A CASE STUDY OF AN APPROACH TO NURSING EDUCATION USING A MIXED MODEL OF DISTANCE AND LIVE INSTRUCTION

By

Greg Evan Gogolin

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ABSTRACT

By

Greg Evan Gogolin

This study examines the effectiveness of combined two-way interactive video and traditional classroom instruction. Although two-way interactive video technology is being used by growing numbers of colleges and universities, it may not be the most effective learning method. Four semester-length bachelor of science in nursing courses at Ferris State University were studied. Student and faculty measures were taken by means of pre and posttests and pre and post surveys/interviews. Students were enrolled in classes at Ferris State University campus locations in Big Rapids, Michigan and Grand Rapids, Michigan. Each class was comprised of students in Big Rapids meeting simultaneously via two-way interactive video with students in Grand Rapids. The instructor rotated between Big Rapids and Grand Rapids each week, but the students remained at their site. All students and faculty involved in this study had previous experience with two-way interactive video instruction.

The research questions were: 1) Is the combination two-way interactive video/live instructor instruction technique effective in meeting the learning objectives of the students and instructors? 2) Is there a relationship between student experience level with ITV and satisfaction with ITV? 3) Do instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered via ITV? 4) What teaching methods (such as lecture, group discussion, team exercises)

do instructors and students perceive as effective in the ITV classroom? 5) What factors detract from the two-way interactive video learning experience?

This research found that in the format used in this study, two-way interactive video was not as effective as traditional instruction and was not effective in meeting the learning objectives of the students or the instructors. Results included an indication that two-way interactive video introduces some compromises in the way instruction may be delivered, which can impact effectiveness. These compromises were of concern.

Learning in a distance education environment can be illustrated with a Venn diagram. One circle would represent the learning derived from traditional instruction and the second circle would represent the learning derived from distance education. The question is not if the circles in the Venn diagram perfectly intersect. The question is: are the circles the same size?

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DEDICATION

To "Mr. Evan" - Evan David Gogolin, whose lifetime of struggles has taught me so much about life and people.

To Lauri, Erin, Isaac and "the new baby", who put up with me and gave up their time while I worked on this lifetime goal.

To Cas, who got me started on my doctorate in person and was there in spirit at the conclusion.

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CHAPTER 1

INTRODUCTION

The 1990's saw dramatic changes in the way colleges and universities deliver classes. The composition of the student population has changed significantly from the traditional ages of late teen's and early twenties to a much larger percentage of students over the age of 25. These older students typically have lifestyles that require much more flexibility than traditional younger students. Enrollment challenges have also forced colleges to become more aggressive in their efforts to attract students. The early 1990's has also been the time when computer and telecommunications technologies have matured to the point that they can provide substantial benefit and flexibility to both students and colleges and universities in a cost effective manner. Two-way interactive video technology is increasingly being used in place of traditional classroom instruction.

Researcher's Purpose for Conducting this Study

Businesses have been quick to adapt to the use of a variety of computer technologies for communication, training employees, and as a means to reduce expenses. Two-way interactive video technology is frequently used to set up face-to-face meetings with people in different locations for workplace learning and collaborative decision making. This saves travel time and expense by allowing

participants to talk to each other via the technology in much the same way that they would if they were sitting at the same table. Colleges and universities are trying a similar approach. Typically an instructor is teaching one group of students at one location, and a second group of students at a different location participates in the class by means of the two-way interactive video technology.

This researcher's specific purposes for undertaking this study were (1) to examine four combination two-way interactive television (ITV) and live instructor classes to determine if the arrangement is effective in meeting learning objectives for the students and instructor, (2) to determine what teaching methods instructors and students perceive as effective in the distributed classroom, (3) to identify factors that detract from the two-way interactive video learning experience, (4) to determine if there is a relationship between selected student characteristics including experience level with ITV and satisfaction with ITV, (5) to determine if instructors and students think there is a difference in instructional quality as it relates to learning objectives between class sessions where the instructor is present and class sessions delivered via ITV.

For the purpose of this study, ITV will be defined as two or more distinctly separate classrooms linked by real-time voice/video cameras and microphones. Visual aids such as overhead transparencies and computer slide shows are usually displayed on television monitors in all classrooms.

Context of the Study

The study examined student and instructor perception of the effectiveness of a mixed two-way interactive video and traditional instruction environment. Student performance in the classroom when the instructor is available via two-way interactive video compared to when the students are at a location where the instructor is physically present was investigated. The research environment was four classes taught with a combination of traditional and ITV instruction. The classes studied were NUS416FL (Family Nursing Lecture), NUS416FC (Family Nursing Clinical), NUS416CL (Community Nursing Lecture) and NUS416CC (Community Nursing Clinical).

NUS416FL was taught one night per week for 3 hours from January 11, 2000 to February 29, 2000. It was offered simultaneously in two classrooms. Classroom "A" was on the main campus of Ferris State University, in Big Rapids, Michigan and classroom "B" was on the main campus of Grand Rapids Community College, in Grand Rapids, Michigan. The instructor rotated between classroom "A" and classroom "B" each week. The second class (NUS416FC) was taught for 2 hours on the same night immediately after NUS416FL with a similar mixed ITV/traditional instruction method. One instructor taught the clinical and lecture Family Nursing classes.

The third class, NUS416CL, was taught one night per week for 3 hours from March 14, 2000 to May 2, 2000. It was offered simultaneously in two classrooms. Classroom "A" was on the main campus of Ferris State University, in Big Rapids, Michigan and classroom "B" was on the main campus of Grand Rapids Community

College, in Grand Rapids, Michigan. The instructor rotated between classroom "A" and classroom "B" each week. The fourth class (NUS416CC) was taught for 2 hours on the same night immediately after NUS416CL with a similar mixed ITV/traditional instruction method. One instructor taught the clinical and lecture Community Nursing classes.

Table 1.1 contains an illustration of the environment for the classes in this study. Each half of the semester covers distinctly different course material. Ferris State University is a 10,000 student "open door" public university located in central lower Michigan. Ferris offers programs from certificate to doctoral level.

Table 1.1 –Classroom location and instructional method.

	BIG RAPIDS CLASSROOM	GRAND RAPIDS CLASSROOM
January 11, 2000	First Instructor present	Instruction via ITV
January 18, 2000	Instruction via ITV	First Instructor present
January 25, 2000	First Instructor present	Instruction via ITV
February 1, 2000	Instruction via ITV	First Instructor present
February 8, 2000	First Instructor present	Instruction via ITV
February 15, 2000	Instruction via ITV	First Instructor present
February 22, 2000	First Instructor present	Instruction via ITV
February 29, 2000	Instruction via ITV	First Instructor present
March 14, 2000	Second Instructor present	Instruction via ITV
March 21, 2000	Instruction via ITV	Second Instructor present
March 28, 2000	Second Instructor present	Instruction via ITV
April 4, 2000	Instruction via ITV	Second Instructor present
April 11, 2000	Second Instructor present	Instruction via ITV
April 18, 2000	Instruction via ITV	Second Instructor present
April 25, 2000	Second Instructor present	Instruction via ITV
May 2, 2000	Instruction via ITV	Second Instructor present

Statement of the Problem

Although two-way interactive video technology is being used by growing numbers of colleges and universities, it may not be the most effective learning method. Interactive television comes closer to bringing people in other locations face-to-face than less sophisticated distance education technologies (Russell, 1992); however, issues remain regarding its effectiveness (Cyrs & Smith, 1990; Lochte, 1993). Cobb (1997) indicates that different media may not necessarily produce different outcomes, but he argues that different media may influence cognitive efficiency. This brings up several questions that need to be researched. For example, is learning as effective in a distance learning environment as it is in traditional classroom instruction? What role do student background characteristics play in determining how well he/she responds to interactive video? Does a student's technical ability affect his/her ability to learn? Does learning style influence how a student responds to interactive video? Do students in the classroom where the instructor is located perform better than the students in the classroom that interacts with the instructor through two-way interactive video? What role does language play in student learning? Are there handicaps, such as deafness, that prohibit effective learning in a two-way interactive video environment? Is it cost effective to utilize two-way interactive video at the post-secondary level? What skills do instructors need to effectively utilize two-way interactive video? What skills do students need to thrive in a two-way interactive video environment?

An important issue to address is how to measure student learning. One of the most common methods of determining student learning effectiveness is by giving tests over the material covered in class. Grades do reflect learning and may be the most readily available measure (Pascarella & Terenzini, 1991). However, grades can be influenced by a number of outside influences, including predominant mode of course instruction (Cunningham & Lawson, 1979); course grading policies (Sgan, 1970; Von Wittich, 1972); and professorial style and personality (Theodory & Day, 1985). Learner satisfaction is also an important factor in effectiveness of distance learning, and satisfaction with the media and processes that make up the learning environment are major components in a student's willingness to continue in a program or participate in further distance learning activities (Chute, Thompson, & Hancock, 1999).

Definition of Terms

The following terms have been defined for the purpose of this study.

1. ITV: Two-way interactive video. This is a technology where video signal is converted at the transmission point, sent to the receiving point, decoded, and then displayed on a television monitor. Compression is utilized to provide efficiency in transmission because compression minimizes the size of the information packet that is transmitted. In this study, sufficient bandwidth (T-1) is available to provide the perception of real-time interaction. The camera/video display will be on the person speaking whenever possible. When visual aids are used, the distant class display will only be on the visual, although the full synchronous audio will

remain available at all times. In this study, ITV and two-way interactive video will be used synonymously.

2. Detracting Factors: things that inhibit the learning process or otherwise negatively impact the learning experience.
3. Distributed Classroom: an environment where one "class" is composed of multiple classrooms. Instruction takes place in all classrooms simultaneously.
4. Teaching Methods students perceive as effective: instructional techniques, formats, and methods. Examples would be lecture, group discussion, and small groups.
5. Knowledge Level Attainment: education gained directly from the classroom experience.
6. Two-way interactive video: two or more distinctly separate classrooms linked by real-time voice/video cameras and microphones.
7. Traditional classroom: an environment where the students and instructor are in the same classroom and all commonly utilized teaching methods may utilized.
8. Distance classroom: an environment where the students and instructor are physically separate. In this study, the students and instructor are connected via two-way interactive video.
9. Distance education technician: a person who controls the cameras, audio, video, and other technical components of the ITV environment. In this study, distance education technicians are utilized.
10. Effectiveness: producing the desired learning result.
11. Quality: a high degree of excellence.

Research Questions

There is a lack of empirical evidence to determine if a combination ITV and live instructor class is effective in a variety of areas. Two areas where questions remain include determining if a combination ITV/live instructor is effective in meeting learning objectives for the students and instructor, as well as what teaching methods instructors and students perceive as effective in the distributed classroom. Further investigation is also needed to determine what factors detract from the two-way interactive video learning experience and if there is a relationship between student experience level with ITV and satisfaction with ITV. The final area of investigation in this study will be to investigate whether instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered via ITV.

Following are the specific questions that were addressed in this study:

1. Is the combination two-way interactive video/live instructor instruction technique effective in meeting the learning objectives of the students and instructors?
2. Is there a relationship between student experience level with ITV and satisfaction with ITV?
3. Do instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered via ITV?

4. What teaching methods (such as lecture, group discussion, team exercises) do instructors and students perceive as effective in the ITV classroom?
5. What factors detract from the two-way interactive video learning experience?

The research question 1 was quantitatively investigated with the use of a Likert-type assessment instrument and student tests and projects. Research question 1 was also qualitatively investigated with the use of open-ended questions. Research questions 2 and 3 were quantitatively investigated with the use of a Likert-type assessment instrument and qualitatively investigated with the use of open-ended questions. Research questions 4 and 5 were investigated with qualitative analysis.

Significance of the Study

The purpose of this study was to provide information to assist in determining if students learn as well in a classroom where an instructor is present as they do in a classroom where the instructor physically resides is a different location and is available via two-way interactive video. This study attempted to determine if there is a significant relationship between instructional method and knowledge level attainment as it relates to students who have received instruction through either two-way interactive video technology (ITV) or a traditional classroom setting. Knowledge level attainment will be determined by test scores and student perception. A pre-test was given at the beginning of each class to establish a base line knowledge level for

each student. Gain in knowledge level was measured by giving a posttest at the conclusion of each class.

Delimitations

The delimitations of the study were:

1. This study was performed on nursing students and may not be generalized to all students.
2. This study was conducted on students that have varying levels of experience with two-way interactive video. Students who have taken multiple courses via two-way interactive video may produce different results than students that have never been exposed to two-way interactive video.
3. This study was conducted on a mixed ITV/traditional instruction environment and may not be generalized to different environments.

Limitations

The limitations of the study are:

1. Some of the information was obtained by questionnaire. The researcher has to assume that questionnaires were read and answered consistently and honestly.
2. Some of the information was obtained by examination. The researcher has to assume that exams were read and answered honestly and to the best of each student's abilities.

3. It is a possibility that students may have learned information used to answer exams and assignments from sources other than the class sessions. However, examination and assignment results still have information pertinent to the study.
4. This research was conducted at multiple locations simultaneously. This researcher had to assume that the students exhibit integrity at all times.
5. The study population was 30 students split between two classrooms, which is typical of a distance education class. Classes taught via ITV are often targeted where there is student demand, but not enough students to support a full-time faculty member.

Outline of the Study

Chapter 1 contains the Introduction, Researcher's Purpose for Conducting this Study, Statement of the Problem, Research Questions, Definition of Terms, Significance of the Study, Delimitations, and Limitations.

Chapter 2 contains the Literature Review. This literature review was conducted in several steps from September 1994 – May 2000. ERIC, Readers Guide, and various other database searches were conducted at Calvin College, Ferris State University and Michigan State University on multiple occasions. Multiple searches of the UMI Dissertation Abstracts from 1989 to present were also conducted. Additionally, computer time was purchased to perform a search of over 50 on-line databases using Dialog and an extensive amount of research time was spent on the Internet and World Wide Web. Headings that were searched included: Two-way Interactive Video, ITV, Instructional Technology, Distance Learning, Educational Technology, Computer Based Learning, Video Classroom, Interactive Video, Interactive Television, Distance Learning Technology, Instructor Attitudes and Distance Education.

Chapter 3 contains the methodology and procedures used to conduct this study. Chapter 4 presents the data that was collected by the researcher during this study. Chapter 5 contains the summary, presentation of findings, conclusions, implications, and recommendations for further study.

CHAPTER 2

LITERATURE REVIEW

This study investigated student and instructor perception of the effectiveness of a mixed two-way interactive video and traditional instruction environment. Student performance in the classroom when the instructor is available via two-way interactive video compared to when the students are at a location where the instructor is physically present was also investigated. A review of the literature was undertaken to discover related studies dealing with two-way interactive video and similar technologies in an academic setting.

This literature review was conducted in several steps from September 1994 – May 2000. ERIC, Readers Guide, and various other database searches were conducted at Calvin College, Ferris State University and Michigan State University on multiple occasions. Multiple searches of the UMI Dissertation Abstracts from 1989 to present were also conducted. Additionally, computer time was purchased to perform a search of over 50 on-line databases using Dialog and an extensive amount of research time was spent on the Internet and World Wide Web. Surprisingly little information was found in the area of effectiveness studies of two-way interactive video in a college classroom setting. Most studies dealt with student satisfaction with the distance learning environment (Murphy, 1997; Tiene, 1997; McHenry, 1997; Gallaher & McCormick, 1999)

Rationale for Distance Learning

Education is commonly being delivered in ways that weren't thought feasible just a few years ago. Distance learning courses are offering students new flexibility in course and even campus selection, causing many institutions to begin redefining themselves (Noon, 1996). Increased competition for students while schools are facing tight budgets has pushed schools to seek students in areas much different than the traditional campus setting. Distance learning has become a big market for student-hungry colleges. To provide distance learning in a fiscally feasible manner, technology is increasingly being utilized.

Definition of Distance Education

There are four elements of distance education: 1) the separation of teacher and student during most of the instructional process, 2) the influence of an educational organization and the provision for student evaluation, 3) the use of educational media to carry the course content, and 4) provision for two-way communication (Wilson, 1991).

Advancements in computer and telecommunications technology are enabling institutions to reach more students at various locations. Television has been used for decades, while satellite downlinks, Internet, video disks, computer-assisted instruction, video tape, and ITV are more recent developments. This study will focus primarily on the use of ITV. In many cases, a teacher and class will be at one location, while other classes will be connected via communication lines. There is typically a video camera and at least two television monitors in both locations. One

monitor shows what the camera in that location is picking up - usually the person talking, the class, or a visual aid. The other monitor shows what the camera in the remote location is picking up. The cameras are frequently controlled locally, so someone in each location may have to control the camera. Technicians were used to control the distant camera in this study. At some schools, students in the distant class control the distant camera.

A number of researchers have concluded that there is frequently a different type of student at the distant location. Some of the studies have indicated a more mature, articulate student is in a distant location compared to a traditional environment (Goodwin, Miklich, & Overall, 1993). These types of conclusions indicate that a careful research design is necessary, and that result comparison between distant and traditional classes may not be appropriate in some cases.

Powell, Conway, and Ross (1990) described student characteristics that were correlated with success in computer-mediated learning. Among these characteristics were female, married, highly literate students, students who rated themselves as organized, persistent, likely to succeed in their studies, and their formal and informal learning as high.

Use of ITV

The perceptions of the teachers and students are of utmost importance in determining the overall effectiveness of the learning experience using ITV (Tiene, 1997). Faculty have been somewhat slow to embrace the technology. Faculty participation in distance education will continue to be limited because of a lack of

incentives (Dillon, 1989). There is a lot of extra work in making a presentation to a class over interactive video. Just getting familiar with the logistics of such an environment is a considerable challenge. A lot more can go wrong than just an overhead burning out. There is frequently a technician familiar with the equipment stationed at the source location. This lets the instructor focus on delivering the lesson rather than worrying about the transmission aspects.

Preparation is key to effective use of ITV. Participants indicated that instructors who were well prepared and organized through the use of syllabi, study guides, and supplemental technologies contributed to effective television instruction (Murphy, 1997). Planning so that class materials are available to everyone when needed can be an added complexity of distance education. Use of e-mail, FAX machines, and class web sites on the world wide web help address these issues. As Gunawardena (1992) suggests, distance teaching is more effective with the teacher as facilitator. It is clear that interactive television demands more from a teacher than is normally required in the self-contained classroom (Tiene, 1997).

Presentation skill has been identified as important for effective learning (Egan, 1991). In addition to clear delivery, interaction is a key component of presentation. Interactive training has been shown to increase retention rates and decrease costs (Greengard, 1993). Unless interaction is promoted in an aggressive fashion, students will tend to be passive learners and much of the power of distance learning will be lost (Newcomb, 1994).

It should be pointed out that any technological advancement that can improve the learning environment in a distance learning class has the potential to be used in a

traditional class as well. Technical advancements can improve any learning environment, not just distance learning.

Research indicates that certain subject areas lend themselves well to instruction via two-way interactive video, while other subject areas are inherently incompatible with this type of instruction (Tiene, 1997). Student needs also influence what is delivered via two-way interactive video. Courses in technology are frequently taught in this manner in part because of the comfort level of the students with the delivery medium. Conversely, the expense associated with providing a two-way interactive video and the scarcity of resources are barriers that frequently prohibit providing this type of course offering for classes where the number of students would be small.

With regard to the face-to-face with video comparison, some data suggest that the presence of the instructor, regardless of site, increases the amount of interaction (Farr, 1991). This means that just having an instructor present in one of the ITV sites will increase interaction at all of the sites. Although concerned about loss of active involvement with students, 89% of the instructors using interactive video were satisfied with telecommunications teaching (Kendal, 1992). This suggests that once faculty members become comfortable with the use of ITV they believe it is effective.

In an ITV environment, the instructor has to develop a variety of skills in addition to the skills used in a traditional environment. In an Internet format, students usually need special equipment or software. Depending on the technical ability of the students, they may need training before they are equipped to take a class. Most of these issues do not exist in an ITV environment.

When conducting a class that has more than one location, the instructor has the added responsibility to make himself/herself available to everyone. In a distance education setting such as the ITV, instructors have to be flexible enough to receive FAX and telephone interruptions from the distant class during the class session in order to receive certain types of feedback. Electronic mail and flexible office hours and appointments are necessary to ensure a smooth class. An instructor must make himself/herself available to the learners at the distant site (Newcomb, 1994).

Reception of two-way interactive video

As previously mentioned, student reception to the use of ITV has been positive. An important consideration is that there are two groups of students in the ITV setting. The "studio" class and the "distance" class. Instructors have expressed concern for the distance class, but the studio class also has adjustments to make. Live telecast of a course involves technicians, cameras, lights, microphones, telephones, FAX machines, and TelePrompTers. These are major distractions (Whittington, 1994). Both groups of students will have to learn to adapt to the ITV setting, and this may impact their learning. Some studies indicate that linking multiple locations into "one" classroom may affect the teacher and the student achievement levels (Beaudoin, 1990; Willis, 1994). This is further supported by Miller et al. (1993) (cited in Pugh & Siantz, 1995) that students did not feel their mastery of course content was adequate when the professor was in the remote location.

An additional consideration of distance learning and the use of interactive video is that the various locations tend to draw different types of students. On-campus classes

tend to attract more traditional students with less life experience, while the distant classrooms tend to be made up of older adult learners with a wealth of experience to share (Stenberg, 1994). This would suggest that the instructor has to be able to capture the interest of more than one type of audience with multiple levels of understanding.

Comparing the effectiveness of interactive video to other possible delivery methods will assist in determining the best method for a given situation. In a 1990 study, Stafford found that retention was significantly higher for instruction presented with interactive video as opposed to computer-assisted instruction. When students in an interactive video setting were asked to respond to a questionnaire administered to assess the effectiveness and appropriateness of the medium, the response was overwhelmingly favorable (Tiene, 1997; Kolomeychu, 1992). Pascarella, Whitt, Nora, Edison, Hagedorn, and Terenzinin (1996) found a positive relationship between students' satisfaction with instruction and their success in a college course.

Research Studies

Research in distance education is generally performed with some combination of descriptive studies, case studies, correlations, and experimental design. Relevant studies were reviewed in the areas of a) faculty attitudes toward and perceptions of interactive television teaching, b) comparison between students in a traditional microcomputer course and those in a remote location, c) distance learners' satisfaction with instruction, d) student views on the distance education instructional environment, and e) comparing distance learning and classroom learning.

Faculty Attitudes toward and Perceptions
of interactive television teaching

In a 1998 study, Bodenbender investigated nursing faculty attitudes toward and perceptions of interactive television teaching. Bodenbender found in her survey research that instructor participation in interactive television teaching is important to help non-traditional students able continue their college education. Bodenbender also found that institutions need to provide more encouragement than is currently given, and that interactive television teaching should receive professional recognition and be considered in tenure and promotion decisions. With regard to instructor training, Bodenbender's research indicated that orientation to the use of the equipment was the only developmental opportunity that is adequately available.

A 1995 Faculty Advisory Committee report presented to the Oklahoma State Regents for Higher Education indicated that 30% of "experienced and highly trained" instructors did not want to teach another distance class. A similar level of dissatisfaction was found in Kendall and Oaks 1992 study.

Comparision between Students in a traditional
Microcomputer Course and those in a remote location

In a 1998 study, Bartel conducted a study to determine if differences existed between students who completed similar microcomputer applications courses within different learning environments. The learning environments consisted of an on campus class with a live instructor and a distance education class with a remote instructor. Data were collected by means of a multiple-choice pretest, a multiple-

choice posttest, and a survey instrument. The scores of the multiple-choice tests were used to measure student performance in the two learning environments. The survey instrument was used to measure demographic and perception data.

Bartel concluded that there was no statistically significant difference in the performance of the on campus and distance learning students. Bartel also concluded that there was no statistically significant difference in the perceptions of the two groups of students. There was also no statistically significant difference between the performance and perceptions of the on-campus students. However, there was a statistically significant difference between the performance and perceptions of the distance-education students. The on-campus students showed a statistically significant relationship between performance and the demographic variables of rank, grade point average, and expected course grade. The distance education students displayed a statistically significant relationship between performance and the demographic variables of age, grade point average, and expected course grade.

Distance Learners Satisfaction with Instruction

Sherry, Fulford, and Zhang (1998) conducted two studies to assess distance learners' satisfaction with instruction. Two approaches were investigated: 1) a survey on the key aspects of interaction; and 2) a time-intensive facilitated interview with the objective of measuring the instructional climate. Both approaches evaluated students' perceptions of instructional effectiveness by measuring their satisfaction with the learning environment.

The composition of students in the first study was ethnically diverse, and the majority were male with no prior distance learning experience. A Likert scale survey instrument was used to assess students' perceptions of interaction, level of interaction between the instructor and the class, and the level of interaction between the students. The design of the survey was consistent with Moore's (1989) general framework of interaction in distance education, which indicates that overall interaction is a superordinate category composed of learner-to-content interaction, learner-to-learner interaction, and instructor-to-learner interaction. The results of this study indicated that the survey instrument has potential for effectively and reliably measuring student perceptions of the interactive climate in an interactive television environment.

Student Views on the Distance Education Instructional Environment

In the second study, Sherry, Fulford, and Zhang utilized the Small Group Instructional Diagnosis (SGID) instrument to measure students' views on the instructional environment and several multidimensional factors that can be used in formative course evaluation. This study indicated that small group interaction was helpful in making the learning experience more effective. This would support the notion that interaction, both learner-to-instructor and learner-to-content, is a key factor in determining learning effectiveness.

Comparing Distance Learning and Classroom Learning

Smith and Dillon (1999) conducted a study comparing distance learning and classroom learning. The purpose of this study was to utilize comparative data to

provide insight into designing more effective distance education courses. Smith and Dillon argue that while the majority of distance learning studies conclude that there is "no significant difference," it may be premature to conclude that the "no significant difference" studies mean that delivery systems do not affect learning.

Smith and Dillon point out that studies with generalizable findings control for confounding variables by ensuring that only treatment variables are varied. They indicate that for a comparison study to be a true measure, one instructional technique can not be compromised as a method of equalizing it with the comparison instructional technique. The example is given in which traditional classroom instruction is compared to one-way video. In the traditional classroom, student questions and similar features were not allowed because they wouldn't be possible in a one-way video environment. It isn't surprising that there is "no significant difference" in the amount of learning that occurred, but the traditional classroom environment was not utilized to its full extent.

In a 1993 study, Brunning, Landis, Hoffman, and Grosskopf found that students in a satellite-based video course in Japanese language performed higher in listening and written tests than students in traditional classes. The Brunning et al. (1993) study did not provide an operational definition of traditional class treatment, so Smith and Dillon argue that they didn't address the media/method confound. Phipps and Merisotis (1999) make a similar observation about adequately controlling for confounding variables in most of the distance learning studies that they reviewed that were cited in Thomas Russell's book entitled *The No Significant Difference Phenomenon.*

Approaches to studying nursing students

In a 1991 study, Shamian used a case study approach to determine the effect of teaching decision analysis on student nurses' clinical intervention decision making. Sixty-eight third and fourth year nursing students were invited to participate in the study that entailed the use of clinical case studies. The experimental intervention included interactive and videotaped instruction on decision analysis. The control intervention included interactive and videotaped instruction on ethics.

The experiment measured the number of responses to situations that were in accordance with the experts. The results of the experimental and control group responses were compared utilizing a t-test. The study concluded that teaching decision analysis enabled nursing students to prioritize interventions in accordance with clinical experts. Additionally, nursing students used these skills once they learned them. The study also found that nursing students benefited from the combination videotape/interaction instruction.

A 1998 case study by Olson studied the historical challenge of how to balance theory and practice in nursing education. The qualitative and quantitative study investigated nursing data from St. Luke's Hospital Training School for Nurses in St. Paul, Minnesota. One of the conclusions of the study was that there is a legacy of mistrust of a strictly academic nursing education. The basic issue raised was defining the balance between academic and clinical nursing experiences. A more technical or "skilled trades" approach might be most appropriate for less than baccalaureate

education, while an emphasis on academics as a means to process knowledge might be most appropriate at the baccalaureate level or beyond.

A 1998 study by Stillman, Alison, Croker, and Tonkin also used a case study approach to studying nurses. The purpose of this study was to examine situated learning as a model for designing interactive multimedia instruction on medication administration for nurses. The study took place at the School of Nursing at James Cook University in Australia. Nursing students would navigate a multimedia application to simulate administering medications. It was argued that this was a proper approach to training because the nurses could readily see how it would apply to their future careers. The study concluded that situated learning was an effective framework for the design and implementation of facilitated learning environments.

Nursing education

Nursing education has been under intense pressure for years, but the pressure has increased even more in recent years. Market-driven economic policy, dramatic technology developments, changing demographics, and the knowledge explosion are rapidly changing health care and educational institutions as well as creating a climate of continuous rapid change. Virtual universities change the way all institutions deliver education (Lindeman, 2000).

The health care industry has seen the credential requirements for nurses become more stringent. The use of Licensed Practical Nurses has been reduced or eliminated at many hospitals, and the current trend is toward requiring Registered Nurses to have a bachelor degree. There are still a large number of associate degree in nursing

(ADN) and diploma nursing programs. In fact, ADN and diploma nurses are the largest portion of the nursing population. They form an enormous pool of candidates to meet the future demand for nurses with the needed bachelor of science in nursing (BSN) degree (Dean, 1997).

Continuing education has become a requirement for continued licensure in many health care fields including nursing. Credit is given for attendance at seminars and for courses taken at colleges. This has created an opportunity for educational institutions because their graduates need education beyond their initial license and/or degree to stay employed. In order to meet this need, technology is increasingly being leveraged.

One of the technologies that is being heavily utilized in nursing education is ITV. Immersion in technology like ITV instruction has resulted in the classroom becoming technology-driven rather than curriculum driven. After the initial honeymoon period both faculty and students become disenchanted with the limits of the technology. Despite these limitations, students in a study conducted by Chandler (2000) unequivocally voted to keep the technology because it made it possible to obtain a bachelor degree. Many of the students felt that they wouldn't have the opportunity to pursue nursing education if the technology wasn't available.

The use of technology to deliver education does not come without its problems. Faculty are faced with a number of challenges. Developing proficiency in using technology in the classroom is often identified as an area of concern of nursing faculty (Carty & Rosenfeld, 1998). There are a number of reasons for this including the fact that many nursing faculty were trained as nurses and were never trained as educators. The emphasis in nursing graduate education for a generation has been away from

education for teaching and administration toward clinical specialization roles (Boyden, 2000).

Because of the intense demand for nurses and nursing education, nursing programs are offering opportunities in creative ways. In a 1991 study, Allen found that forty-eight percent of nursing programs in a four state area gave academic credit ranging from 21 to 70 semester hours to registered nurse students for experiential learning. This recognizes the value of work experience and the intense learning experience that it can provide.

As previously described, there are various ways to obtain a BSN degree. However, there isn't a great deal of uniformity in how this is done. Baccalaureate curricula have never been analyzed to fully understand their development or to contrast the variations that exist between the different types of baccalaureate programs (Strobeck, 1996). Some of this variation exists simply because nursing programs are struggling to keep up with demand.

The dramatic changes in the health care industry are also placing additional pressures on nursing education. Baccalaureate nursing programs across the country are facing the need to change their undergraduate curricula in response to massive developments that are occurring in health care (Acord, 1999). This directly impacts the nursing faculty and their continued development. There is significant concern about the impending shortage of qualified nursing faculty. Noncompetitive academic salaries, desire for clinical practice, and rising expectations in higher education were factors deterring nurses with graduate degrees from pursuing faculty roles (Brendtro, 2000).

Further indication of the pressures in the nursing profession includes an alarming survey (Eagles, 1999) of self-selected nurses in California that indicated that one-third planned to leave the field within five years. The most frequent reasons for leaving the profession included "burnout" and that nursing was "too physically demanding." The rapid turnover, educational pressures, and nature of the work point to a profession where educational opportunities will be in great demand for the foreseeable future.

Course Evaluation

In a 1985 study of an evaluation of programmed and lecture instruction in college business math courses, Swartz used pretest and posttest measures of course content, a student attitudinal survey, and final course grade to evaluate the effectiveness of two instructional methodologies. The purpose of the study was to determine if both lecture and programmed teaching methodologies should be continued, and what modifications may optimize student learning. The results of the study indicated the importance of student attitudinal assessment in evaluating learning effectiveness with regard to teaching methodology and subject matter.

A study evaluating student attitudes toward subject matter, the effects of instruction on those attitudes, and the relationship of student attitudes toward achievement (Gogolin, 1988) used quantitative and qualitative measures. Student attitudes were measured using pretest and posttest surveys. Posttest measures also included the final course grade. Survey validity and reliability was established using pilot testing in conditions approximating the conditions of the study group and computing reliability coefficients.

A study evaluating how students and faculty responded to on-line distance education was conducting using surveys to gather their opinions of the delivery medium (White, 2000). Students and faculty were asked what they liked and didn't like about on-line education and course delivery. The most frequently mentioned advantage of on-line education was the flexibility it provided. Technical difficulties were a major source of dissatisfaction and frustration for students and faculty. Faculty also indicated it was difficult to get students to show initiative in class participation. The study concluded by itemizing a number of competencies that instructors must have in addition to normal teaching skills in order to teach effectively on the web.

The primary method for course evaluation of student satisfaction and attitude toward distance education have been with a survey (Lin & Creswell, 1989; Silvernail & Johnson, 1992; Simpson, Pugh, & Parchman, 1993; Jegede & Kirkwood, 1994; Zhang & Fulford, 1994; Boone, Bennett, & Ovando, 1995; Bozik, 1996). Paulsen, Higgins & Peterson (1998) used pretest and posttest measures of course content to measure subject matter knowledge gain among broadcast classroom students, receiving ITV students, and videotape lectures. The pretest and posttest contained the same items. They also administered a student satisfaction survey to measure student perception of instructional method. Paired sample t-test and ANOVA were employed to analyze the data. The findings were that students achieved equally well regardless of instructional method. They also found that students receiving the ITV transmission were satisfied, but they would prefer a setting with the instructor present.

Measuring effectiveness

Clearly, defining what to measure must be done before determining how to measure. Original research in distance education assessment usually examines three measures: student outcomes, student attitudes about learning through distance education, and overall student satisfaction toward distance learning (Phipps & Merisotis, 1999). Interaction is a key component of the learning environment, and successful interaction has a positive influence on student success. Interaction in distance education is frequently categorized as learner-to-content, learner-to-learner, and instructor-to-learner (Moore, 1989; Moore & Kearsley, 1995).

Learner-to-content interaction deals with mental responses to course materials. Exercises, problems and questions are frequently embedded in the material. Learner-to-learner interaction is frequently used for group projects, feedback and clarification in lieu of an instructor, and for socialization. Learner-to-instructor interaction can be used for feedback, reinforcement, and clarification.

Measuring the effectiveness of distance learning compared to traditional classroom study is a difficult task. Angelo and Cross (1993) describe classroom assessment as an approach to help teachers find out what students are learning in the classroom and how well they are learning it. In this study, the objective was to compare the assessment results between the two classrooms to determine learning effectiveness, in addition to interpreting survey data.

Angelo and Cross (1993) describe six assessment techniques that they feel are appropriate for nursing students: course-related self-confidence surveys, directed

paraphrasing, empty outlines, human tableau or class modeling, memory matrix, and one-sentence summary.

Self-confidence surveys are useful in a clinical setting, where performing specific tasks is the core of the nursing practice. Directed paraphrasing is useful when the student will have to explain a topic to someone. In the case of a nurse, he/she may have to explain a procedure or medical condition to a patient or family member. The empty outline assessment is where the instructor gives the student an empty or partially complete outline of the class presentation and the student finishes the outline after class. Human tableau or class modeling involves acting out scenes or processes. A memory matrix is a table where the columns are headings and the rows are concepts. The student fills in the cells of the table to illustrate recall of information. The one-sentence summary is where a student is given a topic and asked to indicate "Who does what to whom, when, where, how, and why?"

Chute, Thompson, and Hancock (1999) indicate that structured and often standardized procedures are generally used to measure how much has been learned, and that the rationale for measuring the amount learned by an individual distance learner is identical to that for assessing the learning of a traditional student. They further indicate that many of the traditional assessment techniques are as appropriate in a distance learning environment as they are in a traditional classroom setting. Assessing distance learning students may require special attention to logistical issues and things like test security.

Summary

After an extensive literature search, several studies could be located that dealt with television, video, and computer-based instruction. However, little research could be found that dealt with the effectiveness of ITV from the student's perspective. One source compared students that were in a traditional classroom setting with students that were in a remote location, and one source compared distance learning with classroom learning. These studies were the closest parallel that could be found to determining the effectiveness of two-way interactive video.

Several studies were uncovered that indicated that faculty and student perceptions were important factors in determining overall effectiveness in a distance learning environment. This indicates that more than just evaluating student test scores is needed to provide an overall assessment of two-way interactive video effectiveness in a learning environment. This study will address this by using test scores and student and instructor surveys to assess the ITV environment.

The research that was uncovered is valuable in providing direction and insight into the ITV environment. There are several similarities between the various technologies previously described in this study. Among them is the challenge for the instructor to keep the class progressing in a timely manner even though his/her control of the situation is limited when juxtaposed to traditional classroom setting. This includes leveraging technology to its fullest potential to achieve an effective learning situation.

Research indicates that students tend to achieve similar grades regardless if they are in a distant or local ITV site. What is not clear is if the material presented in an ITV environment is the same material that is presented in a non-ITV environment.

This study will provide insight into this by evaluating learning effectiveness from a student and instructor standpoint in both distant and local ITV classrooms. This study will also explore student and faculty opinions of the effectiveness of ITV compared to traditional instruction.

CHAPTER 3

METHODOLOGY

The purpose of this study was to examine the relationship of the effectiveness between instruction method and knowledge level gained as it relates to students who have received instruction by either ITV or in a traditional classroom setting. The use of two-way interactive video is becoming increasingly popular as a means of delivering instruction in a variety of settings. It is a popular choice to assist in distance learning because it expands the boundaries of the classroom, is less expensive than employing a full-time instructor, provides more flexibility in scheduling, and cuts down on travel time.

This study examines the learning effectiveness in nursing classes at Ferris State University. Four classes conducted simultaneously in two locations were studied. Enrollment was 30 students, which is typical of a distance education class. There were 13 students in the four class sections at the Grand Rapids location and 17 students in the four class sections at the Big Rapids location. A Grand Rapids class section and the corresponding Big Rapids class section made up each class population. Classes taught via ITV are often targeted where there is student demand, but not enough students to support a full-time faculty member.

One instructor taught the first two classes, and a second instructor taught the second two classes. The first two classes were Family Nursing Lecture (NUS416FL) and Family Nursing Clinical (NUS416FC). The second two classes were Community Nursing Lecture (NUS416CL) and Community Nursing Clinical (NUS416CC).

Two characteristics of this study were that conducting this research may impact the learning in the course being studied and that students experienced both local and distant learning. It has been the experience of some faculty at Ferris State University and by some faculty at Michigan State University that retention rates and student enthusiasm for classes delivered via two-way interactive video are improved if the instructor rotates between the locations of the class rather than remaining in one location for the duration of the semester. To minimize the impact of conducting a study on a class, the decision was made not to alter the format that was normally employed.

In some instances, technology (or limits in technology) drives curriculum. This may alter the emphasis or format of a course, but it doesn't necessarily mean that learning is compromised. Trying to utilize new techniques and discoveries in different ways is what learning is all about.

This study attempts to advance the field of learning effectiveness research by building on what others have done, considering the critiques of the research, and operating from the constraints of the environment that is available.

Population of the Study

To determine the effectiveness of two-way interactive video instruction compared to traditional classroom instruction, an undergraduate class of nursing majors at Ferris State University was studied. The classes studied were NUS416FL - Family Nursing Lecture, NUS416FC – Family Nursing Clinical, NUS416CL -Community Nursing Lecture, and NUS416CC – Community Nursing Clinical. The courses were offered simultaneously in two classrooms. Classroom "A" was on the main campus of Ferris State University, in Big Rapids, Michigan and classroom "B" was on the main campus of Grand Rapids Community College, in Grand Rapids, Michigan.

NUS416FL was taught one night per week for 3 hours from January 11, 2000 to February 29, 2000. Classroom "A" was on the main campus of Ferris State University, in Big Rapids, Michigan and classroom "B" was on the main campus of Grand Rapids Community College, in Grand Rapids, Michigan. The instructor rotated between classroom "A" and classroom "B" each week. The second class (NUS416FC) was taught for 2 hours on the same night immediately after NUS416FL with a similar mixed ITV/traditional instruction method.

The third class, NUS416CL, was taught one night per week for 3 hours from March 14, 2000 to May 2, 2000. Classroom "A" was on the main campus of Ferris State University, in Big Rapids, Michigan and classroom "B" was on the main campus of Grand Rapids Community College, in Grand Rapids, Michigan. The instructor rotated between classroom "A" and classroom "B" each week. The fourth class (NUS416CC) was taught for 2 hours on the same night immediately after NUS416CL with a similar mixed ITV/traditional instruction method.

The courses being studied were taught by tenured faculty members in the Department of Nursing, in the School of Allied Health at Ferris State University, Big Rapids, Michigan. NUS416FL and NUS416FC were taught by one instructor, and NUS416CL and NUS416CC were taught by a second instructor. The courses were part of the normal course offerings for the Department of Nursing for winter semester 2000.

The demographics of the students in the study held three distinct patterns: 1) most of the students were women, 2) a large number of students were returning to Ferris State University to upgrade their credentials from an associate degree to a bachelor's degree and had significant relevant work experience, and 3) several students were continuing their studies toward a bachelor of science in nursing immediately after obtaining their associate degree in nursing. The number of students that enroll in the course and the number of students that successfully complete the course were tracked.

The average age of the 13 Grand Rapids nursing students was 36, with a median age of 35. Student ages ranged from 23 to 49 with a standard deviation of 8.5. The average grade point average (gpa) of these students was 3.53, with a median gpa of 3.5. Student gpa's ranged from 2.9 to 4.0, with a standard deviation of 8.5.

The average number of years of nursing experience for the Grand Rapids students was 11 years (median of 10 years). Experience ranged from 0 to 30 years with a standard deviation of 9.5. Eleven of the students had associate degrees in nursing (ADN), one student had an ADN and an associate in arts and one student had an associate in arts and an associate in science. Three of the students were minorities, two students were Caucasian males, and eight students were Caucasian females.

The average age of the 17 Big Rapids nursing students was 28, with a median age of 22. Student ages ranged from 20 to 48 with a standard deviation of 10.2. The average gpa of these students was 3.4, with a median gpa of 3.5. Student gpa's ranged from 2.7 to 3.9, with a standard deviation of .36.

The average number of years of nursing experience for the Big Rapids nursing students was 4.7 years (median 6 months). Experience ranged from 0 to 25 years with a standard deviation of 8. Sixteen of the students had an ADN and one student had no degree. Two of the students were minorities and fifteen students were Caucasian females.

Instruction

The course content focused on the utilization of health promotion concepts for selected families and communities. Specific aspects involved the role of the nurse in family and community health promotion and the utilization of epidemiological and biostatistical data. Other topic areas include cultural factors that effect individual, family, and community health, and the application of a framework for providing nursing care to families and communities.

The instructors have taught via two-way interactive video on a number of occasions. Both instructors have several years of experience as registered nurses, and both have master's degrees in nursing from Wayne State University.

Course Delivery

The courses were taught one night per week for 8 weeks. The NUS416FL & NUS416FC (Family Nursing Lecture and Family Nursing Clinical) courses were

offered simultaneously in two classrooms from January 11, 2000 to February 29, 2000. The NUS416CL & NUS416CC (Community Nursing Lecture and Community Nursing Clinical) courses were offered simultaneously in two classrooms from March 14, 2000 to May 2, 2000. Classroom "A" was on the main campus of Ferris State University, in Big Rapids, Michigan and classroom "B" was on the main campus of Grand Rapids Community College, in Grand Rapids, Michigan. The instructor rotated between classroom "A" and classroom "B" each week. The lecture classes met from 4pm to 6:50 pm and the clinical classes met from 7pm to 9pm. The clinical and lecture classes had the same students. Table 3.1 contains a timeline of events during the semester.

Table 3.1 –Timeline of study measures.

Event	Time
Family Nursing pretest	January 11, 2000
student survey	January 11, 2000
instructor survey	January 11, 2000
Family clinical journals/class projects	January 11 – February 29, 2000
Family clinical & lecture project/final	February 29, 2000
Student surveys – clinical & lecture	February 29, 2000
Family Nursing Posttest	February 29, 2000
Family instructor survey & interview	February 29, 2000
Community Nursing pretest	March 14, 2000
Community instructor survey	March 14, 2000
Community clinical journals/class projects	March 14 – May 2, 2000
Community clinical & lecture project/final	May 2, 2000
Student surveys – clinical & lecture	May 2, 2000
Community Nursing posttest	May 2, 2000
Community instructor survey & interview	May 2, 2000

Research Instruments

For the purposes of the study, the following research questions were posed:

To address the specific purpose:

1. To determine if a combination ITV and live instruction is effective in meeting learning objectives for the students and instructor.

The following student survey questions were generated:

1.1 What grade do you expect in this class?

1.2 Do you anticipate the use of two-way interactive video will influence the effectiveness of this class? Why?

1.3 Do you think the use of two-way interactive video will be a positive or negative experience? Why?

1.4 Do you think there is a difference in effectiveness of meeting course objectives between a traditional class with the instructor always present and a class delivered exclusively via two-way interactive video? Why?

1.5 Now that you have been exposed to two-way interactive video, how do you view its effectiveness in the classroom?

1.6 Was the use of two-way interactive video a positive or negative experience? Why?

1.7 How comfortable were you in obtaining help from the instructor?

1.8 If there was a time when you needed help, whom did you as and how (email, verbal dialog, etc.)?

1.9 If the instructor was not in your location, did you ask the instructor for help during class via two-way interactive video or did you ask a classmate at your location?

1.10 If the instructor was in your location, did you ask the instructor for help or did you ask a classmate at your location?

1.11 Do you think there is a difference in effectiveness of meeting course objectives between a traditional class with the instructor present and a class delivered via two-way interactive video? Why?

1.12 Do you think there is a difference in ability to learn the material when comparing a combination two-way interactive video/traditional instructor led class with a traditional class where the instructor is always present? Why?

1.13 Did the use of two-way interactive video influence the effectiveness of this class? Why?

1.14 Was this class effective? Why?

The following instructor interview questions were generated:

1.1 What are your learning objectives for your part of the course?

1.2 Were the learning objectives met for your part of the course?

1.3 For your part of the course, what measures of student performance were used and what levels of student performance are acceptable in order to consider the course effective?

1.4 Do you expect student learning will be/was the same, less, or better in the class sessions delivered to students by two-way interactive video?

1.5 Are there benefits to using a mixed two-way interactive video/live course delivery system?

1.6 Do you think the use of two-way interactive video was/will be a positive or negative experience? Why?

1.7 How do you view the effectiveness of two-way interactive video in the classroom?

1.8 Do you think there is a difference in meeting class objectives between a traditional class with instructor present and a class delivered via two-way interactive video? Why?

1.9 How comfortable will you be in providing help to the distant class? Do you anticipate any problems?

1.10 Was this class effective? Why?

The following technique was employed:

A pretest of the course material was given to all students at the beginning of the course and a posttest was given to all students at the conclusion of each course. The pretest and posttest contained the same items. Exam scores and instruction technique for NUS416FL and NUS416CL, and instruction technique and student grades on assignments and projects from NUS416FC and NUS416CL were explored.

To address the specific purpose:

2. To determine if there is a relationship between student experience level ITV and satisfaction with ITV.

The following student survey questions were generated:

The following student survey questions were generated:

2.1 Have you been involved in a class with ITV before this?

2.2 If yes to question 2.1, how many?

2.3 If you could choose between two classes taught at the same location, would you prefer to take the two-way

interactive video class, the class where the instructor is always present, a combination two-way interactive video class/instructor present part of the time, or no preference?

2.4 If you could take a class near your home exclusively via two-way interactive video or you could take a class located at least 1 hour away where the instructor is always present, which class would you take?

2.5 Was this class successful and why?

2.6 Would you take a class that is a combination two-way interactive video/instructor present part of the time again?

2.7 Would you take a course exclusively via two-way interactive video?

The following technique was employed:

A pretest of the course material was given to all students at the beginning of the course and a posttest was given to all students at the conclusion of each course. The pretest and posttest contained the same items. Exam scores and instruction technique for NUS416FL and NUS416CL, and instruction technique and student grades on assignments and projects from NUS416FC and NUS416CL were explored.

To address the specific purpose:

3. To determine if instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered via ITV.

The following student survey questions were generated:

3.1 Do you anticipate the use of two-way interactive video will influence the effectiveness of this class?

3.2 Explanation of question 3.1.

3.3 Did the use of ITV to influence the effectiveness of this class?

3.4 Explanation of question 3.3.

3.5 Do you think there will be a difference in instructional quality when comparing a combination two-way interactive video/traditional instructor led class with a traditional class where the instructor is always present? Why?

3.6 Do you think there was a difference in instructional quality between two-way interactive video and traditional instructor led instruction? Why?

3.7 Do you perceive a difference in the ability to learn the material if the instruction is by two-way interactive video compared to when the instructor is in the classroom? Why?

3.8 Do you think having a class connected via two-way interactive video to another class where the instructor is present has a positive effect, negative effect, or combination of both on the class where the instructor is present? Why?

The following instructor interview questions were generated:

3.1 What is your teaching preference between two-way interactive video, instructor always present, combination two-way interactive video/instructor present, and no preference? Why?

3.2 What factors, if any, make two-way interactive video less effective than traditional classroom instruction?

3.3 Do you think there will be a difference in instructional quality between two-way interactive video and traditional instructor led instruction?

3.4 Do you think there was a difference in instructional quality between two-way interactive video and traditional instructor led instruction?

3.5 Do you perceive a difference in the student's ability to learn the material if the instruction is by two-way interactive video compared to when the instructor is in the classroom? Why?

3.6 Was your portion of the class effective? Why?

3.7 What would improve future mixed two-way interactive video/instructor present classes?

3.8 Do you think mixed two-way interactive video/instructor present classes are preferable to straight two-way interactive video classes? Why?

3.9 Do you think having a class connected via two-way interactive video to another class where the instructor is present has a positive effect, negative effect, or combination of both on the class where the instructor is present? Why?

To address the specific purpose:

4. To determine what teaching methods (such as lecture, group discussion, team exercises) instructors and students perceive as effective in the ITV classroom.

The following student survey questions were generated:

4.1 Do you think having the instructor in the classroom half of the class sessions makes the class better than having the instructor teach the entire semester at one location? Why?

4.2 What would you recommend to make a two-way interactive video class better?

4.3 What instructional techniques (use of visual aids, video tape, class activities, etc.) did you think were effective in a two-way interactive video environment?

The following instructor interview questions were generated:

4.1 Do you think having the instructor in the classroom half of the class sessions makes the class better than having the instructor teach the entire semester at one location

4.2 What would you recommend to make a two-way interactive video class better?

4.3 Were did you present course material in addition to the classroom (email, course web page, telephone conference, etc.)?

4.4 Do you do anything different because you are also teaching to a distance class via two-way interactive video?

4.5 Will/did you employ any special techniques to promote interaction in the distant class? If so, what will they be?

4.6 What do you find effective in a mixed traditional instruction/two-way interactive video classroom?

To address the specific purpose:

5. To determine what factors detract from the two-way interactive video learning experience.

The following student survey questions were generated:

5.1 What factors do you perceive, if any, that make two-way interactive video less effective than the traditional classroom with the instructor present?

5.2 What instructional techniques (use of visual aids, video tape, class activities, etc.) do you feel did not work well in a two-way interactive video environment? Why?

The following instructor interview questions were generated:

5.1 What problems or barriers do you think students face in learning the material when it is delivered in a mixed two-way interactive video/traditional instruction setting?

5.2 What are the difficulties for you as an instructor in using this mode of delivery?

5.3 What factors, if any, make two-way interactive video less effective than traditional classroom instruction?

Consent Procedures

A consent form was distributed to all students and the instructors in the class being studied. Forms were signed before the class began. Appendix B contains a copy of the consent forms. All students signed consent forms, so nobody had to be excluded

from the study. Appendix B contains a copy of the consent form. The data analysis met Michigan State University Human Subjects Review criteria and was approved by the review panel. The approval is in Appendix L.

Data Analysis

There is a quantitative aspect of the study focusing on knowledge level gain using a pretest, a mid-term, and a final exam. The decision was made to use this format because this is what is typically done in the class when it isn't being studied. The pretest contained the same items as the posttest. The purpose of the pretest was to determine if there were students with significantly greater prior knowledge of course content than other students (outliers).

Information could have been obtained by pre-testing and post-testing after each class meeting, but it was felt that this type of arrangement would not be appropriate since it isn't the normal mode of conducting the class. It would also subject the students to an environment that they aren't used to, which would have the potential to introduce stress, reactive effects, and other factors that may impact the results.

For analyzing the posttests, class discriminators (Appendix J) and the results of the pretest were examined by a t-test to determine if differences in the students by location existed that may impact analysis of the mid-term or final exam. If differences were discovered, they were to be handled as covariates, utilizing ANCOVA, and reporting would include differences in the means and a description of the differences. Since no covariates were introduced, a t-test analysis was sufficient.

Data for the tests for the lecture classes was stored in a record format described in Appendix K. There are 5 data fields: student code, student location, class identifier, pretest score, posttest score. It is understood that there may be potential for confounding variables in this analysis, but it is felt that there is a possibility of interesting trends that may be overlooked if this analysis were not performed. A t-test analysis was conducted on the pretest and posttest.

Data for the clinical classes included student scores for journals, projects and topic reviews and critiques. The data were analyzed in a similar fashion to the data previously described in the lecture class.

A further quantitative aspect was investigated by using an additional course survey at the conclusion of the course. The survey was the Instructional Assessment System Form I (IASI) developed by the Office of Educational Assessment at the University of Washington. Appendix A contains a copy of the IASI.

The IASI is a Likert-type instrument specifically designed for distance learning course evaluation. The design of the survey is consistent with Moore's (1989) general framework of interaction in distance education, which indicates that overall interaction is a superordinate category composed of learner-to-content interaction, learner-to-learner interaction, and instructor-to-learner interaction. A self-report has been established as the most direct method to determine beliefs (Henerson, Morris, and Fitz-Gibbon, 1987).

A pilot of the IASI, surveys, and interview instruments used in this study was conducted in December, 1999. The IASI, surveys, and interview instruments also underwent a panel review to verify validity of the instrument. The panel consisted of

Dr. Fred Swartz, Director of Student Assessment at Ferris State University, and Dr. Michael Cooper, Professor of Statistics and Measures at Ferris State University.

A qualitative analysis was conducted by means of instructor and student interviews at the conclusion of the courses. Additionally, student surveys were conducted at the beginning and conclusion of the courses. Some of the questions on the student surveys were further analyzed by means of a t-test. The data analysis from all the courses was then compared to determine the degree of consistency between the conclusions.

Sampling Procedure

The courses were eight weeks in length, with each lecture class session lasting three hours and each clinical class session lasting two hours. The instructor began each course by meeting at the Grand Rapids location first. A pre-test of a majority of the information to be covered in the course was distributed to all students at the beginning of the first session. Additionally, all students took Survey 1 during the first class session. At the conclusion of each course, a posttest, Survey 2 and Survey 3 were distributed to all students. One instructor taught both the clinical and lecture classes for the Family Nursing courses, and a second instructor taught both the clinical and lecture classes for the Community Nursing courses. The instructor interviews were conducted prior to the first class session and after the last class session. Scores for clinical class projects, journals, and reviews and critiques were collected throughout the duration of the courses.

Each instructor taught in the Grand Rapids classroom the first week of the classes, with the Big Rapids classroom receiving the ITV transmission and participating as the distant site. The second week of classes, the instructor taught in the Big Rapids classroom, with the Grand Rapids classroom receiving the ITV transmission and participating as the distant site. The third week of classes, the instructor taught in Grand Rapids, with Big Rapids receiving the ITV transmission. The alternating scenario continued throughout the semester. One meeting of the Community Nursing classes was cancelled due to instructor illness.

Hypothesis

For the purposes of the study, the following hypotheses were developed pertaining to class environment, student grades, IASI survey results, student survey results, student experience level, and perception of quality:

For class environment:

H_0a: The combination two-way interactive video/live instructor instruction technique is not effective in meeting the learning objectives of the student.
H_1a: The combination two-way interactive video/live instructor instruction technique is effective in meeting the learning objectives of the student.

For student grades based on instructor location:

H_0b: Student Family Nursing exam scores will not differ based on instructor location.
H_1b: Student Family Nursing exam scores will differ based on instructor location.

H_0c: Student Community Nursing exam scores will not differ based on instructor location.
H_1c: Student Community Nursing exam scores will differ based on instructor location.

For IASI survey results:

H_0d: Results will not differ based on instructor location.
H_1d: Results will differ based on instructor location.

For student experience level:

H_0e: There is no relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video.
H_1e: There is a relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video.

For perception of instructional quality:

H_0f: There is no difference in student perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video.
H_1f: There is a difference in student perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video.

H_0g: There is no difference in instructor perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video.
H_1g: There is a difference in instructor perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video.

A mapping of each hypothesis question to the survey or data source is contained in Appendix I. A description of the information gathered on each student in addition to test and survey data is in Appendix J. A description of the data used in the pretest and posttest analysis is in Appendix K.

Summary

The study was conducted at Ferris State University's Big Rapids and Grand Rapids campuses during the winter 2000 semester. The study involved 30 students and two instructors.

Quantitative methods were used to assess the differences with relation to learning effectiveness between instruction method and knowledge level gained. Data was gather using a pretest and posttest of course material, pre and post surveys of student perceptions, and pre and post surveys of instructor perceptions. Data was analyzed using a t-test with a alpha level of .05.

Qualitative data was gathered by student and faculty surveys and interviews. Questions were developed by the researcher and included closed and opened-ended questions. Information was presented descriptively.

CHAPTER 4

FINDINGS

The study investigated the effectiveness of a combination two-way interactive video/live instruction at Ferris State University. The following areas were evaluated by quantitative and qualitative measures: (1) the effectiveness of the combination two-way interactive video/live instruction, (2) the relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video, (3) the difference in perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video, (4) the impact of instructor location on grades, and (5) the relationship of student test results to the perception of two-way interactive video as a positive experience.

Data Collection Results

The student surveys were administered to 33 individuals. Three students did not complete the initial survey and were excluded from the data analysis of the Family Nursing classes. There were some questions on some surveys that students left blank. These surveys were included in the data analysis. Only one student was lost through attrition between the Family and Community classes. Both instructors completed pre and post surveys for their clinical and lecture classes.

Validity and Reliability

A pilot of the IASI, surveys, and interview instruments used in this study was conducted in December, 1999. The IASI, surveys, and interview instruments also underwent a panel review to verify validity of the instrument. The panel consisted of Dr. Fred Swartz, Director of Student Assessment at Ferris State University, and Dr. Michael Cooper, Professor of Statistics and Measures at Ferris State University. Comments on the instruments by the students and review panel were integrated into the instruments. Reliability was established by the review panel and by Levene's Test for Equality of Variance on pilot data.

Analysis of Research Questions

The research questions that were addressed in this study were:

1. Is the combination two-way interactive video/live instructor instruction technique effective in meeting the learning objectives of the students and instructors?
2. Is there a relationship between student experience level with ITV and satisfaction with ITV?
3. Do instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered via ITV?
4. What teaching methods (such as lecture, group discussion, team exercises) do instructors and students perceive as effective in the ITV classroom?
5. What factors detract from the two-way interactive video learning experience?

The data collected to answer the five research questions were analyzed by quantitative and qualitative means. Quantitative analysis was conducted using SPSS version 9.0. Descriptive statistics were run on all quantitative data and homogeneity

of variance was assured by Levene's Test for Equality of Variances. All statistical tests were based on a .05 level of significance. Qualitative research was formalized descriptively.

Research Question One

Combination two-way interactive video and live instruction effectiveness in meeting student learning objectives

The first research question was: Is a combination two-way interactive video and live instruction effective in meeting the learning objectives of the students and instructor? The effectiveness of meeting **student** learning objectives will be explored first.

> H_0 a: The combination two-way interactive video/live instructor instruction technique is not effective in meeting the learning objectives of the student.

Appendix M contains the group statistics of the independent samples from the Community Clinical and Community Lecture classes. Appendix N contains the group statistics of the independent samples from the Family Clinical and Family Lecture classes.

A t-test comparing the means of the two locations of the four classes was used to test the hypothesis that the combination two-way interactive video and live instruction is not effective in meeting the learning objectives of the student. Homogeneity of variance was assured by Levene's Test for Equality of Variances.

The probability of each question where a t value could be obtained for the Community Clinical and Lecture classes (Appendix M) and the Family Clinical and Lecture classes (Appendix N) was very high. Consequently the Null Hypothesis cannot be rejected and we conclude that the combination two-way interactive video/live instructor instruction technique is not more effective than traditional instruction in meeting the learning objectives of the student.

The students further support this conclusion in the qualitative aspect of the study when they mentioned things like "I just like having the instructor present." Four Grand Rapids (GR) Community Clinical nursing students (N=13) and four Big Rapids (BR) Community Clinical nursing students (N=17) indicated that they wanted an instructor present. Three of the GR Community Lecture students (N=13) and seven BR Community Lecture students (N=17) indicated that they wanted an instructor present. In the Family Clinical classes, two GR students (N=13) and six BR students (N=17) indicated the same desire, as did two GR (N=13) and five BR students in the Family Lecture classes.

Several students also indicated that it was more difficult to learn in an ITV environment than a traditional classroom. An interesting aspect of this is that this information was received in an open-ended question and was not prompted. The actual data with this response was three GR Community Clinical students (N=13), three BR Community Clinical students (N=17), four GR Community Lecture students (N=13), three BR Community Lecture students (N=17), two GR Family Lecture students (N=13), four BR Family Lecture students (N=17), and one BR Family Clinical student (N=17).

Most student comments were consistent between lecture and clinical classes, so further description of responses will be aggregate (N=30) unless there is something unique to a class. The notable exception was that the subject matter and privacy concerns in the clinical classes tended to be more influenced by the technology than the lecture classes. Students were hesitant to discuss these things via ITV. One student mentioned that she thought there was more miscommunication with video. Two students thought that it required a stronger commitment by them to meet the learning objectives in an interactive video class in part because the instructor seemed inaccessible. Another student indicated that she felt like she was receiving instruction every other week. Eight students felt that they had trouble paying attention in and ITV class.

Not all comments were negative. In combining the positive responses of the students in the four classes into one group, two students (N=30) thought the change of pace offered by an interactive video class was an interesting experience. Two students (N=30) felt it was just as easy to ask questions of the instructor via two-way interactive video as in person. Four (N=30) indicated that they weren't particularly pleased with two-way interactive video, but they were glad the class was available to them. However, these views were far outweighed by comments like "the technology sucks", "it stinks", "it isn't the same", "I find it harder to pay attention", "it feels like the distance class gets ignored", and "I'd only take another class in this format if I had to." One student went as far as saying that students in an ITV environment should get a tuition break because they aren't getting a "real" class.

Combination two-way interactive video and live instruction effectiveness in meeting instructor learning objectives

The first research question was: Is a combination two-way interactive video and live instruction effective in meeting the learning objectives of the students and instructor? The effectiveness of meeting **instructor** learning objectives will be now be explored.

Descriptive analysis was used to investigate if the combination two-way interactive video and live instruction is effective in meeting the learning objectives of the instructor. The two instructors were each asked their perception of the effectiveness of two-way interactive video in the classroom before their classes began and after they ended. Both instructors had taught in this format many times. Their perceptions were generally consistent from the beginning to the end of the courses. Their perceptions were also generally consistent between the two courses (clinical and lecture) that each instructor taught, so each instructors comments are grouped together for their classes unless specifically noted.

Instructor 1 viewed the effectiveness of meeting course objectives for the instructor using interactive video as similar to that of classroom interaction. He also indicated that this type of technology has significant potential for future use and that he hasn't seen any data to influence his opinion. Instructor 1 also felt that instructor behavior was altered by using interactive video, that the distant class interacts less frequently than the local class, and that sound quality is an issue. He indicated that having the instructor rotate between locations improved the class, but it was

challenging to plan for a class offered in multiple locations. Instructor 1 did emphasize that the course objectives were the same for all students in both locations.

Instructor 2 indicated that issues such as sound quality and tasks such as repeating student comments to the other classroom impact effectiveness because it disrupted the flow of the course. She further indicated that she thought it was less effective than face-to-face or even online instruction and that two-way interactive video is less effective in meeting course objectives than traditional classroom instruction. Instructor 2 also felt that instruction delivered via two-way interactive video was of less quality than traditional instruction for a variety of reasons including not being able to see everyone at all times, loss of ability to see student body language, and a reduced sense of presence.

Although Instructor 1 was generally positive about the effectiveness of two-way interactive video in meeting the learning objectives of the instructor, he did raise some issues that challenged the notion that there is no significant difference. Instructor 2 felt strongly that there was a significant difference.

Family Nursing grades

The first research question was: Is a combination two-way interactive video and live instruction effective in meeting the learning objectives of the students and instructor? The variance of the grades of the Family Nursing classes based on instructor location will be now be explored in order to answer the question as it relates to the student.

H_0b: Student Family Nursing exam scores will not differ based on instructor location.

Table 4.1 contains the group statistics of the independent samples from the Family Nursing classes.

Table 4.1 – Group Statistics/Independent Samples - Family Nursing test comparison by location.

Test	Location	N	Mean	St. Deviation	t	probability
Family pretest	GR	13	5.0000	1.1547	-1.446	.159
	BR	17	5.5882	1.0641		
Family posttest	GR	13	6.0769	1.6053	-2.345	.027
	BR	16	7.1250	.7188		

A t-test comparing the means of the two locations of the Family Nursing classes was used to test the hypothesis that student exam scores will not vary by instructor location. Homogeneity of variance was tested by Levene's Test for Equality of Variances and no impact on results was indicated.

The t-test indicates that there is a strong probability of a difference in student performance between location and that instructor location may impact student's Family Nursing exam scores (Big Rapids scores were higher than Grand Rapids scores). Therefore the null hypothesis should be rejected and we conclude that student Family Nursing exam scores will differ based on instructor location.

An important observation to point out is that the mean gain between the Family Nursing pretest and the Family Nursing posttest was -1.4231 with a standard deviation of 1.2704. A t-value of –5.712 was obtained, which provided a .000 level of significance. Therefore it is clear that learning did occur in the Family Nursing class. It should also be noted that the content of the Family Nursing tests was

specifically covered in the Family Nursing Lecture class, but many of the concepts were covered in the Family Nursing Clinical class. Therefore, the test analysis treats both Family Nursing classes as one.

Community Nursing grades

The first research question was: Is a combination two-way interactive video and live instruction effective in meeting the learning objectives of the students and instructor? The variance of grades of the Community Nursing classes based on instructor locations will be now be explored in order to further answer the question as it relates to the student.

> H_0c: Student's Community Nursing exam scores will not differ based on instructor location.

Table 4.2 contains the group statistics of the independent samples from the Community Nursing classes.

Table 4.2 – Group Statistics/Independent Samples - Community Nursing test comparison by location.

Test	Location	N	Mean	St. Deviation	t	probability
Community pretest	GR	11	5.2727	1.8488	1.600	.122
	BR	17	4.4118	1.0037		
Community posttest	GR	13	6.4615	1.3914	1.053	.302
	BR	16	6.0000	.9661		

A t-test comparing the means of the two locations of the Community Nursing classes was used to test the hypothesis that student exam scores will not vary by instructor location. Homogeneity of variance was tested by Levene's Test for Equality of Variances and no impact on results was indicated.

The probability of .302 (Table 4.2) indicates that there is no difference in student performance between location and that instructor location may not impact student Community Nursing exam scores. Therefore the null hypothesis cannot be rejected. This is in contrast to the Family Nursing exam scores.

An important observation to emphasize is that the mean gain between the Community Nursing pretest and the Community Nursing posttest was 1.4074 with a standard deviation of .2887. A t-value of 4.875 was obtained, which provided a .000 level of significance. Therefore it is clear that learning did occur in the Community Nursing class. It should also be noted that the content of the Community Nursing tests was specifically covered in the Community Nursing Lecture class, but many of the concepts were covered in the Community Nursing Clinical class. Therefore, the test analysis treats both Community Nursing classes as one.

Impact of instructor location on IAS survey results

The first research question was: Is a combination two-way interactive video and live instruction effective in meeting the learning objectives of the students and instructor? The variance of instructor location on IAS survey results will now be explored to again address research question.

H_0d: Results will not differ based on instructor location.

The survey for the Grand Rapids location was not filled out correctly or in sufficient numbers, so only the results from the Big Rapids location will be explored

and no conclusion can be reached on H_0d. The Big Rapids students filled out one IAS survey and were asked to answer questions based on their experience in all four classes being studied. The primary reason for this was a concern of having students fill out too many instruments and losing interest in accuracy. The first 18 questions in the IAS survey are based on a scale of 1 to 6. A one translates to excellent, a two is very good, three is good, four is fair, five is poor, and six is very poor.

Students were asked to rate the distance learning course as a whole. This produced a mean score of 3.625, a standard deviation of .7187, a median of 3.5 and mode of 3. This places the student evaluation of the course in the Fair to Good range.

Students were asked to rate the effectiveness of the distance learning format. The mean score was 3.9375, standard deviation was .9287, median was 4 and mode was 4. This places the student evaluation of the effectiveness of the distance learning format in the Fair range.

Students were asked to rate the quality of the instructor feedback. The mean score was 2.25, standard deviation was .6831, median was 2 and mode was 2. This places the student evaluation of the quality of instructor feedback in the Very Good range.

Students were asked to rate the grade they would receive in these courses relative to the grades they would receive in other courses. The mean score was 2.533, the standard deviation was .9904, median was 2 and mode was 2. The scale was from 1 (much higher) to 7 (much lower). This would indicate that the students anticipated receiving a better grade in these courses than other courses.

Students were asked to rate their level of involvement in the course such as doing assignments, attending classes, etc. The mean score was 1.6667, the standard

deviation was .7237, median was 2 and mode was 1. The scale was from 1 (much higher) to 7 (much lower). This would indicate that students thought they were very involved in course activities.

Relationship between grades and student perception of two-way interactive video effectiveness

The first research question was: Is a combination two-way interactive video and live instruction effective in meeting the learning objectives of the students and instructor? The relationship between grades and perception of two-way interactive video as a positive experience will be now be explored.

Descriptive analysis was used to investigate the relationship between grades and student perception of two-way interactive video as a positive experience. The 30 students were asked to indicate what grade they expected in the courses. Thirty-one percent indicated they expected an "A", forty-four percent expected and "A-", thirteen percent expected a "B+", six percent expected a "B", and six percent expected a "B-". Actual grades were fifteen percent received an "A", twenty-seven percent received an "A-", thirty-nine percent received a "B+" , fifteen percent received a "B", two percent received a "B-", and two percent received a "C+". Because of the limited range of expected grades, four incompletes and the limited sample size, a correlation of grades to perception of effectiveness has limited utility. However, the high grades would lend itself to an argument that the combination two-way interactive video/live instructor format was effective in meeting the learning objectives of the students if their objective was to receive a high grade.

Summary of research question one results

The results of the research items associated with determining if a combination two-way interactive video and live instruction is effective in meeting the learning objectives of the students and instructors are somewhat mixed. The overwhelming measurement results from the students indicate that they feel it is not effective. The only argument that would indicate otherwise is that they all expected good grades. However, grades are only a partial measure. In the courses studied, much of the weight for grading came from individual projects and assignments done independent of the class sessions. It was brought out in the student interviews that they felt a greater responsibility for learning was placed on the student because of the interactive video environment.

The results from the research items associated with determining if a combination two-way interactive video and live instruction is effective in meeting the learning objectives of the instructors is not as clear. However, the fact that it is not clear would indicate that differences exist.

Research Question Two

Relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video

The second research question was: Is there a relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video?

> H_0e: There is no relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video.

Table 4.3 describes the experience level of the students with two-way interactive video and if they think it will be a positive experience. Previous interactive television experience was indicated on the survey data record with a "1", while a "2" indicated no experience. This data indicate that the vast majority of students did have previous interactive video experience and that there is no significant difference between the two locations with regard to level of experience with interactive television.

Table 4.3 – Group Statistics/Independent Samples – Student experience level with two-way interactive video (initial measures).

Test	Location	N	Mean	St. Deviation	t	probability
Previous itv experience	GR	13	1.0769	.2774	.190	.850
	BR	17	1.0588	.2425		
Number itv courses	GR	13	3.9231	2.4651	.640	.527
	BR	17	3.4706	1.3747		
Itv will be positive	GR	13	2.8462	.6887	-1.736	.094
	BR	17	3.3529	.8618		

A t-test comparing the means of the two classroom locations was used to test the hypothesis that there is no relationship between student experience level with two-

way interactive video and satisfaction with two-way interactive video. Homogeneity of variance was tested by Levene's Test for Equality of Variances and no impact on results was indicated.

The Grand Rapids and Big Rapids locations were both somewhat neutral in ranking interactive video as a positive experience. There also was no significant difference in how the students at the two locations felt, so H_0e cannot be rejected.

Data analysis regarding experience level with ITV gathered by the Family Nursing Clinical (Fc) and Family Nursing Lecture (Fl) post surveys is compiled in Appendix O.

A t-test comparing the means of survey items of the two classroom locations was used to test the hypothesis that there is no relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video. Homogeneity of variance was tested by Levene's Test for Equality of Variances and no impact on results was indicated.

Survey results show that students' perception of interactive video as a positive experience was nearly the same before and after the Family Nursing classes for both locations. Students' experience level with interactive television was generally from 2 to 5 courses for most students. There was no significant difference in the differences between the two locations for each class, so H_0e cannot be rejected.

Data analysis regarding experience level with ITV gathered by the Community Nursing Clinical (Cc) and Community Nursing Lecture (Cl) post surveys is compiled in Appendix P.

A t-test comparing the means of survey items of the two classroom locations was used to test the hypothesis that there is no relationship between student experience level with two-way interactive video and satisfaction with two-way interactive video. Homogeneity of variance was tested by Levene's Test for Equality of Variances and no impact on results was indicated.

Survey results show that students' perception of interactive video as a positive experience was nearly the same before and after the Community Nursing classes for both locations. Students' experience level with interactive television was generally from 2 to 5 courses for most students. There was no significant difference in the differences between the two locations for the two classes, which doesn't allow us to reject the null hypothesis.

Students were asked to rank their preference for class format including instructor present – no interactive video, two-way interactive video/instructor present half the time, and two-way interactive video, instructor never present. All but two respondents ranked instructor present – no interactive video as their first preference. The two respondents that didn't rank it as their first choice ranked it as their second choice. All but two respondents (N=27) ranked the combination two-way interactive video/instructor present half the time as their second preference. Two students ranked this format as their first preference. All students ranked two-way interactive video with no instructor present as their least preferred method of instruction.

Students said that they were more apt to drive at least one hour to take a class where the instructor is present than take it via two-way interactive video after the

Family Nursing classes than before. They were even more inclined to drive after the Community Nursing classes.

An analysis of the data concerning whether students would take another combination two-way interactive video/instructor present half the time compared to a two-way interactive video instructor never present provided additional insight. Table 4.4 indicates that the combination two-way interactive video/instructor present half the time is preferred over an interactive video only class. Students were asked if they would take either method again. A "1" indicated yes and a "2" indicated no. A t-test was run to compare the means and resulted in a T value of –1.94 with a probability of .055. Conclusive results can't be realized from these questions to determine if there would be a substantially different level of acceptance between a combination class and one that is interactive video only, but the trend indicates that this may in fact be the case.

Table 4.4 – Preferred ITV mode.

Survey Questions	Location	N	Mean
25 Take combo itv/instructor again	GR & BR	53	1.2075
26 Take itv only	GR & BR	53	1.3774

Two students (N=30) indicated in their survey responses that they believe technological advances are always a plus and that it is good to keep an open mind about things. However, the level of dissatisfaction with two-way interactive video was so prevalent that it didn't matter what a student's level of experience was, the vast majority of students didn't care for it. Six students (N=30)made comments that indicated that the only reason they were taking two-way interactive television classes

was that they had no alternative. If alternatives were available, most students would decide against further interactive television classes.

Summary of research question two results

The results of the research items associated with determining if there is a relationship between student experience level with interactive television and satisfaction with interactive television are reasonably clear. Measures in this study indicated that there is no relationship between student experience level with interactive television and satisfaction with interactive television. Therefore there is no basis to reject the null hypothesis.

Research Question Three

Student perception of instructional quality with two-way interactive video

The third research question was: Do the instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered by two-way interactive video? The perceptions of the students will be explored first.

> H_0f: There is no difference in student perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video.

Table 4.5 contains the group statistics of the survey measures for student perception of instructional quality as they relate to the null hypothesis.

Table 4.5 – Group Statistics/Independent Samples – Family Nursing class and Community Nursing class students' perception of quality.

Test	Location	N	Mean	St. Deviation	t	probability
Is07 – itv influences effectiveness	GR BR	13 17	2.3846 2.4118	.8697 .9393	-.081	.936
Fc22 differences in instructional quality	GR BR	9 16	2.4444 2.0625	1.1304 .9287	.914	.370
Fl22 differences in instructional quality	GR BR	9 16	2.3750 2.1250	.7440 1.0878	.582	.566
Cc22 differences in instructional quality	GR BR	11 16	2.3636 1.7500	.9244 .7746	1.870	.073
cl22 differences in instructional quality	GR BR	13 16	2.3077 1.8125	.8549 .8342	1.572	.128

An evaluation of the data in Table 4.5 indicates that there is no difference in the opinions of instructional quality between the class locations and that the null hypothesis should be accepted. This means that all four classes had the same perception of instructional quality as it relates to learning objectives, but it doesn't necessarily indicate what they think of the quality. This can be answered by survey questions where students were asked to explain their answer.

During the interviews and qualitative questions, two students (N=30) indicated that the quality of interaction and the access to the instructor in the distance class is not of the same caliber as it is when everyone is present in the same classroom. Thirteen students (N=30) said that they held their questions and caught up with the instructor the following week when the instructor was present because of difficulty interacting or discomfort with the technology. Five students (N=30) indicated that ITV was an impersonal environment. Two students (N=30) said that the difference in quality didn't matter and that the instructor can help mitigate the differences in quality. Other individual comments included an observation that the class in which

the instructor is present often develops their own routine while the distant class sometimes is ignored.

One interesting pattern was that six students (N=30) said they would ask a peer their questions rather than the instructor if the instructor was at the other site. This would generate noise that would be picked up by the microphones, which would interfere with the audio transmission. What this means is that students would often ask each other questions rather than the instructor, but by doing this, they were affecting the audio for both classrooms inadvertently.

One of the most common indications that the quality of an interactive video class is not as effective in meeting the learning objectives of the students was that sound quality was an issue. If papers were rustled, a student sneezed or there was other background noise, the students in the other class couldn't hear the transmission clearly. Another indication of reduced quality were the comments about only being able to see part of the other class by interactive video. Six students (N=30) pointed to audio and visual problems as something that decrease quality. Five students further indicated that the technician responsible for the class was of superior quality and helped make the class run smoothly. However, two students indicated that even though there were no significant technical interruptions and couldn't point to any specific instance, they still had the perception that the technology was causing problems.

Because of the trends that may be apparent in the data in Table 4.5 and the information gathered from student interviews in the qualitative survey questions, the obvious question that arises is: if the students all have the same perception of quality,

is the perception of that quality good, bad or indifferent? This question can potentially be answered by recoding the questions that deal with quality on the surveys taken at the end of all four classes. These questions are 1, 2, 7, 17, 22, 24, and 27 (Appendix D & E). All of these questions have a Likert scale of strongly agree, agree, neutral, disagree, and strongly disagree. The value for strongly agree becomes a 2, agree becomes a 1, and neutral, disagree, and strongly disagree all become 0. A one-sample t-test is then run to determine if the opinions are significantly different from zero. The data for analysis is in Appendix Q.

Reviewing the data in Appendix Q very clearly indicates that there is a difference from zero. This indicates that students think ITV quality is not as good as traditional instruction. Therefore, in addition to not rejecting the null hypothesis, we can also strongly indicate that the students are consistently of the opinion that the quality of two-way interactive video is not as good as a traditional class where the instructor is present.

Instructor perception of instructional quality with two-way interactive video

The third research question was: Do the instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor-lead class and a class delivered by two-way interactive video? The perceptions of the **instructors** will now be explored.

> H_0g: There is no difference in instructor perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video.

The first instructor indicated in the interview that some of the barriers students face include interruption of audio and visual images, initial student reluctance to engage in promoting dialogue between locations, inability of the instructor to observe non-verbal behavior at the distant site, and older students having a reluctance to work with the technology.

The first instructor went on to indicate that cost savings are frequently seen as one of the most significant benefits in using two-way interactive video. However, the instructor felt that this should be looked at more closely as it may actually be more expensive to use this format in many cases. Costs include the hardware and software, the support technicians and communication lines. Unrealized costs may include students who decide not to sign up for a class simply because it is two-way interactive video.

The difficulty in providing test security, logistical coordination of classroom materials, and remaining current with the technology required to deliver a course in this manner are further challenges to quality. The first instructor also indicated that his teaching style is modified by two-way interactive video. The way material is presented and the importance of eye contact and acknowledgement is magnified. The first instructor did feel that the Family Nursing lecture class was affected by poor picture and sound quality, and that one session utilizing a particular PowerPoint presentation had challenges because of readability.

The first instructor did not have a particular preference between two-way interactive video and a class where the instructor is present. Instructor one did not feel that there was a difference in instructional quality using two-way interactive

video and a traditional class before the classes started, but after the classes were finished the first instructor did feel that there was a difference in instructional quality. One of the reasons cited for the change in opinion of the quality was the difficulty in picking up on body language at the distant site. The absence of this feedback affects the ability to address issues with the distant class and deal with the sensitivity of a confused student.

Some of the challenges that the first instructor noted included the difficulties with coordinating student use of the camera and presentation aids when making a presentation from the Grand Rapids location. The Grand Rapids cameras were controlled by the presenter. This is an added degree of learning and anxiety for the student. There was also concern about privacy of patient information that was discussed in the clinical class because of the potential for the signal to be picked up by unintended audiences.

The second instructor initially thought that student learning would be the same for class sessions delivered by two-way interactive video, but after the classes concluded, she felt that interactive video was less effective. The second instructor also mentioned that the distant class usually feels less engaged and that audio and visual quality can be an issue. Like the first instructor, the second instructor thought body language was an important aspect that was missing. It was also very difficult to "shoot a look" to a disruptive student. Like the first instructor, the second instructor believed before classes started that the use of two-way interactive video would be a positive experience. The second instructor indicated that it wasn't a positive experience at the conclusion of the courses. Both instructors cited a change from a T-

3 telecommunications connection to a much slower T-1 connection as a significant impact on quality.

The second instructor had a preference for teaching in the physical presence of the students. Being able to read body language and not having to deal with technical challenges were the main reasons. The second instructor liked to employ small group discussions during interactive video classes. This deflected the emphasis of the technology. The second instructor also indicated that there was a difference in instructional quality between a traditional class with the instructor present and a class delivered by two-way interactive video, in part because it was felt by the instructor that spontaneity was lost in two-way interactive environments.

The information gathered from the instructor interviews and surveys indicate that there is no difference in the instructors' perceptions of instructional quality as they relate to learning objectives between a class where the instructor is present and a class delivered by two way interactive video. Therefore, we cannot reject the null hypothesis. This means that we may conclude that the instructors had the same opinion of the quality of instruction of ITV. Using survey and interview data, it is clear that the instructors think that ITV instruction is of less quality than traditional instruction.

Summary of research question three results

The results of the surveys and interviews of the students did not allow us to reject the null hypothesis: there is no difference in student perception of instructional quality as it relates to learning objectives between a class session where the instructor

is present and a class session delivered by two-way interactive video. Additional evaluation of qualitative and quantitative data indicated conclusively that students consistently perceive the quality of two-way interactive video to be less than a traditional class where the instructor is present.

The results of the surveys and interviews of the instructors did not allow us to reject the null hypothesis: there is no difference in instructor perception of instructional quality as it relates to learning objectives between a class session where the instructor is present and a class session delivered by two-way interactive video. The opinion the instructors held left no doubt that they felt there was a difference in instructional quality between a between a traditional class with the instructor present and a class delivered by two-way interactive video.

Research Question Four

Effective teaching methods for students using two-way interactive video

Research question four was: what teaching methods (such as lecture, group discussion, team exercises) did instructors and students perceive as effective in the two-way interactive video classroom. The responses of the students (N=30 unless indicated) will be explored first.

Students were asked what instructional techniques they thought were effective in a two-way interactive video environment. Three students indicated that a solid syllabus and a concrete schedule helped them to be better prepared to follow the class. Four

students indicated that they preferred straight lecture because it minimized the challenges of multiple people interacting.

Three students indicated that PowerPoint presentations were effective, but one student didn't think PowerPoint was effective. One of the uses of visual aids is to deflect attention from the instructor, so visual aids like PowerPoint would be a natural fit because students would tend to look at the visuals rather than the instructor in a traditional classroom anyway. Adequate font and appropriate color selection were important. Along the same lines, six students (N=17) thought videotapes were effective. Many students encouraged more breakout sessions because people went "off camera" for a period of time.

The students were also asked what they would recommend to make a two-way interactive video class better. Thirteen of the students indicated a need for improved video and audio. The television monitors in the classroom being studied were 25" in Grand Rapids and Big Rapids. The microphones were mounted on the tables in Big Rapids and suspended from the ceiling in Grand Rapids. The speakers were ceiling mounted in both locations.

Seven students also indicated a lack of privacy inhibited conversation at times. There were times that they wanted to talk to a student in the other classroom, but they didn't want to do it in the presence of everyone. Three students suggested adding telephones. One student mentioned integrating computers more closely – perhaps using chat rooms. General response was positive to the times when computer use was integrated into classroom activities using things like PowerPoint and the Internet.

The placement of the cameras restricted the structure of the classroom. Students indicated that the instructor pretty much had to stay behind the podium. This changed the characteristics and feel of the class. One student indicated that additional camera angles would help break up the monotony. One student requested more monitors.

Because of the slight delay that was sometimes present in transmissions, interaction between locations was frequently clumsy. Some students went as far as to say don't use two-way interactive video at all. Many indicated that there needed to be more focus on the distant class.

Effective teaching methods for
instructors using two-way interactive video

The instructors were asked why they used the combination format of two-way interactive video and instructor rotation. The indicated that this format evolved from earlier student feedback and seemed to increase student satisfaction. It also seemed to increase interaction in both classrooms. Students felt this arrangement was at least palatable, while they were dissatisfied with two-way interactive video only. This compromise was seen as a way to balance the student tolerance level with two-way interactive video with instructional effectiveness. Having the instructor available every other week afforded the students an opportunity to clarify questions in person within a week.

Instructors were also asked what they would recommend to make a two-way interactive video class better. Many of the responses about improved technology were similar to those of the students. Instructors also emphasized several advantages that

could be realized by closer integration with the Web. They did use email extensively and some content was covered with Internet technology.

One instructor stressed several times that the class format becomes much more lecture based when two-way interactive video is used because of the barriers to communication if multiple people try to interact. The instructors also increased the number of visual aids that they used, but found that this also brought up some copyright issues. The instructors found their eye contact and communication patterns were altered in two-way interactive video format. A technique that was used to increase interaction in the distant class was to ask a question of the group, let them discuss it, and then present it before both classes. Another effective method of instruction was to have the distant class control the cameras occasionally. Sometimes this was for presentations, sometimes it was for increased interaction.

Research Question Five

Factors cited by students that detract from two-way interactive video learning

Research question five was: what factors detract from the two-way interactive video learning experience. The responses of the students will be examined first.

Students were asked what factors they perceive, if any, that make two-way interactive video less effective than the traditional classroom with the instructor present. The most common responses had to do with audio challenges such as sound quality and volume. If more than one person is talking at a location, or if there are external noises, the other location has difficulty understanding the audio transmission.

There were also issues when someone didn't speak clearly or in the direction of a microphone. Often the instructor or another student would ask for the comment to be repeated, which relates back to previous comments about loss of spontaneity and a reluctance on the part of the students to contribute.

Sound volume was identified as a factor that detracted from the two-way interactive video learning experience. The relative distance someone is from a microphone can impact volume. A sudden change in this distance can substantially change the volume of the audio transmission. An example would be the distance someone is from a microphone when they sneeze.

White noise (background/environmental noise) was also identified as a detractor. In some cases, white noise could distract the listener to the point that they found themselves no longer paying attention. While this is a potential problem in a traditional classroom, it was felt that the effects were more pronounced in a two-way interactive video setting.

The delay in transmission was also something that detracted from two-way interactive video. This was more noticeable on the T1 line than the T3 line. One of the effects was that people would talk at the same time and not realize it was happening until a couple seconds later.

Students also pointed to video challenges. Even if large screen television monitors were used, students in the distant classroom are much smaller than life size. Students also didn't like the fact that they could only see one display of the distant class. In other words, they could only see the instructor, only the students, only a video, or only the pad (overhead display) camera.

Students were also asked what instructional techniques they felt did not work well in a two-way interactive video environment. Students didn't like when the camera was kept on the teacher. During brief exchanges, it is difficult to move the camera focus back and forth between the people in the conversation. This often meant having the camera focus on the entire classroom, which gives too small a picture, or having the camera remain on the teacher.

Most of the other student comments centered on visual aids. In some instances, formats that some students desired in visual aids were not appreciated by other students. One thing that was consistent among the students was that poor quality visual aids should not be used at all.

Students also didn't care for visuals that are spread out. In other words, if the entire visual couldn't be displayed in a single camera shot, they didn't want it used at all. They found this to be a disorienting experience because they lost track of where they were on the visual.

The use of group project presentations was discouraged because it was difficult to get everyone on camera. Even though the group exercise may be effective, a presentation by several people was difficult to coordinate and resulted in a compromised experience.

Some of the student comments indicated that they felt so strongly about the importance of having the instructor present that nothing can be done to the interactive television experience to make it as effective as classroom instruction.

Factors cited by instructors that detract
from two-way interactive video learning

The instructors were asked what problems or barriers they thought students faced in learning the material when it is delivered in a mixed two-way interactive video/traditional instruction setting. The barriers cited included interruption of audio or visual images, initial student reluctance in promoting dialog between locations, and inability of the instructor to observe non-verbal behavior at the distant site. The instructors also had a perception that older students had a stronger initial reluctance to participate in a class with interactive video technology. They also believed that the distant class feels less engaged with the instructor.

The instructors were also asked what the difficulties were for them as an instructor in using two-way interactive video. The inability to read body language was one of the strongest responses. To complicate this, students liked to sit out of the camera range. It was also difficult for the instructors to facilitate discussions if there were any audio challenges.

The instructors also indicated that providing test security, distributing class materials, and getting the distant class fully involved were difficulties for them. They also found staying abreast of the changes in the technology a challenge, but they also found it exciting.

The final question for the instructors was what factors, if any, make two-way interactive video less effective than traditional classroom instruction. This was easily summed up as audio quality, interaction, and the fact that two-way interactive video does not provide the entire visual experience. On one occasion, there was a few

minute interruption in transmission between the two locations. This resulted in lost class time. Classroom interruptions occur in virtually any environment – burned out overhead, no chalk or markers to write on the board, etc. – but in a multiple classroom environment it can be more discouraging for the students because they might not immediately know what caused the interruption or how long it will be.

CHAPTER 5

SUMMARY AND RECOMMENDATIONS

Summary

Effectiveness studies of instructional practices are beneficial to assist in determining the value of the practices and in making decisions to improve the educational process. Effectiveness studies generate information that can be built upon in future investigations. This investigation at Ferris State University was built upon a case study of four nursing classes delivered by a combination of two-way interactive video and having the instructor present. It is understood that the pool of students is small. Moreover, these observations involve nursing students and may not be generalized to the general student population.

This study examined student and instructor perceptions of the effectiveness of a mixed two-way interactive video and traditional instruction environment. Student performance in the classroom when the instructor is available via two-way interactive video compared to when the students are at a location where the instructor is physically present was investigated. The research environment was four nursing classes taught with a combination of traditional and ITV instruction on the campus of Ferris State University and Grand Rapids Community College.

Although two-way interactive computer technology is being used by growing numbers of colleges and universities, it may not be the most effective learning method. This generated five research questions that were the basis for the null hypotheses.

1. Is a combination ITV and live instruction is effective in meeting learning objectives for the students and instructor?

2. Is there is a relationship between student experience level ITV and satisfaction with ITV?

3. Do instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered via ITV?

4. What teaching methods (such as lecture, group discussion, team exercises) instructors and students perceive as effective in the ITV classroom?

5. What factors detract from the two-way interactive video learning experience?

The criterion for judging the null hypothesis was a .05 level of significance on the evaluative statistical test. There was also a qualitative aspect to the research that was formalized descriptively.

Literature

The research questions were the basis for a literature review that included distance education studies, interactive video studies, nursing education and case study research, student and instructor reception of ITV and other instructional medium, and effectiveness research.

Four studies dealt with satisfaction of distance education. A 1997 study by Tiene found that instructors were slow to embrace technology. Dillon pointed out in 1989 that faculty acceptance will be low unless there are incentives. Several studies indicated that maintaining a high level of interaction is key to the success of distance

education. One study indicated that 89% of teachers that used interactive video are satisfied with its use in teaching.

Three studies indicated that there are a lot of distractions in an ITV classroom and that these distractions may affect student and instructor performance. Two studies indicated that students were satisfied with the effectiveness of two-way interactive video instruction and one study found a positive relationship between student satisfaction and their performance in the class.

Two studies indicated that survey instruments have potential for effectively and reliably measuring student perceptions of the interactive climate in an interactive television environment.

Several studies are contained in Thomas Russell's (1999) book No Significant Difference. The general thrust of these studies indicate that there is no significant difference between traditional instruction and distance education. However, two 1999 studies raise the question that there may be a difference. These studies argue that the reason the difference has not been measured is that the research design frameworks and measurement techniques do not control for confounding variables. It is the contradiction in these viewpoints, one of "no significant difference" and one of "compromised framework" that point to the need for this study.

Methodology

The study was conducted on four nursing classes that utilized a combination ITV/live instruction. There were 17 students in four Big Rapids classes and 13

students in the four Grand Rapids classes. Students in a Grand Rapids class and the corresponding Big Rapids class made up each class population.

Characteristics of this study were that conducting the research may impact the learning in the course being studied and that students experienced both local and distant learning for each class. One instructor taught Family Nursing Lecture (NUS416FL) and Family Nursing Clinical (NUS416FC). A second instructor taught Community Nursing Lecture (NUS416CL) and Community Nursing Clinical (NUS416CC).

Measures taken included a pretest and posttest of material before and after NUS416FL and NUS416CL, which the lecture classes. A student survey was taken at the beginning of the semester and a survey of all four classes was taken at the conclusion of the classes. An instructor survey was taken before they started teaching their courses at the beginning of the term and at the conclusion of each course. Additionally, a standardized distance education survey was taken at the end of the semester. The quantitative data were analyzed using SPSS version 9 at Ferris State University's Assessment Center.

Results

The first research question attempted to determine if a combination ITV and live instruction was effective in meeting learning objectives for the students and instructor. The results of the research items associated with determining if a combination two-way interactive video and live instruction was effective in meeting the learning objectives of the students and instructors has been somewhat mixed. The

overwhelming measurement results from the students indicate that they feel it was not effective. The only argument that indicates otherwise was that they all expected good grades. However, grades are only a partial measure of effectiveness measurement. In the courses studied, much of the weight for grading came from individual projects and assignments done independent of the class sessions. As was brought out in the student surveys, a greater responsibility for learning was placed on the student because of the interactive video environment.

There are a number of reasons why students don't feel that ITV is effective in meeting their learning objectives. Audio and video technology has progressed rapidly in recent years, but it is still a compromise. It is very difficult to conduct discussions, feedback is slower, and attention spans may be shorter in an ITV environment. The technology also introduces an impersonal aspect to the classroom. Some of these things can be overcome with technological improvements, but the fact remains that in most cases, these improvements are not in place. However, the loss of contact with the instructor creates an impersonal environment that most students resent and there are not feasible technical solutions in the foreseeable future.

The results from the research items associated with determining if a combination two-way interactive video and live instruction was effective in meeting the learning objectives of the instructors was not as clear as the students' response. However, the very nature that it was not clear indicates that differences exist between the effectiveness of live instruction and ITV.

The comments that the instructors made about distractions in a two-way interactive video environment are consistent with the observations of Whittington in 1994. The

observations of the instructors that there is a decrease in the amount of interaction would point to a less effective learning environment as characterized by Moore (1989), Moore and Kearsley (1995), and Sherry, Fulford, and Zhang (1998). These findings also support the arguments of Smith and Dillon (1999) and Phipps and Merisotis (1999), where they indicated that it may be premature to conclude that "no significant difference" exists in distance learning studies. However, these findings would somewhat contradict Bartel's 1998 study and a number of the studies in Russell's 1999 *The No Significant Difference Phenomenon.*

The instructors in this study were experienced and respected in their use of two-way interactive video, and were observed to be very comfortable in an interactive video environment. The student surveys are full of compliments of the instructors in their effort to deal with the challenges presented by the technology. It is questionable if most two-way interactive video classes have as talented and dedicated instructors as those in this study. This would mean that the differences in effectiveness that were found in this study would be even more pronounced in a larger cross-section of classes.

It is clear that differences in effectiveness exist between instruction where the instructor is present and two-way interactive video even though there is some variation in the ability to reject or accept the various null hypotheses associated with research question one. It is also clear that students prefer the combination of two-way interactive video/instructor present half the time to a class via just two-way interactive video. Since mixed ITV/live instructor is more popular than students participating in a class just via ITV, it can be argued that the differences in learning

effectiveness found in this study would be even more pronounced in students that participate in class just via ITV.

The very fact that the vast majority of students in most studies would prefer to have an instructor present at all times rather than participate via ITV should raise a big red flag that indicates there must be something beneficial in having an instructor present. This holds true even for the students in studies that claim "no significant difference". A possible explanation why students are not voicing this concern more vigorously is that their alternative of a somewhat compromised form of instruction would be no instruction. Another explanation is that students are willing to make compromises in effectiveness if it means convenience. A third explanation would be that students are a captive audience once they invest enough into a course of study.

The second research question investigated if there is a relationship between student experience level with ITV and satisfaction with ITV. The results of the research items associated with determining if there is a relationship between student experience level with interactive television and satisfaction with interactive television is reasonably clear. Measures in this study indicated that there is no relationship between student experience level with interactive television and satisfaction with interactive television. Therefore there is no basis to reject the null hypothesis.

The third research question attempted to determine if instructors and students think there is a difference in instructional quality as it relates to learning objectives between instruction in a traditional instructor lead classroom setting and classes delivered via ITV. The results of the surveys and interviews of the students indicated that students in both locations for all four classes felt the same about the instructional quality.

Evaluation of qualitative and quantitative data lend support to the notion that students consistently perceive the quality of two-way interactive video to be less than a traditional class where the instructor is present.

The results of the surveys and interviews of the instructors left no doubt that they felt there was a difference in instructional quality between a between a traditional class with the instructor present and a class delivered by two-way interactive video. These results did not allow us to reject the null hypothesis.

The fourth research questions investigated what teaching methods instructors and students perceive as effective in the ITV classroom. Students were asked what instructional techniques they thought were effective in a two-way interactive video environment. A solid syllabus and a concrete schedule help students to be better prepared to follow the class. Several students indicated that they preferred straight lecture because it minimized the challenges of multiple people interacting.

Several students indicated that PowerPoint presentations were effective. One of the reasons for visual aids is to deflect attention from the instructor, so visual aids like PowerPoint would be a natural fit because students would tend to look at the visuals rather than the instructor in a traditional classroom anyway. Font size and color selection was important. Along the same lines, students thought videotapes were effective. Many students encouraged more breakout sessions because people went "off camera" for a period of time.

Students were also asked what would make an interactive video class better. Many of the students indicated a need for improved video and audio. Some mentioned

integrating computers more closely, perhaps using chat rooms. They did react positively to the times when computer use was integrated into classroom activities.

The placement of the cameras restricts the structure of the classroom. Additional camera angles would help break up the monotony. Reducing the delay that was sometimes present in transmissions would help foster interaction. Some students went as far as to say do not use two-way interactive video at all. Many indicated that there needed to be more focus on the distant class.

The instructors were asked why they used the combination two-way interactive video and instructor present format. This evolved from student feedback and seemed to increase student satisfaction. It also seemed to increase interaction in both classrooms. Students felt this arrangement was at least palatable, while they were dissatisfied with two-way interactive video only. This compromise was seen as a way to balance the student tolerance level with two-way interactive video with instructional effectiveness. Having the instructor available every other week afforded the students with an opportunity to clarify questions in person within a week.

Instructors were also asked what they would recommend to make a two-way interactive video class better. Many of the responses about improved technology were similar to those of the student. They also emphasized several advantages that could be realized by closer integration with the web. They did use email extensively and some content was covered with Internet technology.

One instructor stressed several times that the class format becomes much more lecture based when two-way interactive video is used because of the barriers to communication if multiple people try to interact. The instructors also increased the

number of visual aids that they used, but found that this also brought up some copyright issues. The instructors found their eye contact and communication patterns were altered in two-way interactive video format. A technique that was used to increase interaction in the distant class was to ask a question of the group, let them discuss it, and then present it before both classes. Another method of instruction that was perceived effective was to have the distant class control the cameras occasionally. Sometimes this was for presentations, sometimes it was for increased interaction.

The fifth research question investigated what factors detract from the two-way interactive video learning experience. Students were asked what factors they perceive, if any, that make two-way interactive video less effective than the traditional classroom with the instructor present. The most common responses had to do with audio challenges such as sound quality and volume. If more than one person is talking at a location, or if there are external noises, the other location has difficulty understanding the audio transmission. Sound volume was identified as a factor that detracted from the two-way interactive video learning experience. White noise was also identified as a detractor. In some cases, white noise could distract the listener to the point that they found themselves no longer paying attention. While this is a potential problem in a traditional classroom, it was felt that the effects were more pronounced in a two-way interactive video setting.

The delay in transmission was also something that detracted from two-way interactive video. This was more noticeable on the T1 line than the T3 line. One of the effects was that people would talk at the same time and not realize it was happening until a couple seconds later.

Students also pointed to video challenges. Even if large screen television monitors were used, students in the distant classroom are much smaller than life size. Students also didn't like the fact that they could only see one display of the distant class.

Students were also asked what instructional techniques they felt did not work well in a two-way interactive video environment. Students didn't like when the camera was kept on the teacher. During brief exchanges, it is difficult to move the camera focus back and forth between the people in the conversation.

Most of the other student comments centered on visual aids. In some instances, formats that some students desired in visual aids were not appreciated by other students. One thing that was consistent among the students was that poor quality visual aids should not be used at all. This included visuals that couldn't be shown in one camera shot.

The use of group project presentations was discouraged because it was difficult to get everyone on camera. Even though the group exercise may be effective, a presentation by several people was difficult to coordinate and resulted in a compromised experience.

Some of the student comments associated with these research items indicate that they feel so strongly that having the instructor present is so important that nothing can be done to the interactive television experience to make it as effective as classroom instruction.

The instructors were asked what problems or barriers they thought students faced in learning the material when it is delivered in a mixed two-way interactive video/traditional instruction setting. The barriers cited included interruption of audio

or visual images, initial student reluctance in promoting dialog between locations, and inability of the instructor to observe non-verbal behavior at the distant site. The instructors also had a perception that the older students had a stronger initial reluctance to participate in a class with interactive video technology and that the distant class feels less engaged.

The instructors were also asked what the difficulties were for them as an instructor in using two-way interactive video. The inability to read body language was one of the strongest responses. It was also difficult for them to facilitate discussions if there were any audio challenges. They also found logistics and staying abreast of the changes in technology a challenge.

The final question for the instructors was what factors, if any, make two-way interactive video less effective than traditional classroom instruction. This was easily summed up as poor sound quality, difficulty in interaction, and the fact that two-way interactive video does not provide the entire visual experience.

Recommendations

There is enough evidence to suggest that further research should be conducted on the effectiveness of two-way interactive video instruction. It appears that while the learning objectives of the instructor might be satisfied, it seems likely that there is some degree of compromise in the learning objectives in a distance learning class compared to a traditional class.

Schools should provide training and incentives to the faculty, and the administrators should visit these rooms while classes are in session so that they have a

better understanding of the issues surrounding distance education. The instructors bear the brunt of student dissatisfaction when things go wrong, but usually the instructor has little control over the situation. If a school has multiple distance learning rooms, invariably they are not set up the same. This makes it more difficult for the instructors because they have to become familiar with multiple environments.

Students indicated that they were more apt to drive at least one hour to take a class where the instructor is present than take it via two-way interactive video after having had the first and second nursing classes than before. They were even more inclined to drive after the third and fourth classes. Perhaps there is a point were students become saturated with interactive video and need a different class format. Although it was not specifically measured in this study, it would be beneficial for future researchers to attempt to determine the optimal length of time for an ITV class. The comments from the students while at the distant location indicated that it is hard to pay attention somewhere between one and two hours after a class begins. It was very easy to tune the class out. Instructors also indicated that classes just feel longer when done in an ITV environment.

Studies may have shown that no significant difference exists between traditional and distance education because the non-distant (broadcast) classes are no longer utilized to their full potential. Teaching techniques that may normally be utilized in a traditional classroom can not be used in an ITV setting. An example would be to the use of a projection unit to display a computer screen. In a traditional setting, projecting an image on a wall magnifies the image many times its original size. When displaying the same computer image on a television screen via ITV, the font

size has to be increased so significantly that it dramatically limits what can be viewed in one frame.

The conclusion of this study is that as it is currently used, ITV does not enjoy the same quality or effectiveness in learning or instruction as that which is conducted with the instructor present. Virtually every participant had experienced ITV prior to this study. Twenty-eight of the thirty student participants indicated that they felt ITV had compromised quality and effectiveness. Both instructors felt the same way. It is difficult to discount as an aberration the results of all of these experience participants that were measured in four classes. This certainly points out the need for further research because the findings of this study are a contradiction to most ITV effectiveness research..

The implications of this study are that ITV is not and never has been as effective as traditional instruction. It is not possible to limit a learning experience to the tunnel vision of a camera and expect the same results as a learning experience with full peripheral vision. Many of the limitations are technical in nature and could be mitigated with improved technology. The fact remains that the technology to do this is cost prohibitive in most cases. The expense to equip, maintain, and staff an effective ITV environment would be higher than to hire more teachers. Further research should include a cost benefit analysis of the entire environment.

Students should consider the implications of taking an ITV course. They may very well receive a grade similar to what they would receive in a traditional classroom, but the difficulty in paying attention that was mentioned by the students in this study may indicate that long-term retention is reduced in an ITV environment.

Instructors need to be far more than just good teachers in an ITV environment. They need to be technicians, have camera presence, and have the ability to make compromises. They must be equipped with a backup plan in case the technology fails. They also have to use different instructional methods than in a traditional classroom setting. Instructors should also realize that in most situations, ITV is a no win situation. Students would prefer an instructor present. Colleges typically give little, if any, reward for faculty to participate in ITV.

Nursing education could benefit significantly if ITV were more effective. The nature of nursing education, with continuing education requirements, skill upgrades, and certifications all point to a need for alternatives to traditional instruction. The argument being made in this study is not that it isn't possible for ITV to be effective. The argument is that the state of the implementation of the technology is not as solid as it should be.

There has to be a bottom line of quality. There are a lot of things that can and do go wrong in an ITV environment. Many of these challenges are simply taken in stride as the price paid for using technology. However, lost instruction time due to technical challenges, no matter how slight, consume a portion of available instruction time that usually cannot be recovered. ITV has been struggling with audio quality since its inception. Although its present state is improved, it is still a compromise.

An implication of this study is that it isn't practical to generalize what is found in one study to an entire environment. There are too many variables in the distance education equation to make blanket statements. It isn't appropriate to conclude that different learning environments will always produce the same results. An awareness

of this will help students and instructors that are utilizing non-traditional formats because it will change how they approach and adapt to the situation.

There are some potential opportunities in ITV that are generally not taken advantage of. For example, an ITV class can easily be video taped for students that are unable to make it to class. This makes it possible to easily "repeat" a course at a time convenient for the student. There are instructional techniques and skills that can be obtained in an ITV environment that are not possible in a traditional classroom. Distractions, technical challenges, and the modification in teacher and student behavior all point to a reduced effectiveness in the classroom. This doesn't mean that distance education should not be exploited. On the contrary, technology and techniques used in distance education open up doors that are not available in the traditional classroom setting. We don't have to – and shouldn't – do things the way they have always been done. Perhaps striving for equal learning as it is traditionally defined is the wrong approach.

Learning in a distance education environment can be illustrated with a Venn diagram. One circle would represent the learning derived from traditional instruction and the second circle would represent the learning derived from distance education. The question is not if the circles in the Venn diagram perfectly intersect. The question is: are the circles the same size?

APPENDICES

Appendix A

Instruction Assessment System Form I

Please answer the following questions on the following scale:

Excellent, Very Good, Good, Fair, Poor, Very Poor

1. The distance learning course as a whole was:
2. The course content was:
3. The instructor's contribution to the course was:
4. The effectiveness of the distance learning format was:
5. The helpfulness of the distance learning staff overall was:
6. Student confidence in instructor's knowledge was:
7. Timeliness of instructor response to assignments was:
8. Quality/helpfulness of instructor feedback was:
9. Tailoring of instruction to varying student skill levels was:
10. Clarity of course objectives was:
11. The organization of the study guide was:
12. Usefulness of reading assignments in understanding course content was:
13. Usefulness of written assignments in understanding course content was:
14. Usefulness of videotapes in understanding course content was:
15. Usefulness of computer on-line resources in understanding course content was:
16. Relevance and usefulness of course content was:
17. Evaluation and grading techniques (tests, papers, projects, etc.) were:
18. Reasonableness of assigned work was:

Answer the following questions on a 7 point scale from Much Higher to Average to Much Lower relative to other college courses you have taken.

19. Do you expect your grade in this course to be:
20. The intellectual challenge presented was:
21. The amount of effort you put into this course was:
22. The amount of effort to succeed in this course was:
23. Your involvement in this course doing assignments, attending classes, etc. was:
24. On average, how many hours per week have you spent on this course, including attending classes, doing readings, reviewing notes, writing papers, and any other course related work? under 2, 2-3, 4-5, 6-7, 8-9, 10-11, 12-13, 14-15, 16-17, 18-19, 20-21, 22 or more.
25. From the total average hours above, how many do you consider were valuable in advancing your education? under 2, 2-3, 4-5, 6-7, 8-9, 10-11, 12-13, 14-15, 16-17, 18-19, 20-21, 22 or more.
26. What grade do you expect in this course? A, A-, B+, B, B-, C+, C, C-, D+, D, D-, E, Pass, Credit, No Credit.

Appendix B

Student Consent Form

Explanation of Research

This survey is being conducted as part of a doctoral study to investigate the effectiveness of two-way interactive video instruction at Ferris State University. The purpose of this study is to help determine the effectiveness of learning in a mixed two-way interactive video/traditional classroom instruction environment.

You will be asked to read survey questions relating to two-way interactive video instruction (ITV), decide how you feel about the statements, and record your responses on the survey sheet. Each survey should take you about 15 minutes to complete.

You will be free to withdraw your participation from the study at any time without recrimination. Your grade will not be affected by your decision.

Consent to Participate:

I have been informed that this study is being conducted to investigate the effectiveness of a mixed two-way interactive video/traditional classroom instruction setting. The purposes and procedures of the study have been explained to me, and I voluntarily agree to participate in the research.

I understand that I am free to withdraw my participation at any time without recrimination. Measures used in this study will include surveys, examinations, and class projects.

I understand all information will remain completely anonymous, and that the results of the study will be available to me upon request.

Name (please print) _____

Signature_____

Date_____

Instructor Participation Consent Form

Explanation of Research

This study is being conducted as part of a doctoral study to investigate the effectiveness of two-way interactive video instruction at Ferris State University. The purpose of this study is to help determine the effectiveness of learning in a mixed two-way interactive video/traditional classroom instruction environment.

You will be free to withdraw your participation from the study at any time.

Consent to Participate:

I have been informed that this study is being conducted to investigate the effectiveness of a mixed two-way interactive video/traditional classroom instruction class setting. The purposes and procedures of the study have been explained to me, and I voluntarily agree to participate in the research.

I understand that I am free to withdraw my participation at any time without recrimination. Measures used in this study will include instructor and student interviews, as well as student surveys, examinations, and class projects.

I understand all information will remain completely anonymous, and that the results of the study will be available to me upon request.

Name (please print) _____

Signature_____

Date_____

Appendix C

Student Code:_____

Student Survey 1

Please answer each question as thoroughly as possible.

1) What college degree(s) do you have?

2) What is your age?

3) What is your approximate undergraduate GPA?

4) When did you receive your RN license? (If you have not received it yet, answer as "have not yet received")

5) How many nursing classes have you taken?

6) How many years of nursing experience do you have? (excluding school).

7) The use of two-way interactive video will influence the effectiveness of this class.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

8) Explain your answer to question 7.

9) The use of two-way interactive video will be a positive experience.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

10) Explain your answer to question 9.

11) Have you ever been involved in a class with two-way interactive video before this?

Yes No

12) If yes to question 11, how many?

13) There is a difference in effectiveness of meeting course objectives between a traditional class with the instructor present and a class delivered via two-way interactive video.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

14) Explain your answer to question 13.

15) There will be a difference in instructional quality when comparing a combination two-way interactive video/traditional instructor led class with a traditional class where the instructor is always present.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

16) Explain your answer to question 15.

17) There is a difference in ability to learn the material when comparing a combination two-way interactive video/traditional instructor led class with a traditional class where the instructor is always present. Why?

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

18) Explain your answer to question 17.

Appendix D

Student Code: _____

Student Survey 2 - Clinical

Please answer each question as thoroughly as possible.

1) The use of two-way interactive video influenced the effectiveness of this class.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

2) Explain your answer to question 1.

3) The use of two-way interactive video was a positive experience.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

4) Explain your answer to question 3.

5) Rank your preference for class format from 1 to 3. (1 - most preferred, 3 - least preferred)

____ a) two-way interactive video/ instructor never present
____b) two-way interactive video/ instructor present half the time
____c)Instructor Present - no interactive video

6) If you could take a class near your home exclusively via two-way interactive video or you could take a class located at least 1 hour away where the instructor is always present, which would you take?

Take two-way interactive video Class Drive to Location of Class

7) Having the instructor in the classroom half of the class sessions makes the class better than having the instructor teach the entire semester at one location.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

8) Explain your answer to question 7.

9) What would you recommend to make a two-way interactive video class better?

10) What would you recommend to make the class where the instructor is present better?

11) What factors, if any, make two-way interactive video less effective than the traditional classroom with the instructor present?

12) How comfortable were you in obtaining help from the instructor.

a) very comfortable b) comfortable c) neutral d) uncomfortable e) very uncomfortable

13) Explain your answer to question 12.

14) If there was a time when you needed help, whom did you ask and how (email, verbal dialog, etc.)?

15) If the instructor was not in your location, did you still ask the instructor for help during class via two-way interactive video or did you ask a classmate at your location?

16) If the instructor was in your location, whom did you ask for help? (circle all that apply)

a) instructor b) a classmate at your location c) classmate at distant location

17) There is a difference in effectiveness of meeting course objectives between a traditional class with the instructor always present and a class delivered exclusively via two-way interactive video.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

18) Explain your answer to question 17.

19) Was this class effective and why?

20) What instructional techniques (use of visual aids, video tape, class activities, etc.) did you think **were** effective in a two-way interactive classes?

21) What instructional techniques (use of visual aids, video tape, class activities, etc.) did you think **weren't** effective in a two-way interactive classes?

22) There was a difference in instructional quality between two-way interactive video and traditional instructor led instruction.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

23) Explain your answer to question 22.

24) There is a difference in the ability to learn the material if the instruction is by two-way interactive video compared to when the instructor is in the classroom.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

24) Explain your answer to question 23.

25) Would you take a class that is a combination two-way interactive video/instructor present part of the time again?

Yes No

26) Would you take a course exclusively via two-way interactive video?

Yes No

27) Having a class connected via two-way interactive video to another class where the instructor is present has a positive effect.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

28) Explain your answer to question 27.

29) Any additional comments?

Appendix E

Student Code:_____

Student Survey 3 - Lecture

Please answer each question as thoroughly as possible.

1) The use of two-way interactive video influenced the effectiveness of this class.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

2) Explain your answer to question 1.

3) The use of two-way interactive video was a positive experience.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

4) Explain your answer to question 3.

5) Rank your preference for class format from 1 to 4. (1 - most preferred, 4 - least preferred)

____ a) two-way interactive video/ instructor never present
____b) two-way interactive video/ instructor present half the time
____c)Instructor Present - no interactive video

6) If you could take a class near your home exclusively via two-way interactive video or you could take a class located at least 1 hour away where the instructor is always present, which would you take?

Take two-way interactive video Class Drive to Location of Class

7) Having the instructor in the classroom half of the class sessions makes the class better than having the instructor teach the entire semester at one location.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

8) Explain your answer to question 7.

9) What would you recommend to make a two-way interactive video class better?

10) What would you recommend to make the class where the instructor is present better?

11) What factors, if any, make two-way interactive video less effective than the traditional classroom with the instructor present?

12) How comfortable were you in obtaining help from the instructor.

a) very comfortable b) comfortable c) neutral d) uncomfortable e) very uncomfortable

13) Explain your answer to question 12.

14) If there was a time when you needed help, whom did you ask and how (email, verbal dialog, etc.)?

15) If the instructor was not in your location, did you still ask the instructor for help during class via two-way interactive video or did you ask a classmate at your location?

16) If the instructor was in your location, whom did you ask for help? (circle all that apply)

a) instructor b) a classmate at your location c) classmate at distant location

17) There is a difference in effectiveness of meeting course objectives between a traditional class with the instructor always present and a class delivered exclusively via two-way interactive video.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

18) Explain your answer to question 17.

19) Was this class effective and why?

20) What instructional techniques (use of visual aids, video tape, class activities, etc.) did you think **were** effective in a two-way interactive classes?

21) What instructional techniques (use of visual aids, video tape, class activities, etc.) did you think **weren't** effective in a two-way interactive classes?

22) There was a difference in instructional quality between two-way interactive video and traditional instructor led instruction.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

23) Explain your answer to question 22.

24) There is a difference in the ability to learn the material if the instruction is by two-way interactive video compared to when the instructor is in the classroom.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

25) Explain your answer to question 24.

26) Would you take a class that is a combination two-way interactive video/instructor present part of the time again?

Yes No

27) Would you take a course exclusively via two-way interactive video?

Yes No

28) Having a class connected via two-way interactive video to another class where the instructor is present has a positive effect.

a) strongly agree b) agree c) neutral d) disagree e) strongly disagree

29) Explain your answer to question 28.

30) Any additional comments?

Appendix F

Instructor Interview 1

1) What are your learning objectives for your part of this course?

2) For your part of the course, what measures of student performance do you use and what levels of student performance are acceptable to you in order to consider the course effective?

3) Do you expect student learning will be the same, less, or better in the class sessions delivered to students by two-way interactive video?

4) What problems or barriers do you think students face in learning the material when it is delivered a mixed two-way interactive video/traditional instruction setting?

5) Are there benefits to using a mixed two-way interactive video /live course delivery system?

6) What are the difficulties for you as an instructor in using this mode of delivery?

7) Do you think the use of two-way interactive video will be a positive or negative experience?

Positive Negative

8) Explain your answer to question 7.

9) How do you view the effectiveness of two-way interactive video in the classroom?

10) Do you think there is a difference in effectiveness of meeting class objectives between a traditional class with the instructor present and a class delivered via two-way interactive video?

11) Explanation of question 10.

12) What is your teaching preference?

Instructor Present combination two-way interactive video/instructor present

two-way interactive video No Preference

13) Explanation of question 12.

14) If a student could take a class near their home via two-way interactive video or they could take a class located at least 1 hour away where the instructor is always present, which would they take?

Take two-way interactive video Class Drive to Location of Class

15) Do you think having the instructor in the classroom half of the class sessions makes the class better than having the instructor teach the entire semester at one location?

Yes No

16) What would you recommend to make a two-way interactive video class better?

17) What factors, if any, make two-way interactive video less effective than traditional classroom instruction?

18) Where will you present course material in addition to the classroom (email, course web page, telephone conference, etc.)?

19) How comfortable will you be in providing help to the distant class? Do you anticipate any problems?

20) Do you do anything different because you are also teaching to a distance class via two-way interactive video?

21) Will you employ any special techniques to promote interaction in the distant class? If so, what will they be?

22) What do you find effective in a mixed traditional instruction/two-way interactive video classroom?

23) Do you think there is a difference in quality in instruction between a traditional class with the instructor present and a class delivered via two-way interactive video?

24) Explanation of question 23.

25) Explain the history of two-way interactive instruction at Ferris State University and how the mixed instruction model evolved.

26) Any additional comments?

Appendix G

Instructor Interview 2 - Clinical

1) Where the learning objectives met for your part of this course?

2) For your part of the course, what measures of student performance did you use and what levels of student performance? Was this course effective?

3) Do you think student learning was be the same, less, or better in the class sessions delivered to students by two-way interactive video?

4) What problems or barriers do you think students faced in learning the material when it is delivered a mixed two-way interactive video/traditional instruction setting?

5) Are there benefits to using a mixed two-way interactive video /live course delivery system?

6) What are the difficulties for you as an instructor in using this mode of delivery?

7) Do you think the use of two-way interactive video was a positive or negative experience?

Positive Negative

8) Explain your answer to question 7.

9) How do you view the effectiveness of two-way interactive video in the classroom?

10) Do you think there is a difference in effectiveness of meeting course objectives between a traditional class with the instructor present and a class delivered via two-way interactive video?

11) Explanation of question 10.

12) What is your teaching preference?

Instructor Present combination two-way interactive video/instructor present

two-way interactive video No Preference

13) Explanation of question 12.

14) If a student could take a class near their home via two-way interactive video or they could take a class located at least 1 hour away where the instructor is always present, which would they take?

Take two-way interactive video Class Drive to Location of Class

15) Do you think having the instructor in the classroom half of the class sessions makes the class better than having the instructor teach the entire semester at one location?

Yes No

16) What would you recommend to make a two-way interactive video class better?

17) What factors, if any, make two-way interactive video less effective than traditional classroom instruction?

18) Where did you present course material in addition to the classroom (email, course web page, telephone conference, etc.)?

19) How comfortable were you in providing help? Any problems?

20) Did you do anything different because you are also teaching to a distance class via two-way interactive video?

21) Did you employ any special techniques to promote interaction in the distant class? If so, what were they?

22) What do you find effective in a mixed traditional instruction/two-way interactive video classroom

23) Do you think there is a difference in quality in instruction between a traditional class with the instructor present and a class delivered via two-way interactive video?

24) Explanation of question 23.

25) Was this class effective and why?

26) What would improve future two-way interactive video classes?

27) Do you perceive a difference in the student's ability to learn the material if the instruction is by two-way interactive video compared to when the instructor is in the classroom? Why?

28) Do you think mixed two-way interactive video/instructor present classes are preferable to straight two-way interactive video classes? Why?

29) Any additional comments?

Appendix H

Instructor Interview 2 - Lecture

1) Where the learning objectives met for your part of this course?

2) For your part of the course, what measures of student performance did you use and what levels of student performance? Was this course effective?

3) Do you think student learning was be the same, less, or better in the class sessions delivered to students by two-way interactive video?

4) What problems or barriers do you think students faced in learning the material when it is delivered a mixed two-way interactive video/traditional instruction setting?

5) Are there benefits to using a mixed two-way interactive video /live course delivery system?

6) What are the difficulties for you as an instructor in using this mode of delivery?

7) Do you think the use of two-way interactive video was a positive or negative experience?

Positive Negative

8) Explain your answer to question 7.

9) How do you view the effectiveness of two-way interactive video in the classroom?

10) Do you think there is a difference in effectiveness of meeting course objectives between a traditional class with the instructor present and a class delivered via two-way interactive video?

11) Explanation of question 10.

12) What is your teaching preference?

Instructor Present combination two-way interactive video/instructor present

two-way interactive video No Preference

13) Explanation of question 12.

14) If a student could take a class near their home via two-way interactive video or they could take a class located at least 1 hour away where the instructor is always present, which would they take?

Take two-way interactive video Class Drive to Location of Class

15) Do you think having the instructor in the classroom half of the class sessions makes the class better than having the instructor teach the entire semester at one location?

Yes No

16) What would you recommend to make a two-way interactive video class better?

17) What factors, if any, make two-way interactive video less effective than traditional classroom instruction?

18) Where did you present course material in addition to the classroom (email, course web page, telephone conference, etc.)?

20) How comfortable were you in providing help? Any problems?

20) Did you do anything different because you are also teaching to a distance class via two-way interactive video?

21) Did you employ any special techniques to promote interaction in the distant class? If so, what were they?

22) What do you find effective in a mixed traditional instruction/two-way interactive video classroom

23) Do you think there is a difference in quality in instruction between a traditional class with the instructor present and a class delivered via two-way interactive video?

24) Explanation of question 23.

25) Was this class effective and why?

26) What would improve future two-way interactive video classes?

27) Do you perceive a difference in the student's ability to learn the material if the instruction is by two-way interactive video compared to when the instructor is in the classroom? Why?

28) Do you think mixed two-way interactive video/instructor present classes are preferable to straight two-way interactive video classes? Why?

29) Any additional comments?

Appendix I

Data Mapping to Hypothesis Questions

Hypothesis question	Survey/Data source	Analysis Technique
1	Student surveys - 1.13, 1.14, 1.17, 1.18, 2.1, 2.2, 2.7, 2.8, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17, 2.18, 2.19, 2.24, 2.25, 3.1, 3.2, 3.7, 3.8, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.17, 3.18, 3.19, 3.24, 3.25	t-test and discussion of open-ended questions
2	Instructor interviews - 1.9, 1.10, 1.11, 1.15, 1.17, 1.19, 1.22, 2.1, 2.2, 2.3, 2.4, 2.9, 2.10, 2.11, 2.15, 2.17, 2.19, 2.20, 2.21, 2.22, 2.27	t-test and discussion of open-ended questions
3	Student surveys - 1.5, 1.9, 1.10, 1.11, 1.12, 2.3, 2.4, 2.5, 2.6, 2.26, 2.27, 2.28, 2.29, 3.3, 3.4, 3.5, 3.6, 3.26, 3.27, 3.28, 3.29	t-test and discussion of open-ended questions
4	Student surveys - 1.7, 1.8, 1.15, 1.16, 2.22, 2.23, 3.22, 3.23	t-test and discussion of open-ended questions
5	Instructor interviews - 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.12, 1.13, 1.14, 1.20, 1.23, 1.24, 2.7, 2.8, 2.12, 2.13, 2.23, 2.24, 2.25	t-test and discussion of open-ended questions
6	Student tests and projects	t-test
7	Student tests and projects	t-test
8	Student tests and projects	t-test
9	IASI survey & student tests and projects	t-test
10	Student survey 1.9, 1.10, 2.3, 2.4, 3.3, 3.4 and student tests and projects	t-test, ANOVA and discussion of open-ended questions

Appendix I is a mapping of the hypothesis questions to the survey or data source. The number to the left of the decimal position is the survey number. The number to the right of the decimal position is the question number. For example, 1.13 is survey 1 question 13. The analysis technique for each hypothesis question is also included.

Appendix J

Description of Student Characteristic Variables

Variable	cont/disc	Type	Scale
Student Code	discrete	---	nominal
Site	discrete	predictor	nominal
# nursing classes taken	continuous	predictor	ratio
# years experience	continuous	predictor	ratio
RN license date	discrete	predictor	nominal
GPA	continuous	predictor	ratio
College degrees earned	discrete	predictor	nominal
# ITV classes taken	discrete	predictor	ratio

Appendix J describes the information about the students in the test group. Information was gathered as part of the first survey and from official student records. Students could choose to not answer any question. Appendix J is a record description of information gathered on each student in addition to test and survey data.

Appendix K

Description of Student Test Score Variables

Variable	cont/disc	Type	Scale
Student Code	Discrete	----	Nominal
Student location	discrete	---	Nominal
Class	Discrete	--	Nominal
Pre-test score	Continuous	Predictor	Interval
Posttest score	Continuous	outcome	Interval

Appendix K is a record description of the type of data used in the pretest and posttest. This is the format data was stored electronically for statistical analysis.

Appendix M

Group Statistics/Independent Samples – Community Clinical and Lecture

Survey Questions	Location	N	Mean	St. Deviation	t	probability
CC01 IV influenced effectiveness	GR	12	2.9167	1.1645	-.174	.863
	BR	16	3.0000	1.3166		
CC07 Instructor half time better than one location	GR	12	3.4167	1.3114	.454	.653
	BR	16	3.1875	1.3276		
CC12 Comfortable obtaining instructor's help	GR	12	2.0833	.9003	.437	.666
	BR	16	1.9375	.8539		
CC16a Help – instructor	GR	12	1.0000	.0000	*	*
	BR	16	1.0000	.0000		
CC16b Help – Classmate at location	GR	12	1.6667	.4924	.541	.593
	BR	16	1.5625	.5123		
CC16c Help – Classmate at distant location	GR	12	2.0000	.0000	*	*
	BR	16	2.0000	.0000		
CC17 Effectiveness meeting course objectives	GR	11	2.2727	1.1037	.822	.419
	BR	16	1.9375	.9979		
CC19 Was class effective	GR	8	1.1250	.3536	-.760	.456
	BR	15	1.2667	.4577		
CC24 Difference in ability to learn	GR	11	2.2727	.9045	.334	.741
	BR	16	2.1250	1.2583		
CC25 Take combination IV-instruction	GR	11	1.1818	.4045	-1.063	.298
	BR	16	1.3750	.5000		
CL01 IV influenced effectiveness	GR	13	2.9231	1.1152	.529	.601
	BR	16	2.6875	1.2500		
CL07 Instructor half time better than one location	GR	13	3.5385	1.3301	1.114	.275
	BR	16	3.0000	1.2649		
CL12 Comfortable obtaining instructor's help	GR	13	2.3077	1.1094	1.496	.146
	BR	16	1.8125	.6551		
CL16a Help – instructor	GR	13	1.0000	.0000	-.898	.377
	BR	16	1.0625	.2500		
CL16b Help – Classmate at location	GR	13	1.7692	.4385	1.151	.260
	BR	16	1.5625	.5123		
CL16c Help – Classmate at distant location	GR	13	2.0769	.2774	1.114	.275
	BR	16	2.0000	.0000		
CL17 Effectiveness meeting course objectives	GR	13	2.2308	1.0919	.583	.565
	BR	16	2.0000	1.0328		
CL19 Was class effective	GR	10	1.3000	.4830	.073	.943
	BR	14	1.2857	.4688		
CL24 Difference in ability to learn	GR	13	2.3077	.8549	.446	.659
	BR	16	2.1250	1.2583		
CL25 Take combination IV-instruction	GR	13	1.1538	.3755	-1.319	.198
	BR	16	1.375O	.5000		

* t cannot be computed because the standard deviations of both groups are 0.

Appendix N

Group Statistics/Independent Samples – Family Clinical and Lecture

Survey Questions	Location	N	Mean	St. Deviation	t	probability
IS13 Difference IV vs Trad effectiveness	GR BR	13 17	2.3846 2.0000	.8697 1.0607	1.062	.298
IS17 Difference ability to learn – IV vs Trad	GR BR	13 17	2.6154 2.3529	1.1929 1.1695	.604	.551
FC01 IV influenced effectiveness	GR BR	9 16	2.5556 3.0000	1.1304 1.0954	-.963	.346
FC07 Instructor half time better than one location	GR BR	9 16	2.3333 3.1875	1.2247 1.4245	-1.509	.145
FC12 Comfortable obtaining instructor's help	GR BR	9 16	1.8889 1.8125	1.0541 .8342	.200	.843
FC16a Help – instructor	GR BR	9 16	1.0000 1.0625	.0000 .2500	-.743	.465
FC16b Help – Classmate at location	GR BR	9 16	1.5556 1.3750	.5270 .5000	.850	.404
FC16c Help – Classmate at distant location	GR BR	9 16	2.0000 1.8750	.0000 .3416	1.088	.288
FC17 Effectiveness meeting course objectives	GR BR	8 13	2.5556 1.8750	.8819 .8062	1.960	.062
FC19 Was class effective	GR BR	8 13	1.1250 1.2308	.3536 .4385	-.575	.572
FC24 Difference in ability to learn	GR BR	9 16	2.4444 2.5625	1.1304 1.1529	-.247	.807
FC25 Take combination IV-instruction	GR BR	9 16	1.0000 1.1250	.0000 .3416	-1.088	.288
FL01 IV influenced effectiveness	GR BR	9 16	2.1111 2.6875	.7817 1.0782	-1.404	.174
FL07 Instructor half time better than one location	GR BR	9 16	2.2222 2.9375	1.0929 1.5262	-1.234	.230
FL12 Comfortable obtaining instructor's help	GR BR	9 16	2.0000 1.9375	1.0000 .8539	.165	.870
FL16a Help – instructor	GR BR	9 16	1.0000 1.1250	.0000 .3416	-1.088	.288
FL16b Help – Classmate at location	GR BR	9 16	1.6667 1.3750	.5000 .5000	1.400	.175
FL16c Help – Classmate at distant location	GR BR	9 16	2.0000 1.9375	.0000 .2500	.743	.465
FL17 Effectiveness meeting course objectives	GR BR	9 16	2.3333 2.1250	1.0000 .7188	.604	.552
FL19 Was class effective	GR BR	7 14	1.1429 1.0714	.3780 .2673	.503	.621
FL24 Difference in ability to learn	GR BR	9 16	2.5556 2.5000	1.1304 1.1547	.116	.908
FL25 Take combination IV-instruction	GR BR	9 16	1.0000 1.1875	.0000 .4031	-1.382	.180

Appendix O

Group Statistics/Independent Samples – Family Nursing
Student experience level with two-way interactive video (post measures)

Test*	Location	N	Mean	St. Deviation	t	probability
Fc03 itv positive	GR	9	2.8889	.9280	-1.207	.240
	BR	16	3.3125	.7932		
Fc05a rank – instructor never present	GR	9	2.8889	.3333	-1.311	.203
	BR	15	3.0000	.0000		
Fc05b rank – instructor half the time	GR	9	1.8889	.3333	-.366	.718
	BR	15	1.9333	.2583		
Fc05c rank – instructor present no itv	GR	9	1.2222	.6667	.817	.423
	BR	15	1.0667	.2582		
Fc06 prefer IV or drive	GR	9	1.3333	.5000	-.200	.843
	BR	16	1.3750	.5000		
Fc26 take exclusively itv	GR	9	1.2222	.4410	-.150	.882
	BR	16	1.2500	.4472		
Fc27 connected itv to instr present	GR	8	2.8750	.8345	-.921	.367
	BR	15	3.2667	1.0328		
Fl03 itv positive	GR	9	2.7778	.9718	-1.122	.278
	BR	16	3.1875	.8342		
Fl05a rank – instructor never present	GR	9	2.8889	.3333	-1.311	.203
	BR	15	3.0000	.0000		
Fl05b rank – instructor half the time	GR	9	1.7778	.4410	-.545	.591
	BR	15	1.8667	.3519		
Fl05c rank – instructor never present	GR	9	1.1111	.3333	-.153	.880
	BR	15	1.1333	.3519		
Fl06 prefer IV or drive	GR	9	1.3333	.5000	.103	.919
	BR	16	1.3125	.4787		
Fl26 take exclusively iv	GR	8	1.2500	.4629	.341	.736
	BR	16	1.1875	.4031		
Fl27 connected iv to instr present	GR	8	2.8750	.3536	-1.019	.319
	BR	16	3.2500	1.0000		

*F indicates Family Nursing, c indicates clinical class, l indicates lecture class, and the number indicates the survey item number. For example, Fc03 is Family Nursing Clinical survey question three.

Appendix P

Group Statistics/Independent Samples – Community Nursing
Student experience level with two-way interactive video (post measures)

Test*	Location	N	Mean	St. Deviation	t	probability
cc03 itv positive	GR	12	3.5000	.7977	.554	.584
	BR	16	3.3125	.9465		
Cc05a rank – instructor never present	GR	13	3.0000	.0000	1.363	.185
	BR	15	2.7333	.7037		
Cc05b rank – instructor half the time	GR	13	2.0769	.2774	.101	.920
	BR	15	2.0667	.2582		
Cc05c rank – instructor never present	GR	13	1.1538	.5547	-.164	.871
	BR	16	1.1875	.5439		
Cc06 prefer Itv or drive	GR	12	1.6667	.4924	.541	.593
	BR	16	1.5625	.5123		
Cc26 take exclusively itv	GR	11	1.3636	.5045	-.997	.328
	BR	16	1.5625	.5123		
Cc27 connected itv to instr present	GR	10	3.4000	.6992	-.359	.723
	BR	16	3.5625	1.3150		
Cl03 itv positive	GR	13	3.3077	.7511	-.197	.845
	BR	16	3.3750	1.0247		
Cl05a rank – instructor never present	GR	13	2.8462	.5547	.527	.603
	BR	14	2.7143	.7263		
Cl05b rank – instructor half the time	GR	13	1.9231	.2744	-1.415	.169
	BR	14	2.0714	.2673		
Cl05c rank – instructor present no itv	GR	13	1.0000	.0000	-1.333	.195
	BR	14	1.2143	.5789		
Cl06 prefer IV or drive	GR	13	1.6154	.5064	.278	.783
	BR	16	1.5625	.5123		
Cl26 take exclusively iv	GR	13	1.4615	.5189	-.525	.604
	BR	16	1.5625	.5123		
cl27 connected iv to instr present	GR	12	3.5833	.7930	.340	.737
	BR	16	3.4375	1.3150		

*C indicates Community Nursing, c indicates clinical class, l indicates lecture class, and the number indicates the survey item number. For example, Cc03 is Community Nursing Clinical survey question three.

Appendix Q

One Sample Statistics – Family and Community student quality

	N	Mean	St. Deviation	t	probability
Cc01	28	.54	.64	4.448	.000
Cc03	28	.14	.36	2.121	.043
Cc07	28	.39	.69	3.034	.005
Cc17	27	1.04	.85	6.310	.000
Cc22	27	1.04	.81	6.671	.000
Cc24	27	1.00	.83	6.245	.000
Cc27	26	.15	.46	1.690	.103
Cl01	29	.59	.68	4.627	.000
Cl03	29	.17	.38	2.415	.023
Cl07	29	.41	.68	3.266	.003
Cl17	29	1.00	.89	6.075	.000
Cl22	29	1.00	.80	6.716	.000
Cl24	29	.97	.82	6.318	.000
Cl27	28	.18	.48	1.987	.057
Fc01	25	.52	.52	3.641	.001
Fc03	25	.24	.24	2.753	.011
Fc07	25	.64	.64	3.949	.001
Fc17	25	.96	.96	6.532	.000
Fc22	25	.92	.92	5.662	.000
Fc24	25	.76	.76	4.879	.000
Fc27	23	.26	.26	2.021	.056
Fl01	25	.72	.72	4.884	.000
Fl03	25	.28	.28	2.585	.016
Fl07	25	.76	.76	4.321	.000
Fl17	25	.88	.88	6.608	.000
Fl22	24	.88	.88	5.042	.000
Fl24	25	.76	.76	4.879	.000
Fl27	24	.21	.21	2.005	.057

*F indicates Family Nursing, C indicates Community Nursing, c indicates clinical class, l indicates lecture class, and the number indicates the survey item number. For example, Fc03 is Family Nursing Clinical survey question three.

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