 30 was changed from “How comfortable do you feel with the two-way interactive television system in this classroom?” to “I feel comfortable with the two-way interactive television system in this classroom.” Item 31 was changed from “How effective is this two-way interactive television system for delivering lecture presentation?” to “I feel that this two-way interactive television system is effective for delivering teaching-learning process at a distance.”

Item 32, “How effective is this two-way interactive television system for delivering class discussion (between sites)?” and Item 33, “How effective is this two-way interactive television system for delivering hands-
on computer activities?” were eliminated. Item 34, “Do you plan to take a course with this instructor again?” was changed to “If I have an opportunity, I will take a course with this instructor again.” Item 35, “Do you plan to take any course on this two-way interactive television system in the future?” was removed. The pilot study and a revised pilot study questionnaire are included in the Appendix. The categories of the questionnaire are shown in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Questionnaire Categories</th>
<th>Demographic data</th>
<th>Comfort with teacher</th>
<th>Comfort with system</th>
<th>Effectiveness of system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>1-10</td>
<td>13, 15-22,</td>
<td>11-12, 14,</td>
<td>23-26,</td>
</tr>
<tr>
<td>Items</td>
<td>29-30,</td>
<td>27-28,</td>
<td></td>
<td>31,</td>
</tr>
<tr>
<td>Items</td>
<td>32-33</td>
<td>34</td>
<td></td>
<td>35-36</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>13</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Procedures

The research was conducted at the University of North Texas in Denton, Texas and at Cowart Elementary School in Dallas, Texas. The classroom at the University of North Texas was used as the remote site and did not have a teacher in the room, whereas Cowart Elementary School was used as the host site and had a teacher in the room. The
telecommunication delivery system at the University of North Texas and Cowart Elementary School was a “real-time” fully interactive audio/video and computer network. Each site was set up to provide instructors with a minimum amount of controls to provide full interactive instruction to remote sites. Overhead projection was provided via video camera. Computer displays by both Apple Macintosh and IBM were sent through a scan converter and were displayed in each classroom via television. Every two students were provided with a microphone and computer access to converse and interact with persons and the teacher at other remote sites.

Cowart Elementary School is located in the Dallas Independent School District and was connected via two T1 high speed telephone lines that provide audio/video on one line and data communication on the other. The school is located approximately 40 miles south of the University of North Texas. Each school had a room capacity for 24 students and an instructional area for one or two instructors.

A request to use human resources in this study was submitted to the Institutional Review Board, Office of Research Administration, University of North Texas, along with a teacher permission letter, a minimum risk potential letter, and a student participation form. The request was approved on March 9, 1994. The study was exempted from further review under 45 CFR 46.101.

The two faculty members at the University of North Texas who granted permission for this study to be conducted with their classes taught seven classes in four different technology-related areas at the University of North Texas. One (Instructor A) taught six classes (Classes 1, 2, 3, 5, 6,
and 7), and the other faculty (Instructor B) taught only one class (Class-4) (see Table 2). All participating classes in this study were 5000 graduate level. Graduate students from seven classes were included. These graduate students were technology literate.

Table 2
Details for Instructors A and B and Classes 1, 2, 3, 4, 5, 6, and 7

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor A</td>
<td>Class 1, Class 2, Class 3, Class 5</td>
</tr>
<tr>
<td></td>
<td>Class 6, and Class 7</td>
</tr>
<tr>
<td>Instructor B</td>
<td>Class 4</td>
</tr>
</tbody>
</table>

All classes met for a 3-hour class session 1 night per week for a 14-week semester. Classes 1, 2, 3, 5, and 6 are traditional lecture and hands-on computer classes, whereas Class 4 and Class 7 were traditional and case study type classes. The two faculty members taught their classes via the telecommunication delivery system from the Cowart Elementary School once for each class on the test days for this study. For the remainder of the semester they taught their classes at the University of North Texas. Cowart Elementary School was considered the host site, and the University of North Texas was the remote site. Five classes (Classes 3, 4, 5, 6, and 7) were scheduled in the classroom used as the remote site for
this study, and the other two (Class 1 and Class 2) met in a regular classroom environment (see Tables 3, 4, and 5).

In the middle of the semester, the two classes (Class 1 and Class 2) were moved into the remote-site classroom for two consecutive weeks. The first move occurred 1 week before the test day to avoid a sudden move to a different classroom (Howard, cited in Maurer, 1985, p. 5). For the first changing classroom week, the two faculty members were present in their classes and taught their students face-to-face. The second time was on the test day. For the second week, the two faculty members taught their classes from the host site (Coward Elementary School) via the two-way telecommunication delivery system. A facilitator was present in the classroom with students at the remote site (University of North Texas) to control the telecommunication delivery system.

On the test day for every class, the minimum-risk-potential letters and student participation forms were distributed for students to read and sign if they were willing to answer the questionnaires. The letters were collected and kept secure. The first questionnaire was distributed before the distance education session began to students who were willing to participate by answering the questionnaire. Completed questionnaires were collected, and the distance education session began.

At the end of the distance education session of approximately 3 hours, a second questionnaire, with the exact same questions as the first one, was distributed. Completed questionnaires were collected. Responses were keyed, verified, and analyzed using the facilities at the computer laboratory in the Department of Technology and Cognition, College of
Table 3
Class Schedule Details for Class 1/Instructor A and Class 2/Instructor A

<table>
<thead>
<tr>
<th>Semester time frame</th>
<th>Teaching method</th>
<th>Facility site</th>
<th>Teacher location</th>
</tr>
</thead>
<tbody>
<tr>
<td>First week</td>
<td>L</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Second week</td>
<td>L</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Third week</td>
<td>L</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Fourth week</td>
<td>L</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Fifth week</td>
<td>L</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Sixth week</td>
<td>L</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Seventh week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Eighth week</td>
<td>LH</td>
<td>TDSR</td>
<td>Cowart</td>
</tr>
<tr>
<td>Ninth week</td>
<td>LH</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Tenth week</td>
<td>LH</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Eleventh week</td>
<td>H</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Twelfth week</td>
<td>H</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Thirteenth week</td>
<td>H</td>
<td>TC</td>
<td>UNT</td>
</tr>
<tr>
<td>Fourteenth week</td>
<td>H</td>
<td>TC</td>
<td>UNT</td>
</tr>
</tbody>
</table>

Note:  
L = Traditional lecture  
LH = Traditional lecture and hands-on computer  
H = Hands-on computer  
TC = Traditional classroom  
TDSR = Telecommunication delivery system room  
UNT = University of North Texas  
Cowart = Cowart Elementary School
Table 4

**Class Schedule Details for Class 3/Instructor A, Class 5/Instructor B, and Class 6/Instructor B**

<table>
<thead>
<tr>
<th>Semester time frame</th>
<th>Teaching method</th>
<th>Facility site</th>
<th>Teacher location</th>
</tr>
</thead>
<tbody>
<tr>
<td>First week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Second week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Third week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Fourth week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Fifth week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Sixth week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Seventh week</td>
<td>L</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Eighth week</td>
<td>LH</td>
<td>TDSR</td>
<td>Cowart</td>
</tr>
<tr>
<td>Ninth week</td>
<td>LH</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Tenth week</td>
<td>LH</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Eleventh week</td>
<td>H</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Twelfth week</td>
<td>H</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Thirteenth week</td>
<td>H</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Fourteenth week</td>
<td>H</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
</tbody>
</table>

**Note:**

- L = Traditional lecture
- LH = Traditional lecture and hands-on computer
- H = Hands-on computer
- TDSR = Telecommunication delivery system room
- UNT = University of North Texas
- Cowart = Cowart Elementary School
Table 5  
**Class Schedule Details for Class 4/Instructor B and Class 7/Instructor B**

<table>
<thead>
<tr>
<th>Semester time frame</th>
<th>Teaching method</th>
<th>Facility site</th>
<th>Teacher location</th>
</tr>
</thead>
<tbody>
<tr>
<td>First week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Second week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Third week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Fourth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Fifth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Sixth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Seventh week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Eighth week</td>
<td>LC</td>
<td>TDSR</td>
<td>Cowart</td>
</tr>
<tr>
<td>Ninth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Tenth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Eleventh week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Twelfth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Thirteenth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
<tr>
<td>Fourteenth week</td>
<td>LC</td>
<td>TDSR</td>
<td>UNT</td>
</tr>
</tbody>
</table>

Note:  
- LC = Traditional lecture and case study  
- TDSR = Telecommunication delivery system room  
- UNT = University of North Texas  
- Cowart = Cowart Elementary School

Education, University of North Texas. At the end of the semester, 26 randomly selected students who participated in the study were interviewed in a group and in person using the questions in Appendix C. The two
faculty members involved in the study were individually interviewed using the questions in Appendix D.

Analysis of Data

The Statistical Package for the Social Sciences (SPSS) application at the University of North Texas was used to analyze the data. Pearson's product-moment correlation coefficient and paired t tests were used to find relationships and differences among the following variables: students' perceptions of the effectiveness of the delivery system and students' level of comfort with the teacher and delivery system. Pearson's product-moment is used when both correlated variables are expressed as continuous scores (Borg & Gall, 1989). Paired t tests were used to evaluate changes in scores from the first administration to the second.
CHAPTER 4

PRESENTATION AND ANALYSES OF DATA

Several statistical procedures were used to analyze the data. Pearson's product-moment correlation coefficient between the (a) the perceptions of the system effectiveness and the level of comfort with the system, (b) the perceptions of the system effectiveness and level of comfort with the teacher, and (c) level of comfort with the system and level of comfort with the teacher were calculated to test Hypotheses 1, 2, and 3. Alpha was set at .05. Paired t tests were used to evaluate the differences between before and after a distance education session for the effectiveness of the delivery system (Hypothesis 4) and for the level of comfort with the teacher (Hypothesis 5). Changes in scores from the first administration to the second formed the basis of these comparisons. The alpha level was set at .05.

The instruments were administered twice to each participating student: one before the distance education session and one after the distance education session. The number of completed questionnaires returned was 187. Ninety-seven copies were pretests and 90 copies were posttests. Seven participating students left their classes before answering the posttest questionnaire.

Since there were seven missing posttest data, some statistics were performed to compare the differences between 97 pretests and 90 pretests. From the statistical procedures, there were no differences of statistical
results between 97 pretests and 90 pretests. Therefore, data of only 90 sets of pretests and posttests were used to analyze for this study.

Demographic Characteristics

The demographic characteristics of participating students of this study are shown in Tables 6 through 12. Table 6 represents gender frequency distribution. Tables 7 through 11 show age frequency distribution, required course, subject interest, ADA-registered students, and learning disability, respectively. Tables 12 through 15 represent typing, hearing, speech, and visual problem frequency distributions, respectively. Table 6 indicates that 39 (43.33%) of the 90 participating students were male. 51 (56.67%) of 90 participating students were female.

Table 6

Frequency Distribution of Students by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>39</td>
<td>43.33</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
<td>56.67</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 7 indicates that about 25.56% of the participating students were between 25 and 29 years of age; 21.11% were between 30 and 34 years of age; 20.00% were between 40 and 44 years of age; fewer than
18% were 45 or older; and 12.22% were 35 to 39 years of age. Only 3.33% were under 24 years of age. From the answered questionnaires, it was found that all 3.33% under 24 years of age were female.

Table 7
Frequency Distribution of Students by Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 24</td>
<td>3</td>
<td>3.33%</td>
</tr>
<tr>
<td>25-29</td>
<td>23</td>
<td>25.56%</td>
</tr>
<tr>
<td>30-34</td>
<td>19</td>
<td>21.11%</td>
</tr>
<tr>
<td>35-39</td>
<td>11</td>
<td>12.22%</td>
</tr>
<tr>
<td>40-44</td>
<td>18</td>
<td>20.00%</td>
</tr>
<tr>
<td>45 or older</td>
<td>16</td>
<td>17.78%</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Table 8 shows that 40.00% of the participating students were required to take participating courses. More than half (60.00%) of them were not required to do so. Table 9 presents the frequency distribution of the participating students by subject interest. The categories of the subject interest included none, low, average, above average, and high. More than 45% of the students indicated that their interest in the subject was above average; 30.00% had high interest; 16.67% had average; and 7.78% had low interest in the subject. There were no participating students (0.00%)
who indicated that they had no interest in the subject. Table 10 reveals that 1.11% were ADA-registered students and 98.89% were not ADA registered students.

Table 8

**Frequency Distribution of Students by Required Course**

<table>
<thead>
<tr>
<th>Required course</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>36</td>
<td>40.00</td>
</tr>
<tr>
<td>No</td>
<td>54</td>
<td>60.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 9

**Frequency Distribution of Students by Subject Interest**

<table>
<thead>
<tr>
<th>Subject interest</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Low</td>
<td>7</td>
<td>7.78</td>
</tr>
<tr>
<td>Average</td>
<td>15</td>
<td>16.67</td>
</tr>
<tr>
<td>Above average</td>
<td>41</td>
<td>45.56</td>
</tr>
<tr>
<td>High</td>
<td>27</td>
<td>30.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Table 10
Frequency Distribution of Students by ADA Registration

<table>
<thead>
<tr>
<th>ADA registration</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>1.11</td>
</tr>
<tr>
<td>No</td>
<td>89</td>
<td>98.89</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 11 shows that 1.11% of the participating students had a learning disability. From the answered questionnaire, it was found that the ADA-registered student and the learning disability student were the same person. Data in Table 12 indicate that 3.33% of the participating students had problems in typing. In Table 13, the data show that none of the participating students had any hearing problems (0.00%).

Table 11
Frequency Distribution of Students by Learning Disability

<table>
<thead>
<tr>
<th>Learning disability</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>1.11</td>
</tr>
<tr>
<td>No</td>
<td>89</td>
<td>98.89</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Table 12

Frequency Distribution of Students by Typing Problems

<table>
<thead>
<tr>
<th>Typing problems</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3</td>
<td>3.33</td>
</tr>
<tr>
<td>No</td>
<td>87</td>
<td>96.67</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 13

Frequency Distribution of Students by Hearing Problems

<table>
<thead>
<tr>
<th>Hearing problems</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>No</td>
<td>90</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Data in Table 14 also reveal that none (0.00%) of the participating students had any speech problems. Data in Table 15 provide information concerning the number of participating students who had visual problems. The majority of the participating students had no problems with their vision; however, 1.11% of the participating students had some visual problems.
Table 14

**Frequency Distribution of Students by Speech Problems**

<table>
<thead>
<tr>
<th>Speech problems</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>No</td>
<td>90</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 15

**Frequency Distribution of Students by Visual Problems**

<table>
<thead>
<tr>
<th>Visual problems</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>1.11</td>
</tr>
<tr>
<td>No</td>
<td>89</td>
<td>98.89</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>90</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Presentation of Findings

The purpose of this section is to present the results of the data analyses. There are five hypotheses in this study. Each hypothesis is stated separately, and findings are presented after each hypothesis.

With the Alpha setting at .05, the Pearson's product-moment correlation coefficient was used to find the results for Hypotheses 1, 2, and
3. Tables 16 through 18 present mean, standard deviation, and the results of the Pearson’s product-moment correlation coefficient for each of the above relationship pair respectively. Paired t tests were used to evaluate Hypotheses 4 and 5. The alpha level was set at .05.

**H01**

There will be no relationship between graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system.

As shown in Table 16, the correlations were examined to determine any relationship between graduate students’ perceptions of the delivery system’s effectiveness and their level of comfort with the delivery system.

Table 16

**Means, Standard Deviation, and Results of Pearson’s Product-moment Correlation Coefficient Between Delivery System Effectiveness and the Level of Comfort With the System**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pretest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery system</td>
<td>27.63</td>
<td>6.54</td>
<td>0.73</td>
</tr>
<tr>
<td>effectiveness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of comfort</td>
<td>22.99</td>
<td>6.05</td>
<td></td>
</tr>
<tr>
<td>with the system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Posttest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery system</td>
<td>28.04</td>
<td>7.50</td>
<td>0.82</td>
</tr>
<tr>
<td>effectiveness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of comfort</td>
<td>22.82</td>
<td>6.94</td>
<td></td>
</tr>
<tr>
<td>with the system</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p > .05*
on both the pretest and posttest. It was found that there was a positive relationship between the delivery system’s effectiveness and comfort with the system on pretest (0.73) and posttest (0.82). With a level of significance setting at .05, there was no significant difference between the first and the second administration. Also, the relationship between delivery system effectiveness and the level of comfort with the system was higher on the posttest than the pretest. Therefore, it was concluded that graduate students’ perceptions of the delivery system’s effectiveness were associated with their level of comfort with the delivery system.

Hq2

There will be no relationship between graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the teacher.

Data in Table 17 reveal that the correlation between the delivery system’s effectiveness and the level of comfort with the teacher on the pretest was 0.54 and on the posttest was 0.56. With the level of significance at .05, there was no significant difference between the first and the second administration. Also, there was a positive correlation between graduate students’ perceptions of the system effectiveness and their level of comfort with the teacher on both pretest and posttest. Moreover, these pretest and posttest correlations were almost identical. Therefore, it was concluded that graduate students’ perceptions of the delivery system’s effectiveness were associated with their level of comfort with the teacher.
Table 17

Means, Standard Deviation, and Results of Pearson's Product-moment Correlation Coefficient Between Delivery System Effectiveness and the Level of Comfort With the Teacher

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pretest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery system effectiveness</td>
<td>27.63</td>
<td>6.54</td>
<td>0.54</td>
</tr>
<tr>
<td>Level of comfort with the teacher</td>
<td>51.51</td>
<td>9.78</td>
<td></td>
</tr>
<tr>
<td><strong>Posttest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery system effectiveness</td>
<td>28.04</td>
<td>7.50</td>
<td>0.56</td>
</tr>
<tr>
<td>Level of comfort with the teacher</td>
<td>52.89</td>
<td>9.24</td>
<td></td>
</tr>
</tbody>
</table>

*p > .05

H₀₃

There will be no relationship between graduate students' level of comfort with the delivery system and their level of comfort with the teacher.

Table 18 shows that Pearson's product-moment correlation coefficient was used to determine any relationship between the level of comfort with the delivery system and the level of comfort with the teacher on pretest and posttest. The correlation coefficient between the level of comfort with the delivery system and the level of comfort with the teacher on pretest was 0.37 and posttest was 0.53. With the level of significance at .05, there was no significant difference between the first and the second administration. Also, the relationship between graduate students'
Table 18

**Means, Standard Deviation, and Results of Pearson’s Product-moment Correlation Coefficient Between the Level of Comfort with the System and the Level of Comfort With the Teacher**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pretest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of comfort with the system</td>
<td>22.99</td>
<td>6.05</td>
<td>0.37</td>
</tr>
<tr>
<td>Level of comfort with the teacher</td>
<td>51.51</td>
<td>9.78</td>
<td></td>
</tr>
<tr>
<td><strong>Posttest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of comfort with the system</td>
<td>22.82</td>
<td>6.94</td>
<td>0.53</td>
</tr>
<tr>
<td>Level of comfort with the teacher</td>
<td>52.89</td>
<td>9.24</td>
<td></td>
</tr>
</tbody>
</table>

*p > .05*

perceptions of the level of comfort with the delivery system and the level of comfort with the teacher on both pretest and posttest was positive. In addition, the posttest correlation was higher than the pretest correlation. Therefore, it was concluded that graduate students’ perceptions of the level of comfort with the delivery system were associated with their perceptions of the level of comfort with the teacher.

**H04**

There will be no significant difference in graduate students’ ratings of the effectiveness of the delivery system before a distance education session and after a distance education session.
Table 19

Results of Paired Differences of Mean, Standard Deviation, and Standard Error of Mean and Results of Paired t tests Between Effectiveness of Delivery System Before and After a Distance Education Session

<table>
<thead>
<tr>
<th>Paired differences</th>
<th>Mean</th>
<th>SD</th>
<th>SE of mean</th>
<th>t</th>
<th>df</th>
<th>2-tailed Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.411</td>
<td>6.65</td>
<td>0.70</td>
<td>0.59</td>
<td>89</td>
<td>0.56</td>
</tr>
<tr>
<td>95% CI (-0.98, 1.81)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p > .05

Paired t tests were used to evaluate this hypothesis. The alpha level was set at .05. In Table 19, the results show that the value of two-tailed significance (0.56) was in the range between -0.98 and 1.81. Therefore, there was no significant difference between the first and the second administration. It can be concluded that there were no significant differences in graduate students' ratings of the effectiveness of the delivery system before a distance education session and after a distance education session.

H₀5

There will be no significant difference in graduate students' level of comfort with the teacher before a distance education session and after a distance education session.

The differences between the first administration and the second administration were examined by using paired t tests with the alpha level
setting at .05. As shown in Table 20, the value of two-tailed significance (0.12) did not exceed the range between -0.38 and 3.13. Therefore, no significant difference was found between the first and the second administration. It could be concluded that there were no significant differences in graduate students' level of comfort with the teacher before a distance education session and after a distance education session.

Table 20

Results of Paired Differences of Mean, Standard Deviation, and Standard Error of Mean and Results of Paired t tests Between Level of Comfort With the Teacher Before and After a Distance Education Session

<table>
<thead>
<tr>
<th>Paired differences</th>
<th>Mean</th>
<th>SD</th>
<th>SE of mean</th>
<th>t</th>
<th>df</th>
<th>2-tailed Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.38</td>
<td>8.37</td>
<td>0.88</td>
<td></td>
<td>1.56</td>
<td>89</td>
<td>0.12</td>
</tr>
</tbody>
</table>
95% CI (-0.38, 3.13)

*<sup>p</sup> > .05

Student Interview Questionnaire

Twenty-six randomly selected students gave their opinions related to 11 questions in the student interview questionnaire. In the following sections, each interview question is provided, followed with the results. In addition, Tables 21 through 25 present data for each statement. However, some of the questionnaires are not presented in percentage format and tables.
Question 1

"Do you like being a student in a distance education session? Why/Why not?"

As shown in Table 21, 76.92% of the participating students liked being students in a distance education session. Reasons given included (a) more teaching/learning opportunity (46.15%); (b) interesting technology (7.69%); (c) more concentration on their class materials than in a traditional classroom (7.69%); and (d) traveling time and cost saving.

Table 21

Students' Responses Concerning Why They Liked or Did Not Like Being Students in a Distance Education

<table>
<thead>
<tr>
<th>Statement</th>
<th>Yes Number</th>
<th>Percent</th>
<th>No Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>More teaching/learning opportunities</td>
<td>12</td>
<td>46.15</td>
<td>8</td>
<td>33.33</td>
</tr>
<tr>
<td>Interesting technology</td>
<td>2</td>
<td>7.69</td>
<td>14</td>
<td>57.69</td>
</tr>
<tr>
<td>More concentration on class materials</td>
<td>2</td>
<td>7.69</td>
<td>14</td>
<td>57.69</td>
</tr>
<tr>
<td>Traveling time and cost saving</td>
<td>1</td>
<td>3.85</td>
<td>15</td>
<td>60.78</td>
</tr>
<tr>
<td>Prefer to have a traditional class</td>
<td>3</td>
<td>11.54</td>
<td>12</td>
<td>48.08</td>
</tr>
<tr>
<td>Need their instructor present</td>
<td>5</td>
<td>19.23</td>
<td>11</td>
<td>45.06</td>
</tr>
<tr>
<td>Dissatisfaction with delivery system video quality</td>
<td>1</td>
<td>3.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>76.92</td>
<td>6</td>
<td>23.08</td>
</tr>
</tbody>
</table>
A few participating students (11.54%) stated that they would prefer traditional education to distance education if they had an opportunity to choose their classes.

Of the participants, 23.08% did not like being students in a distance education session; 19.23% mentioned that they needed the presence of their instructor in the same classroom with them as a traditional educational environment; and 3.85% of the participants were not satisfied with the video quality of the delivery system.

**Question 2**

"Did you have any problems with the delivery system while you were participating in the distance education session? What were the problems? If not, did you observe if other students had problems?"

As shown in Table 22, the percentage of the students (46.15%) who reported having problems with the delivery system while they were participating in the distance education session is identical to that of those students who said they had no problems. The following are mentioned problems. First, the delivery system video quality was not in full motion, as are regular motion pictures. Second, the reflection of the handouts was too bright and hard to read when presented on a television set or on the computer monitor via the overhead projector.

Third, they felt uncomfortable with the eye-to-eye contact with the instructor via a camera. They felt as if the instructor was staring at them. Fourth, some students felt that the instructor could not always identify who was addressing the instructor because only half of the class could be seen
and recognized on a television set at a time. Finally, the delivery session was interrupted a few times by announcements at the school (host site).

Table 22

Students' Responses Concerning Whether or Not They Had Problems With the Delivery System While Participating in the Distance Education Session

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>12</td>
<td>46.15</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>46.15</td>
</tr>
<tr>
<td>No comment</td>
<td>2</td>
<td>7.70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>26</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Some students mentioned that they did not have any problem with the delivery system, but that they had to remember to use provided microphones and to identify themselves when they wanted to talk with their instructor. Some students felt that they would interrupt their class if they asked the instructor questions. Of the participating students, 7.70% had no comment on this question.

Only 19.23% of the participating students observed the other students' reactions. They all mentioned that one of their visual learner classmates had a problem seeing the instructor's handwritten notes at once and reading the instructor's lips while the instructor was teaching. One of the students commented that the instructor had a small problem in trying to
show his computer monitor on the television set via the delivery system. However, the problem was solved later.

**Question 3**

"Were you able to interact with your instructor on the other end of this system? How? or Why not?"

The participating students unanimously said that they were able to interact with the instructor on the other end of the delivery system during the distance education session, both verbally and visually via provided microphones and a camera. However, they had to remember to use microphones and to identify themselves to talk to their instructor. Some students added that they could ask the instructor questions at any time. On the other hand, some of them just did not ask any questions because they were too shy to be on the camera and to speak with the instructor via microphones. Some of them felt that they would interrupt the class if they had a question. They mentioned that the instructor called on students frequently in order to get student involvement.

**Question 4**

"How did you feel while you were participating in the distance education session?"

As shown in Table 23, of the participating students, 34.61% liked the technology, 26.92% were comfortable with the technology, and 23.08% felt the same as in a traditional education session. Of the students, 11.54% felt that they were isolated from their instructor, and 3.85% were uncomfortable with the technology at first, but later became used to it.
Table 23

Students’ Responses Concerning How They Felt While Participating in the Distance Education Session

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Like the technology</td>
<td>9</td>
<td>34.61</td>
</tr>
<tr>
<td>Comfortable with the technology</td>
<td>7</td>
<td>26.92</td>
</tr>
<tr>
<td>Same as a traditional education session</td>
<td>6</td>
<td>23.08</td>
</tr>
<tr>
<td>Isolated from their instructor</td>
<td>3</td>
<td>11.54</td>
</tr>
<tr>
<td>Uncomfortable with the technology at first</td>
<td>1</td>
<td>3.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

The participating students added further responses to this question. Some students said that this was a good way for one teacher to disseminate information at low cost. A few students mentioned that it helped to improve their communication skills. Some students stated that they were used to the instructor’s teaching style and that their instructor had been physically present in the class for a while before this distance education session.

On the other hand, some students commented that it was easy to lose their attention and that they had to pay more attention in class. One of the students mentioned having difficulty asking some questions by raising his/her hand until the instructor looked at a class television set instead of the camera. Some students could not decide whether to look at a television
set or a camera when they talked with their instructor. Some students concluded that communication through use of facial expression was limited.

Question 5

"How do you compare your participation in the distance education session to a regular classroom setting?"

Data in Table 24 reveal that 61.54% of the students felt their participation in the distance education session to be the same as it was in a regular classroom. They mentioned that they had more opportunities to get into the class discussions and also that they felt comfortable in interacting with the instructor via the provided microphones and camera. Some students added that the instructor tried to get students involved in the class discussion by calling on them often, and some stated that they paid more attention during the class discussion in the distance education than in a regular class setting.

Table 24

Students' Responses Concerning How They Compare Their Participation in the Distance Education Session to a Regular Classroom Setting

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same as a regular classroom setting</td>
<td>16</td>
<td>61.54%</td>
</tr>
<tr>
<td>Less than a regular classroom setting</td>
<td>10</td>
<td>38.46%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
Among the participating students, 38.46% preferred a regular classroom to the distance education session. They felt that they had less interaction with the instructor in the session than in a regular classroom setting. Some of the students commented that they did not like to be on camera and to be seen on the television set.

**Question 6**

“What do you think are the advantages and disadvantages of being in a distance education session?”

According to the participating students, the following were the advantages of being in a distance education session:

1. It was a good way to spread information to students.
2. It provided more resources for students.
3. Its financial cost is low in the long run.
4. It provided eye-to-eye contact via a camera and a television set.
5. It offered more learning opportunities.
6. It benefited both audio and visual learners because the students could see the instructor’s notes on the television set while the instructor was teaching.
7. It could reach many people at once, obtain more opinions from remote areas, and initiate team teaching.
8. Students needed to concentrate and pay more attention in their class.
9. Students could save traveling time and cost.
10. It could be easily recorded to view later, since the student/teacher interaction was via a camera and microphones.
The participating students’ opinions about the disadvantages of being in a distance education session were as follows.

1. An initial cost setting could be very high.
2. It might be very difficult for a teacher to teach and control the delivery system at the same time.
3. Students needed more motivation to learn and attend a class.
4. Students’ concentration might be interrupted by technical distractions, such as being on television.
5. Students lacked close personal discussion with the instructor after their class.
6. There was a need to have a technician to stand by at the remote site.
7. Teaching and learning solely depended on the delivery system.
8. Distance education would not fit with every teaching/learning style.

**Question 7**

“What do you think would make you feel more comfortable as a student in a distance education session?”

The following are participating students’ suggestions as to what would make them feel more comfortable in a distance education session. The delivery classroom needed to be organized in circle style instead of in rows of tables and chairs. There was a need to have someone control the delivery system while the instructor was teaching. The television set needed to be larger and placed next to the camera so that students could see
the instructor while they were talking to him. More cameras should be installed so that the whole class could be seen at once.

Students should be exposed more often to this type of learning. Familiarity with the instructor and having some sessions with the instructor in person prior to a distance education session were other students' suggestions. Materials presented during the distance education session needed to be organized, prepared, and typed in order to be read easily when they were presented on a television set via an overhead projector. Hand-written notes on the presented materials should be avoided.

Question 8

“Describe the environment of the classroom”

Table 25 shows the participating students’ comments about the classroom environment. Of the students, 50% stated that the classroom was friendly, comfortable, and a pleasant environment; 30.76% agreed that it was a good setup including computers, desks and seats, light, and room temperature; 3.85% mentioned that the room would be more comfortable if it imitated a traditional classroom (circle style); 3.85% said that the classroom provided no motivation to learn; and 11.54% had no comments.

Question 9

“What did you like most in the classroom?”

The participating students commented about what they liked most in the classroom. They were able to pay more attention to class discussions and materials, access computers, clearly see their instructor and the presented materials on their computer monitors, do homework for other
classes without the instructor’s knowledge, and talk with the instructor via provided microphones. They were impressed with the equipment and technology, and they also liked the comfortable room temperature, comfortable seats, and ample desk space.

Table 25

**Students' Responses Concerning the Classroom Environment**

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friendly, comfort, and pleasant</td>
<td>13</td>
<td>50.00</td>
</tr>
<tr>
<td>Good setup</td>
<td>8</td>
<td>30.76</td>
</tr>
<tr>
<td>Need to imitate a traditional classroom setup</td>
<td>1</td>
<td>3.85</td>
</tr>
<tr>
<td>No motivation to learn</td>
<td>1</td>
<td>3.85</td>
</tr>
<tr>
<td>No comment</td>
<td>3</td>
<td>11.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>26</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**Question 10**

“What did you like least in the classroom?”

The following are students’ responses about what they liked least in the classroom. They were unable to see classmates’ faces, only their backs. Moreover, they could see the faces of only half of the class at one time on the television set. They did not like the sensitive microphones because the microphones picked up all the noise, such as fingers tapping on a desk,
typing, and students whispering to each other. They had difficulty reading hand-written notes on the television set.

**Question 11**

“What did you think about working in a classroom without the instructors? How did the other students react?”

The students had a variety of comments about working in a classroom without the instructor.

1. The distance education session was the same as if the instructor were present.

2. Of the participating, 30.77% students liked and were pleased with the delivery system. Moreover, they enjoyed being students in the distance education session.

3. The older students should not have any problems, but the younger ones might.

4. Students needed to pay more attention to their class materials and discussions.

5. It was easy to lose the students’ attention and concentration when they realized that the instructor could not see them if the they were not on the camera.

6. This technology was not suitable as a teaching/learning tool for all teaching/learning styles, subject matters, and ages.

7. Both a facilitator and delivery system control people are needed to help distance teaching/learning proceed smoothly. However, 7.69% of the participating students did not like working in the classroom without the instructors,
8. Both instructors and students need more training and more exposure to this technology.

9. Before a distance education session, a rapport between students and instructor should be established. As a result, they would not be educationally communicating with strangers via the delivery system.

10. Overall, the students felt that the majority of their classmates did not have any problem working in the classroom without the instructors. They added that only one student (7.69%) did not like the situation at all. However, this student was able to participate in the class discussions.

Teacher Interview Questionnaire

The following sections are the participating faculty members' responses for the teacher interview questionnaire. There were seven questions in this questionnaire. The participating faculty members were interviewed separately.

Question 1

“Do you like teaching in distance education? Why/Why not?”

The first faculty member had two answers, “yes and no,” for this question. The faculty member liked teaching in the distance education because the faculty member was able to access a good facility and pleasant teaching atmosphere. On the other hand, the faculty member had comments about why he did not like teaching in distance education. Distance education (a) lacked support from the university and staff, (b) took too much effort in lesson planning and delivery system controlling, (c) had no compensation or incentive, and (d) cost more to
initiate. He would rather teach a traditional class than a distance education class if the faculty member had a choice.

The other participating faculty member commented that he would not particularly say yes or no. However, he would rather teach a traditional class. One reason given was that he would be able to see all students at once instead of half the class at a time. In the distance education session, he was able to see the students only by panning the camera around. The other reason was that he lost the sense of knowing which students were listening and learning.

**Question 2**

"Did you have any problems with the delivery system while you were teaching in the distance education session? What were the problems? Were you able to detect if students were having problems with participating with the delivery system, and how did you resolve these?"

One faculty member had a technical problem that was resolved later, as well as problems with the handout and the monitor. The faculty member added that a few students were uncomfortable with the delivery system. He soothed them by introducing them and letting them control the delivery system at the teaching station. This faculty member also mentioned that some of his students felt isolated.

The other faculty member could not remember having any problems. This faculty member had to remember to put the right camera on while teaching in the distance education session.
Question 3

"Were you able to interact with your students on the other end of this system? How? or Why not?"

Both faculty members agreed that they were able to visually and verbally interact with their students on the other end of the system. One added that the system was conducive to interaction. He asked students to communicate with him via provided microphones and a camera. The other faculty member commented that it was not as easy as being located in the same room.

Question 4

"How did you feel while you were teaching in the distance education session?"

Both faculty members agreed that they were comfortable with the system. However, they were frustrated when they had to teach and control the delivery system at the same time. They needed to have someone controlling the system while they were teaching, and they felt that teaching scripts should be provided to the system controlling person in advance so that the person could control the system properly. They also added that they missed their students’ facial and body expressions as feedback.

Question 5

"How do you compare your participation in the distance education session to a regular classroom situation?"

One faculty member mentioned that distance education sessions (a) needed more structure than traditional education, (b) provided less
freedom for teaching and learning than traditional education, and (c) provided less reward and incentive. The faculty member missed interacting with the students after the distance education was over. The other faculty member stated that the traditional classroom environment is easier to teach in than the distance education environment. In addition, students seemed to participate more in a traditional education environment.

Question 6

“What do you think are the advantages and disadvantages of teaching in a distance education session?”

One faculty member mentioned that students had more opportunities to learn, but that there were no advantages for teachers. The other faculty member stated that it reduced traveling time—the farther away, the better. It provided greater access to expert input.

One faculty member commented that there were disadvantages for both students and teachers. Students may not receive equitable attention from their teacher and, thus, may not participate in their class activities as well as they could. The teacher had less compensation, less flexibility, and felt it was less rewarding. Both participating faculty members agreed that they had to spend more planning time and effort in teaching.

Question 7

“What do you think would make you feel more comfortable as a teacher in a distance education session?”

One faculty member felt more comfortable with the delivery system and the delivery room when he taught a distance education session for the
second time. This faculty member felt it would be nice if the university would provide some reward, such as counting a distance education class as two regular traditional classes and providing the same support as a traditional education class. Also, the television monitor should be larger and placed next to the camera. Both faculty members suggested that a system control person is needed to free the instructor to teach more effectively.
CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents a summary of the purposes, methodology, and procedures of this study, followed by a discussion of the major findings. Conclusions of the study and recommendations for further research are also presented based on the information acquired from an examination of the findings of this study.

Summary

The purposes of this study were to (a) determine graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system, (b) determine graduate students’ perceptions of the effectiveness of the delivery system and their level of comfort with the teacher, (c) determine graduate students’ level of comfort with the delivery system and their level of comfort with the teacher, (d) determine differences in graduate students’ ratings of the effectiveness of the delivery system before a distance education session and after a distance education session, and (e) determine differences in graduate students’ level of comfort with the teacher before a distance education session and after a distance education session.

Data were collected using an instrument that is a revised version of the pilot study questionnaire. The instrument consists of 36 items. Items 1
through 10 are demographic data, and Items 11 through 36 are rated on a Likert type scale (strongly disagree to strongly agree) ranging from 1 to 6. One indicates strong disagreement, and 6 represents strong agreement. Three experts from the Department of Technology and Cognition, College of Education at the University of North Texas were asked to verify the content validity of the pilot study questionnaire. The pilot study with 24 participants was conducted to determine the reliability of the questionnaire. The level of reliability was calculated using the SPSS application. The Cronbach's Alpha (internal consistency Alpha) determined for the pilot study questionnaire was .71.

Several statistical procedures were used to analyze the data. Pearsons' product-moment correlation coefficient between (a) system perceived effectiveness and system comfort, (b) system perceived effectiveness and teacher comfort, and (c) system comfort and teacher comfort was calculated to test Hypotheses 1, 2, and 3. Alpha was set at .05. Paired t tests were used to evaluate the differences between before and after a distance education session for the effectiveness of the delivery system (Hypothesis 4) and for the level of comfort with the teacher (Hypothesis 5). Changes in scores from the first administration to the second formed the basis of these comparisons. The alpha level was set at .05.

The study was conducted at the University of North Texas at Denton, Texas and Cowart Elementary School in Dallas, Texas. The University of North Texas classroom was used as the remote site and did not have a teacher in the room. Cowart Elementary School in the Dallas Independent
School District was used as the host site and had a teacher in the room. The telecommunication delivery system at the University of North Texas and Cowart Elementary School is a “real-time” fully interactive audio/video and computer network.

Each classroom is set up to provide instructors with a minimum number of controls and to provide full interactive instruction to remote sites. Overhead projection is provided via video camera. Computer displays by both Apple Macintosh IIi and IBM PS/2 model 56S/C are sent through a scan converter and are displayed in each classroom via television. Every two students are provided with a microphone and access to a computer (Apple Macintosh IIi or IBM PS/2 model 56S/C) to converse and interact with persons and the teacher at remote sites. Each site has a room capacity for 24 students and an instructional area for one or two instructors. The final research was done with identical computers and telecommunication delivery system as the pilot.

Copies of the instruments were administered twice to each participating student: one before the distance education session and one after the distance education session. The number of completed questionnaires returned was 187. Ninety-seven copies were pretests and 90 copies were posttests. Seven participating students left their classes before answering the posttest.

Since there were seven missing post-test data, some descriptive statistics were performed to compare the descriptive differences between 97 pretests and 90 pretests. From the statistical procedures, there were no differences of descriptive statistical results between 97 pretests and 90
pretests. Therefore, data of only 90 sets of pretests and posttests were used for analysis. Twenty-six randomly selected students participating in the study were interviewed using the questions in Appendix C. The two faculty members involved in the study were interviewed individually using the questions in Appendix D.

Statistical procedures used to analyze the data included frequency distribution, Pearson's product-moment correlation coefficient, and paired t tests. The results of the analyses are presented in Chapter 4.

The following are the major findings of this study with a level of significance setting at .05:

$H_01$. There were positive relationships between graduate students' perceptions of the effectiveness of the delivery system and their level of comfort with the delivery system.

$H_02$. There were positive relationships between graduate students' perceptions of the effectiveness of the delivery system and their level of comfort with the teacher.

$H_03$. There were positive relationships between graduate students' level of comfort with the delivery system and their level of comfort with the teacher.

$H_04$. There were no significant differences in graduate students' ratings of the effectiveness of the delivery system before a distance education session and after a distance education session.

$H_05$. There were no significant differences in graduate students' level of comfort with the teacher before a distance education session and after a distance education session.
Discussion

Based on the major findings of this study, the following topics were selected for the focus of this discussion:

1. The relationships between students’ perceptions of the effectiveness of the delivery system and their level of comfort with the system for both pretest (0.73) and posttest (0.82) were positive correlations. In addition, the posttest relationships were higher than the pretest.

2. There were positive correlations between students’ perceptions of the effectiveness of the delivery system and their level of comfort with their instructor for both pretest (0.54) and posttest (0.56). The posttest relations were slightly higher than the pretest.

3. Both pretest (0.37) and posttest (0.53) correlations between students’ level of comfort with the delivery system and their level of comfort with the instructor were positive. Again, the posttest correlations were higher than the pretest.

4. The results showed no statistical significant differences in students’ opinions about the effectiveness of the delivery system and their level of comfort with the instructor before and after a distance education session. A possible explanation for this would be that these students were technology literate and familiar with their instructors.

5. Students preferred a traditional education classroom to a distance education classroom. If there were a choice, they would choose traditional education classroom over distance education classroom. Their reasons
were that they would like to have live interaction with their instructor and like to have their instructor present in their classroom.

However, like Galbreath (1995), Wagner and McCombs (1995), and Whitaker (1995), they said that distance education allows them to broaden and enrich their learning experiences. Students can interact verbally and visually with their teacher via a camera, microphones, and a television set. Moreover, they can communicate electronically with their teacher and peers by sending electronic mails via computers.

Compared to other studies, the students observed that distance education provides more resources (Dyrli, 1995; Galbreath, 1995; UNESCO, 1984) and saves traveling time and cost (Laaser, 1987; Rutherford & Grana, 1994; Shields, 1995; Thach & Murphy, 1995; Watkins, 1994). In addition, in distance education, students pay more attention to their class materials (Golen & Keller, 1988).

6. Students and participating faculty members were able to visually and verbally interact with each other via camera and microphones. This result supported comments from Cochenour et al. (1993), Keegan (1986), Leeds (1994), Mabus (1991), Oliver (1994), Rutherford and Grana (1994), and Watkins (1994).

These studies mentioned that, with the use of telecommunication technologies, teachers and students at different locations can communicate interactively. Such interactions would help teachers determine how much students can accomplish and allow students to confirm their understanding in a topic (Atkins, 1993; Charron & Obbink, 1993; Garrison, 1989; Kaufer
& Carley, 1994; Oliver, 1994; Parker, 1994; Pelias, 1991; Peters, 1966; Rutherford & Grana, 1994; Texley; 1993; Watkins, 1994).


Like Mabus (1991), Oliver (1994), and Williams (1987), participating students reported that two-way audio/video technology allows students and teacher to initiate eye-to-eye contact via a camera and a television set. Charp (1986), Grace (1994), and Von Prummer (1994) noted that distance education provides benefits for both audio and visual learners. In a one- and two-way video communication delivery system in distance education, students could see a close-up of presented materials on a television set while teachers are teaching about those materials.

Golen and Keller (1988) found that some successful students pay more attention to class in distance education than in traditional education. Laaser (1987), Rutherford and Grana (1994), and Watkins (1994) found that traveling time and cost could be saved for distance education students and teachers. UNESCO (1988) reported that students could record their distance education session for further study on a video tape cassette and/or audio tape cassette.
8. Disadvantages of being in a distance education session were mentioned. First, these were found in studies by Bates (1984), Berge, (1995), Galbreath, (1995), Garrison, (1989), and Laaser (1987), although the cost of delivery system setup, producing, and transmission of a distance education course is tremendously reduced, it is still very expensive for many educational institutions. Second, in distance education, teachers needed to provide more motivation to students (Fallick & DeVilliers, 1986; Wagner & McCombs, 1995).

Like Whitaker (1995), other mentioned disadvantages from participating students were (a) difficulty for a teacher to teach and control the delivery system at the same time, (b) technical distraction, (c) a need for a technician to stand by at the remote site, (d) a need to depend on the delivery system, and (e) a lack of fit with every teaching/learning style.

9. Distance education instructors have to spend more effort in teaching in distance education than in traditional education (Thach & Murphy, 1995). In distance education, teachers try to comfort their remote students by imitating traditional classroom teacher-student interaction. Brookfield (1990), Jones (1985), Kasambira (1984), Knowles (1980), Knox (1986), Riddle (1990), Rutherford and Grana (1994), Watkins (1994), and Willis (1993) agreed that teachers should (a) encourage students to participate in classroom activities, (b) motivate students, (c) create pleasant teaching-learning environments and situations to maximize students' physical and psychological comfort, and (d) increase students' trust to reduce their insecurities about the teachers themselves.
Brookfield (1990) added that teachers should pay serious attention to their students by listening carefully to their interests, apprehensions, or problems. Knox (1986) and Willis (1993) also recommended that teachers provide informal communication with students and build supportive and active learning environments in their classrooms.

10. There were needs for a delivery system control person and at least a facilitator for a host site and each remote site (Berge, 1995; Thach & Murphy, 1995; Whitaker, 1995). The delivery system control person would pan a camera around the classroom, adjust the audio volume, and control an overhead projector (Berge, 1995; Whitaker, 1995). The facilitator would assist students in the learning process, such as helping in class activities, handing out class materials, monitoring class while they take a test, and collecting homework (Berge, 1995; Whitaker, 1995). Holmberg (1977), Morgan and Morris (1994), Oliver (1994), Rutherford and Grana (1994), Watkins (1994), and Willis (1993) found that students can benefit from distance courses if adequate instructional design, guidance, and help from tutors are provided.

11. In order to increase student participation in distance education, instructors should teach their students in a traditional classroom environment for a few sessions before they are separated into different sites. Charron and Obbink (1993), Moore and McLaughlin (1992), Rutherford and Grana (1994), and Watkins (1994) found that communication, interaction, and feedback between teachers and their students are the most important elements in the success of distance education.
Charron and Obbink (1993), Gee (1990), Riddle (1990), and Timmins and Williams (1990) suggested that institutions should provide a face-to-face teaching-learning environment for part of a course in order to enhance the teaching-learning process. In this way, instructors and students can know each other. Students may be more willing to interact with their familiar instructors via the delivery system than with unfamiliar people.

Like Stoffel (1987), M. G. Moore (1987) and Wolcott (1995) found that students in distance education need teachers with a sensitive manner, guidance, active interaction, feedback, and general assistance. Schlageter et al. (1986) and Wolcott (1995) warned that a lack of interaction between students or between students and teachers seems to be the most influential obstacle in distance education.

12. Participating students and faculty members had a few problems during a distance education session. First, the video output did not synchronize with the audio output. The video motion was not as smooth as a picture on a regular television set. However, students felt more comfort with the motion toward the end of the distance education session. Second, the reflection of the materials on the television presented via an overhead projector was too bright, making the handwriting hard to read.

13. Many students were shy about being seen on a television set. Some of them did not ask questions when they wanted to because they felt that they would interrupt the class. However, they were more relaxed at the end of the distance education session. Participating faculty members encouraged their students to participate in class discussions and activities. Riddle (1990) and Wolcott (1995) recommended that teachers should help
their students want to learn and to feel comfortable learning through the distance delivery system by establishing warm personal contact with their students. However, how this can be done without being present with students in a class has yet to be practiced (Whitaker, 1995).

14. Students had a difficult time deciding whether to look at a camera or a television set when they interacted with their instructor. Moreover, the number and size of the television was too small. The participating faculty members mentioned that they could see only half of their students at a time on the television set. As a result, they lacked the students’ body and facial expressions that helped them understand their students’ learning processes (Whitaker, 1995; Wolcott, 1995).

Conclusions

This section provides the conclusions of the findings in this study.

1. It can be assumed that, the more students are exposed to the delivery system, the higher the relationships between students’ recognition of the system effectiveness and their level of comfort with the system, students’ recognition of the system effectiveness and their level of comfort with their instructor, and students’ level of comfort with the system and their level of comfort with the system.

2. Technology-literate students willingly accepted new technology. It is possible that there would be differences for students in other areas.

3. Distance education instructors need more support from their institutions and staff members in order to teach effectively in distance education. If they are to teach such courses, they need more release time to develop these classes and to teach them as they take more time. In the
meantime, staff members may provide as much support to distance education instructors as traditional education instructors (Thach & Murphy, 1995).

4. From participating students’ and faculty members’ points-of-view, a distance education instructor needs to have a delivery system control person at a host site and each remote site during the session. Students also need at least a facilitator to assist them while they learn because their instructor is not in the classroom with them (Berge, 1995; Whitaker, 1995).

5. Distance education requires added effort in both teaching and learning (Thach & Murphy, 1995). Some professors or teachers may not be able to do it due to their teaching philosophies, the sacrifice needed without needed staff support and the additional time required in busy or overloaded schedules. Instructors should encourage students to participate in class activities and discussions, and students should pay more attention in the learning process (Brookfield, 1990; Jones, 1985; Kasambira, 1984; Knowles, 1980; Knox, 1986; Riddle, 1990; Rutherford & Grana, 1994; Watkins, 1994; Willis, 1993).

6. Presented materials should be organized and printed in a readable size. Brightly colored materials should not be used (Whitaker, 1995).

7. Some changes regarding the number of cameras and the number, size, and location of the television sets should be considered to improve the delivery system.
8. For small classes, distance education is not economically possible unless it is pre-taped entirely to be used on a VCR or in a televised program.

Recommendations

Based on the findings of this study, the following recommendations are made.

1. Additional research about students’ and instructors’ perceptions concerning distance education should be conducted.

2. Further research needs to be conducted on the stress level of faculty who operate the cameras and also teach the distance education course.

3. Further research needs to be conducted on students who do other course work or other things during the class time of a distance education course.

4. The number of participating students and instructors should be larger and the time for the study should include the entire course not a slice of a course.

5. Students in other areas should be involved in additional distance education research.

6. A delivery system control person and at least a facilitator should be provided for a host site and all remote sites to affiliate with instructors and students in the distance education teaching/learning process.

7. Students and instructors in distance education should be familiar with each other, and instructors should teach in a traditional classroom environment with their students for a few sessions before going to different locations.
8. Institutions and staff members should provide more support to instructors who teach in distance education. The institution may provide more incentive compensation for distance education instructors. At the same time, staff members may provide the same assistance to distance education instructors as that provided to traditional education instructors. As a result, more instructors would be encouraged to teach in distance education (Thach & Murphy, 1995).

9. In distance education, instructors should encourage students to become more involved and to participate in class activities and discussions.

10. The presented materials should be typed, and brightly colored paper should not be used.

11. There should be at least one teacher camera and two student cameras installed in the two-way video distance education classroom. Large television sets should be used in the classroom. Cameras should be hidden and installed next to or above the television sets.

12. Classroom environment and room temperature appear to help students feel more comfortable with the distance education technology.
APPENDIX A

QUESTIONNAIRE FOR PILOT STUDY
QUESTIONNAIRE FOR PILOT STUDY

The purpose of asking for the last four digits of your SS# is to compare your first set of responses with those from future administrations. Your answers will be confidential.

Last four digits of your SS# __________

General Directions
Rate each statement with respect to class session(s) delivered via the two-way interactive television system with the teacher at the remote site. Circle a number to indicate your response. Please answer as honestly as possible.

1. Gender: (1) Male (2) Female 1 2
2. Age __________
3. How often is the teacher physically in your class?
   (1) never (2) rarely (3) sometimes
   (4) often (5) always 1 2 3 4 5
4. Is this course required? (1) yes (2) no 1 2
5. What grade do you expect in this course?
   (1) A (2) B (3) C (4) D (5) F (6) don't know 1 2 3 4 5 6
6. Indicate your prior level of interest in this subject
   (1) None (2) Low (3) Average
   (4) Above Avg (5) High 1 2 3 4 5
** Use the following descriptor for items 7-28

(1) strongly disagree  (4) slightly agree
(2) moderately disagree  (5) moderately agree
(3) slightly disagree  (6) strongly agree

7. I like being in a two-way interactive television class
   SD  SA
   1  2  3  4  5  6

8. I feel I am part of the larger group in this room
   1  2  3  4  5  6

9. I feel I am treated fairly by the teacher
   1  2  3  4  5  6

10. I will not take a class by two-way interactive
    television again
    1  2  3  4  5  6

11. I feel I do not know the teacher
    1  2  3  4  5  6

12. I have adequate personal contact with the teacher
    1  2  3  4  5  6

13. I feel less close to this teacher than I do to my
    other teachers
    1  2  3  4  5  6

14. The other students get more feedback from the
    teacher than I do
    1  2  3  4  5  6

15. I am unable to determine how I am progressing in
    this class
    1  2  3  4  5  6

16. The teacher has never told me what is good or bad
    about my work
    1  2  3  4  5  6

17. The teacher has pointed out my strengths and
    weaknesses
    1  2  3  4  5  6

18. The teacher has made suggestions on how I could
    improve my work
    1  2  3  4  5  6
19. This course has made me decide against taking any future classes which use two-way interactive television

20. I had no difficulty understanding the course material as it was presented via the two-way interactive television system.

21. There were several times during class when I could not follow the course content because of technical distractions caused by the two-way interactive television system (noise, monitor reception, etc.)

22. I would have learned the material better if it had been taught in a regular classroom setting without the two-way interactive television media.

23. I like this method of learning better than attending class in a regular campus classroom.

24. If I could, I would select this method of learning every time.

25. I had ample opportunities to interact with the instructor during the two-way interactive television session(s).

26. The absence of an instructor physically present in the two-way interactive television classroom was detrimental to the students' learning of the course content.
27. I believe this class session was easier for students receiving instruction by the two-way interactive television system than for students in the regular campus classroom.

28. I had ample opportunities to interact with the instructor during the course.

**Use the rating scale of 0 (lowest) to 100 (highest) for items 29-35**

29. How comfortable do you feel with the instructor of this class? __________

30. How comfortable do you feel with the two-way interactive television system in this classroom? __________

31. How effective is this two-way interactive television system for delivering lecture presentation? __________

32. How effective is this two-way interactive television system for delivering class discussion (between sites)? __________

33. How effective is this two-way interactive television system for delivering hands on computer activities? __________

**Circle the appropriate answer for each item for items 34-35**

34. Do you plan to take a course with this instructor again?
   (1) Yes  (2) Undecided  (3) No

35. Do you plan to take a course on this two-way interactive television system in the future?
   (1) Yes  (2) Undecided  (3) No
APPENDIX B

INSTRUMENT
INSTRUMENT

The purpose of asking for the last four digits of your SS# is to compare your first set of responses with those from future administrations. Your answers will be confidential.

Last four digits of your SS#

Demographic Data
1. Gender: (1) Male (2) Female
2. Age: (1) under 24 (2) 25-29 (3) 30-34 (4) 35-39 (5) 40-44 (6) 45 or older
3. Is this course required? (1) yes (2) no
4. How much interest do you have in this subject? (1) None (2) Low (3) Average (4) Above Average (5) High
5. I am an ADA registered student. (1) yes (2) no
6. I have a learning disability. (1) yes (2) no
7. I have a problem in typing. (1) yes (2) no
8. I have a hearing problem. (1) yes (2) no
9. I have a speech problem. (1) yes (2) no
10. I have a visual problem. (1) yes (2) no
General Directions
Rate each statement with respect to class session delivered that you will attend (just attended) via the two-way interactive television system with the teacher from Cowart Elementary School. Circle a number to indicate your response. Please answer as honestly as possible.

** Use the following descriptor for items 11-36
(1) strongly disagree  (4) slightly agree
(2) moderately disagree  (5) moderately agree
(3) slightly disagree  (6) strongly agree

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. I like being in a two-way interactive television class</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>12. I feel I am part of the larger group in this room</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>13. I feel I am treated fairly by the teacher</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>14. I will not take a class by two-way interactive television again</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>15. I feel uncomfortable with the teacher</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>16. I have adequate personal contact with the teacher</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>17. I feel less close to this teacher than I do to my other teachers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>18. Other students get more feedback from the teacher than I do</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>19. I am unable to determine how I am progressing in this session</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
20. The teacher has told me what is good or bad about my work 1 2 3 4 5 6
21. The teacher has pointed out my strengths and weaknesses 1 2 3 4 5 6
22. The teacher has made suggestions on how I could improve my work 1 2 3 4 5 6
23. I will not take any classes which use two-way interactive television in the future 1 2 3 4 5 6
24. I had no difficulty understanding the course material as it was presented via the two-way interactive television system. 1 2 3 4 5 6
25. There were several times during class when I could not follow the course content because of technical distractions caused by the two-way interactive television system (noise, monitor reception, etc.) 1 2 3 4 5 6
26. I would have learned the material better if it had been taught in a regular classroom setting without the two-way interactive television media 1 2 3 4 5 6
27. I like this method of learning better than attending class in a regular campus classroom 1 2 3 4 5 6
28. If I could, I would select this method of learning every time 1 2 3 4 5 6
29. I had ample opportunities to interact with the instructor during the two-way interactive television session

30. The absence of an instructor physically present in the two-way interactive television classroom was detrimental to my method of learning the course content

31. I believe this class session was easier for me to receive instruction by the two-way interactive television system than a regular campus classroom

32. I had ample opportunities to interact with the instructor during the session

33. I feel comfortable with the instructor of this class

34. I feel comfortable with the two-way interactive television system in this classroom

35. I feel that this two-way interactive television system is effective for delivering teaching-learning process at a distance

36. If I have an opportunity, I will take a course with this instructor again
APPENDIX C
STUDENT INTERVIEW QUESTIONNAIRE
STUDENT INTERVIEW QUESTIONNAIRE

1. Do you like being a student in a distance education session? Why/Why not?
2. Did you have any problems with the delivery system while you were participating in the distance education session? What were the problems? If not, did you observe if other students had problems?
3. Were you able to interact with your instructor on the other end of this system? How? or Why not?
4. How did you feel while you were participating in the distance education session?
5. How do you compare your participation in the distance education session to a regular classroom setting?
6. What do you think are the advantages and disadvantages of being in a distance education session?
7. What do you think would make you feel more comfortable as a student in a distance education session?
8. Describe the environment of the classroom.
9. What did you like most in the classroom?
10. What did you like least in the classroom?
11. What did you think about working in a classroom without the instructors? How did the other students react?
APPENDIX D
TEACHER INTERVIEW QUESTIONNAIRE
TEACHER INTERVIEW QUESTIONNAIRE

1. Do you like teaching in distance education? Why/Why not?

2. Did you have any problems with the delivery system while you were teaching in the distance education session? What were the problems? Were you able to detect if students were having problems with participating with the delivery system, and how did you resolve these?

3. Were you able to interact with your students on the other end of this system? How? or Why not?

4. How did you feel while you were teaching in the distance education session?

5. How do you compare your participation in the distance education session to a regular classroom situation?

6. What do you think are the advantages and disadvantages of teaching in a distance education session?

7. What do you think would make you feel more comfortable as a teacher in a distance education session?
REFERENCES


Thurstone, L. L. (1967). Attitudes can be measured. In M. Fishbein (Ed), Readings in attitude theory and measurement (pp. 77-89). New York: Wiley.


