Constructs that contribute to student satisfaction for participating in graduate level courses delivered by full motion interactive fiber optic communications network

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Constructs that contribute to student satisfaction for participating in graduate level courses delivered by full motion interactive fiber optic communications network

by

Fatemeh Zarghami

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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For the Graduate College
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ABSTRACT

The purpose of this study was to measure constructs that contribute to graduate student satisfaction with interactive televised courses that have been taught via Iowa Communications Network (ICN). In this study student satisfaction with the instructor's communication and teaching skills, accessibility of the instructor out of classroom, course management, course content, and quality of technology was measured by using the Student Satisfaction with ICN (SSICN) questionnaire. Students' needs and their suggestions to improve the quality of education through ICN were identified through five open-ended questions. The population for the study was 690 graduate students who took ICN courses between spring 1996 and spring 1997. From the population, 300 students were selected by using stratified random sampling design. The SSICN questionnaire was mailed to students in the fall 1997. Two follow-up contacts were made to non-respondents.

Descriptive statistics were calculated for each item. Using t-tests to investigate the student satisfaction with each construct, student differences in ratings based on site-type and gender were explored. A correlation analysis was done to investigate the relationships between student satisfaction, age, and motivation. A content analysis of the responses to the open-ended questions indicated student satisfaction with their positive learning experience using interactive televised courses through ICN.

The t-test analysis revealed that there were significant differences between male and female students in their satisfaction with accessibility of instructor out of classroom. However, no significant differences were found between male and female students' satisfaction with the constructs when considering only students in the origination site. When
considering only the remote site students, t-test analysis shows there were significant
differences between male and female students based on their satisfaction with course
management and accessibility of instructor out of classroom. This study did not show any
significant relationships between student satisfaction, student’s age, and motivation for
taking ICN courses.

From the 150 students who responded to questionnaire, 19 students will not
recommend taking ICN courses to other students. Most of those students (17) who did not
recommend ICN course to others were from the origination site. Students in both site-types
felt that technical problems affected their learning. Course management had the lowest
satisfaction rating among all constructs. Students at the remote sites perceived that they did
not have access to course materials and reserved material in the library.

Students at the remote sites demanded more feedback from the instructors. Based on
the results of this study several recommendations were made to improve the quality of the
ICN delivery system. One important recommendation called for educators and program
planners who deal with distance education at both origination and remote sites
simultaneously to give greater attention to the particular needs and concerns of origination
site students, and to assure that their needs are also being accommodated during course
delivery.
CHAPTER I. INTRODUCTION

Technology has changed the way we view higher education and the delivery of instruction. A paradigm shift occurred within education as the world moved from the industrialized age to the information age (Reigeluth, 1994). In the age of information, distributed learning has begun to provide an opportunity to connect students, often at great geographical distances. The result of this shifting has resulted in an increased number of nontraditional or off-campus students who are seeking higher education degrees through distance education.

Due to the rapid development of technology, a variety of media can be used to deliver courses to students in various locations. Distance education is one type of educational technology that provides access to educational resources for diverse students who are pursuing educational goals. Not only has it become the best alternative for those who want to have access to higher education despite various types of commitments, but it also could serve the educational needs of growing populations (Granger. 1990; Moore & Kearsley. 1996).

In the late 1950s and early 1960s, the use of television to support correspondence instruction was studied to measure the effectiveness of television as an educational tool (Wright, 1991). An alternative to traditional higher education emerged in the U.S. in the 1960s and 1970s (Reiser, 1987). In the early 1970s, microwave technology developed. Since the early 1980s, distance education has experienced dramatic growth both nationally and internationally. It has evolved from early correspondence education, using primarily print-based materials, into broadcast radio, broadcast television, computer conferencing,
electronic mail, satellite telecommunication and two-way interactive communication. Advancement in technology also has facilitated learning at a distance for diverse students. Recent developments in interactive multimedia technology provide students with individualized and collaborative learning environments.

The history of distance education consists of two approaches: correspondence study and electronic communication. Correspondence studies in United States started in 1878. William Harper, who became the first president of the University of Chicago, was the early director of correspondence studies (Knowles, 1960). Bates (1995) noted that distance education evolved through a number of different stages, or generations. The first generation was identified by the predominant use of a single technology such as print. The original form of distance education, print-based correspondence study, is more than 150 years old, and academic degrees have been offered via correspondence since the 1880s.

Correspondence study has remained for a long time because of its convenience and economy. The principal media of communication in the first generation period was printed materials such as study guides, written essays or other assignments being sent by mail. Although distance education courses still use printed materials to provide the backbone of the course and a framework for other materials, a limitation of the first generation distance education has been the lack of direct interaction between the students and the instructor.

Second generation distance education began with the first Open University in the 1970s. It involved multiple media approaches, but the lack of direct or real-time two-way communication still posed a limitation. This generation relied heavily on correspondence instruction and recorded media such as radio, television, and audiotapes. Thus, the first and second generation distance education developed into the third generation distance education.
Third generation distance education is based on two-way communication between students and the teacher. It requires new types of educational organization and new teaching skills other than those of traditional education to meet the needs of students. The third generation is identified by full interactive communication among students and the instructor which takes place in real time (i.e., synchronous).

Zuccermaglio (1993) identified two ways of using technology as a delivery system. One is called full technology and the other is open technology. With full technology the students are receivers of information, while with open technology the students are provided with opportunities to reflect on their learning activities. In an interactive televised learning setting, such as the Iowa Communications Network (ICN) which is an open technology, the students are actively involved in the processes of teaching and learning. Such a system of delivery enables students to learn through interaction with both their peers and the instructor.

Interactive distance education has been defined as an educational delivery that involves sharing instruction among two or more sites using telecommunication technology while providing interaction among the participants (Hale, 1988). According to the literature, participant interaction is the key to the success of distance learning. Noticing nonverbal communication cues is important for the instructor as well as for the other students (Bates, 1995; Dede, 1990; Kabat, 1991; Moore & Kearsley, 1996). An interactive televised delivery system also provides students with the feeling of being socially present in learning situations. Hackman and Walker (1990) noted that, in an interactive televised class, cues are given to students through effective interactions. For example, the encouraging gestures and praise are social factors that enhance student satisfaction and contribute to the perception of learning.
In Iowa, distance education is being implemented through the Iowa Communications Network system (ICN). The ICN is a full-motion, interactive fiber optic telecommunications network with two-way audio and video. It is an innovative method of delivering instruction. Currently there are over 400 sites connected to the network. This connection to the ICN enables new interactive educational opportunities to be offered to students throughout the state. The interactive televised courses offered provide an alternative for students with different needs and educational backgrounds (Iowa Distance Education Alliance, 1992).

ICN offers real-time, two-way full interactive audio and video. Iowa State University is providing a variety of graduate and undergraduate courses as an origination site. Although some research has been conducted to determine the effectiveness of the ICN delivery system on student achievement, none has directly studied the satisfaction of graduate students. Most studies measured different variables and were limited to a small sample size or population such as: high school students, community college students and undergraduate students.

Several indicators are used to judge the effectiveness of an educational program. One of the most important indicators of a successful distance education program is student satisfaction with the program (Biner, 1993). Assessing student satisfaction with the learning experiences enables educators to make effective changes in the delivery of course content. Biner, Dean and Mellinger (1994) noted that the effectiveness of distance education programs should be measured by assessing student satisfaction with the program.

Although some authors have indicated that student satisfaction from a distance education program is an important criterion, few studies have been found which examine student satisfaction. Those research studies which have been conducted in the area of student satisfaction were limited to small sample sizes and mostly at the community college or
undergraduate level. The small sample sizes and pre-professional student levels prevent generalizing findings for graduate education programs.

The purpose of this study was to measure constructs that contribute to graduate student satisfaction with interactive televised courses that have been taught via ICN. This was accomplished by using a questionnaire mailed to graduate students who had participated in different ICN courses offered by six colleges at Iowa State University.

Student satisfaction with interactive televised courses was measured by having students complete a Likert-type response scale questionnaire developed especially for this study. Six constructs were used to measure student satisfaction: (a) the instructor's communication skills; (b) the instructor's teaching skills; (c) accessibility of instructor out of the classroom; (d) course management; (e) course content; and (f) quality of technology.

Other variables of interest were: site-type, gender, age, and student motivation for participating in the ICN courses. Demographic information about the students as well as comments and concerns about ICN delivery system were gathered through five open-ended questions.

Objectives of the Study

The objectives of this study were to:

1. Measure student satisfaction based on the six constructs of the study.

2. Compare student satisfaction with the graduate level interactive televised courses based on site-type (origination or remote) and gender.

3. Explore the relationship between student satisfaction with the graduate level interactive televised course based on age and motivation.
4. Identify distance students’ concerns and comments to improve the quality of education through the ICN delivery system.

Statement of the Problem

Today, several key issues are being faced by colleges and universities in the United States (Miller, 1990): (a) the dwindling state and federal support for higher education which has resulted in a need to increase tuition costs to meet financial obligations; (b) the changing makeup of the student body; and (c) the trend to assess in terms of mission effectiveness. To increase enrollment, many institutions are attracting older, part-time adult students by altering admission policies and offering flexible course scheduling that includes evenings and weekends. Most of these adult students are responding to the demands of the marketplace by participating in graduate studies to enhance their job skills.

Adult students who enroll in distance education have different motivations and backgrounds, thus, they have varying levels of enthusiasm for participating and continuing their education. Due to the students’ diverse backgrounds, universities might benefit by addressing innovative methods that increase enrollment. Improving the educational delivery system and revising educational programs to meet the needs of students are considered as effective ways to encourage students to pursue a higher education degree (Dede, 1990). Distance education is considered to be capable of meeting the needs of this adult group of students who have other commitments in their life (Kifer, 1992).

With these issues in mind, identifying the variables that affect student satisfaction is vital for any institution. The main focus of this research was to measure student satisfaction with graduate level interactive televised courses that have been taught through the ICN
delivery system. Because the ICN fiber optic system is the first statewide network of its kind, there is scant research related to student satisfaction at the graduate level with synchronous interactive televised courses for graduate level distance education.

This study looked at a variety of graduate level courses from six colleges at Iowa State University which were offered at different sites and with a diverse population of students. The diversity of the population and the variety of graduate level courses were expected to provide more comprehensive data with a high level of generalization for graduate level distance education.

Research Questions

The study was designed to answer the following research questions:

1. Are there significant differences between students in remote sites and the origination site based on satisfaction with regard to the six constructs?
2. Are there significant differences between male and female students based on their satisfaction with graduate level interactive televised courses with regard to the six constructs?
3. Are there significant differences between male and female students at the remote sites based on their satisfaction with regard to the six constructs?
4. Are there significant differences between male and female students at the origination site based on their satisfaction with regard to the six constructs?
5. Do significant relationships exist for student satisfaction with graduate level interactive televised courses and age or motivation of students?
Definition of Terms

The following terms were defined for the purpose of this research:

Accessibility of instructor out of classroom: The amount of time an instructor can spend with students based on student’s personal needs, and the possibility of having access to instructor either through contact with the instructor during office hours or by fax or e-mail.

Course content: The selection of relevant knowledge and the organization of concepts that will be taught. Course content should be based upon course objectives. Students also may be regarded as potential sources and creators of knowledge.

Course management: The aspects regarding program-student communication, registration and progress record policy, course material delivery, site support, and student access to resources.

Distance education: Instructional delivery that does not constrain the student to be physically present in the same location as the instructor. Any formal approach to learning in which the majority of instruction occurs while the instructor and student are at a distance from each other. Distance education has been defined as the situation where the instructor and students are in separate locations. In this setting the greater control of learning is held by the student rather than the instructor. In distance education settings communications are mediated between instructor and student by print or technology (Keegan, 1986; Moore & Kearsley, 1996).

Fiber optic system: A fiber optic telecommunication system converts voice, video, and data signals into digital light impulses that are transmitted over hair-thin glass fibers. It produces a clear picture, is unaffected by weather, and is less subject to noise and interference than a copper cable (Tedesco, 1990).
Instructor's communication skills: The extent to which the instructor provides the students with an atmosphere wherein the students feel comfortable in expressing themselves, participating in the class discussion, and seeing themselves as part of the classroom.

Instructor's teaching skill: The way an instructor integrates the use of technology, instructional materials, and methods in delivering the subject. It also determines the basic conditions under which the students receive the course content.

Interactive televised course: A learning environment that provides the student with the ability to interact with the instructor and other students in real-time (synchronous). An interactive televised system provides direct interaction between the student and instructor by using variety of technologies. Thus, technologies as delivery systems are crucial in this setting.

Iowa Communications Network (ICN): A statewide two-way, full motion interactive fiber optic network that operates with the main purpose to link colleges, universities, and schools throughout the state of Iowa. The construction of the ICN is entirely supported with state and local funds (Iowa Distance Education Alliance, 1992).

Quality of technology: Aspects pertaining to quality of sound, pictures, graphics, etc., in transferring the information to different sites.

Remote student: A person who participates in a learning process from a location other than the origination site where the instructor is present. A remote student also may be called distance student.

Student satisfaction: Student's state of being satisfied or content with learning experiences utilizing ICN course delivery. Includes an overall assessment based on students' willingness
to recommend ICN courses to other students, and the fulfillment of expectations related to six identified constructs.

**Assumptions of the Study**

This study was based on the assumption that subjects respond honestly to the survey questionnaire. The study presumes that the respondents were truthful, honest, and had correctly understood the directions and contents of the instrument.

**Limitations of the Study**

The study was conducted with the diverse population of graduate students at Iowa State University in different colleges and who had enrolled in a variety of ICN courses. Thus, the generalizability of the study would be limited to the two-way interactive televised courses and to the delivery system similar to the ICN. The amount of student recollection of their past experiences with ICN courses could be a limitation in generalizing the results of this study. Therefore, the results of this study will be more generalizable to the similar delivery system and the same population at other institutions.

**Significance of the Study**

Currently, more and more courses are delivered by way of televised instruction. Higher education institutions are trying to serve adult students who cannot attend traditional classrooms due to varied commitments. Therefore, there is great need to assess the effectiveness of delivery systems and other factors that influence a student's academic performance and attitudes toward distance education.
As revealed in the literature on distance education, there is a positive correlation between student satisfaction with distance education and achievement, and between positive attitudes and retention rates (Biner, 1993). Initial studies in the field focused on whether distance education was as effective as traditional classroom instruction. There is strong need for research to assess student perception and satisfaction with such courses (Biner, 1993). This study focused on student satisfaction by measuring the quality of the constructs that contribute to student satisfaction with interactive televised courses.

Studies of student satisfaction may help educators to identify one or more of the issues that distance education faces. Measuring the constructs that contribute to student satisfaction may help educators to improve the teaching and learning process. The benefits of maintaining high student satisfaction likely would be student support for the program, high student motivation, positive enrollment referrals, lower program attrition rate, and better learning (Biner, 1993).

This study may provide educators with diverse information from students in different colleges, with various educational backgrounds, and from different locations around Iowa. The result also may add some useful information to the body of knowledge in the distance education arena, in general, and the ICN delivery system, specifically. The findings of this study also may be beneficial for further study on other aspects of distance student satisfaction with interactive televised courses such as student's achievement, completion, and retention rates.

Iowa is making a large investment in producing distance educational programs throughout the state at all levels, yet very little is known about student satisfaction with this delivery system for graduate level courses. Programs in graduate education offer
opportunities for many citizens to further their education for graduate degrees, licensure, and professional development. Therefore, this study focused on the specific factors affecting graduate student satisfaction with the ICN delivery system.

The result of this study might provide benchmark data for recognizing the motivation, needs, satisfaction, and students' comments for improving the use of the ICN delivery system in graduate education. Thus, it is hoped that the data will enable educators to gain a greater understanding of the characteristics of adult students at remote and origination sites which can be used to plan for the future delivery of graduate courses through the ICN or any other fiber optic delivery system.

**Summary**

Measuring constructs that contribute to student satisfaction for participating in distance education programs is an important issue in higher education. For successful educational outcomes, educators need to address issues affecting the quality of education, such as student concerns and satisfaction with learning experiences. Measuring student attitudes and satisfaction with different aspects of the distance education program may indicate which part of the program needs improvement and which part is working effectively.

The ICN was established to provide access to education at all levels and today provides 566 educational endpoints within Iowa. This system has been recognized for its capacity to transport interactive, two-way audio, video, and data signals. The ICN is regarded as an innovative method of delivering instruction, and Iowa is a recognized leader
in the use of the fiber optic delivery system. Therefore, assessing the effectiveness of this mode of delivery in different settings will be beneficial to improving the system.

Past investigations of effectiveness of interactive televised instruction have focused on student achievement, but student satisfaction at the graduate level was not studied. The broad range of graduate students, variety of courses that have been taught through two-way interactive televised fiber optic technology in the six colleges in Iowa State University, and the numerous sites that were involved, should make the results of this study very meaningful with the high level of generalizability for similar settings.

The purpose of this study was to measure constructs that contribute to graduate student satisfaction with interactive televised courses that have been taught via ICN. These constructs are: instructor's communication skills, instructor's teaching skill, accessibility of instructor out of classroom, course management, course content, and quality of technology. Graduate students' comments and suggestions for improving the quality of distance education through the ICN delivery system were gathered through responses to five open-ended questions. Measuring student satisfaction with these six constructs might provide data to assist educators, program planners, curriculum developers, and administrators in improving the teaching and providing students with positive learning experiences.
CHAPTER II. LITERATURE REVIEW

The purpose of this study was to measure constructs that contribute to graduate student satisfaction with interactive televised courses that have been taught via ICN. This was accomplished by using a questionnaire mailed to graduate students who had participated in different ICN courses offered by six colleges at Iowa State University. Graduate student satisfaction with interactive televised courses was measured by having students complete a Likert-type response scale questionnaire developed especially for this study. Six constructs were used to measure student satisfaction: (a) the instructor’s communication skills; (b) the instructor’s teaching skills; (c) accessibility of instructor out of the classroom; (d) course management; (e) course content; and (f) quality of technology. Other variables of interest were: site-type, gender, age and student motivation for participating in the ICN courses. Demographic information about the students as well as comments and concerns about ICN delivery system were gathered through five open-ended questions. This study focused on graduate student satisfaction with the interactive televised (ITV) courses that were taught via the Iowa Communications Network (ICN).

Initial sources of information came from Educational Research Information Center (ERIC) and Dissertation Abstracts, while further sources were identified from citations in books, journals, and conference presentations. The review of the literature is divided into the following subsections: (a) What is Distance Education, (b) Interactive Televised Education, (c) Iowa Communications Network Interactive System, (d) Theories of Distance Education, (e) Adult Students Learning Theories, (f) Characteristics of Distance Education Graduate Students, (g) Student Satisfaction with Distance Education; (h) Student Motivation (i)
Interactive Televised Courses and Professional Training, (j) Interaction in Distance Education; (k) Reflection from the Literature, and (L) Summary.

A review of the literature in the field of distance education revealed that much of the studies to date centered on the use of new technologies for teaching and on the effectiveness of distance education as a teaching medium. Most of these studies revealed that there was no significant difference in student's achievement between distance education or traditional delivery systems. None of the previous research focused directly on the graduate student satisfaction with interactive televised courses.

A review of the literature revealed that the assessment of student satisfaction with interactive televised courses has been overlooked mostly due to the general conclusion that students were uniformly satisfied with distance education. Some authors indicated that student satisfaction provided program planners, administrators, and instructors with valuable information that could be used to plan and implement program strategies which encourages students to have positive attitudes toward interactive televised courses and to have higher academic achievement (Archer, 1995; Donnelly, 1995; Price, 1994; Willis, 1993).

According to Kifer (1992) student satisfaction and positive attitudes were important predictors of program effectiveness and student attrition rates. However, relatively little research has been conducted to assess graduate student satisfaction with interactive televised courses to support these assumptions.

This study focused on graduate student satisfaction with the interactive televised (ITV) courses that were taught via the Iowa Communications Network (ICN). In this research student satisfaction was assessed based on the site-type in which the students participated, their gender, and motivation for participating in interactive televised courses.
What is Distance Education

The development of new technologies has promoted an astounding growth in distance education, both in the number of students enrolling and in the number of universities adding distance education to their curriculum (Garrison, 1990). Distance education has been defined in several ways. Some definitions emphasize the physical separation of the instructor and the student (Hoyle, 1996; Perraton, 1988; Rumble, 1989).

Distance education is a method for providing instruction to persons who are engaged in planned learning to achieve identified educational outcomes in which the persons are in a place or time suitable to them rather than to the instructor. Keegan (1990) proposed specific criteria for distance education: (1) separation of the instructor and student during the teaching and learning process; (2) the influence of an educational organization; (3) the use of educational media to unite the instructor and students; (4) the provision of two-way communication between instructor and students; (5) the possibility of occasional meetings for socializing purposes; and (6) participation in a new form of education.

Moore and Kearsley (1996) summarized the different definitions of distance education as follows:

Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special instructional techniques. as well as special organizational and administrative arrangements. (p. 2)

Distance education has two main instructional categories, synchronous and asynchronous. Synchronous instruction requires the simultaneous participation of all students and instructors whereas asynchronous instruction does not. Each form of distance
education has its own advantages and disadvantages. The advantage of synchronous instruction is that the interaction between students and instructors, and among other students, will take place in real time. Distance education learning environments offer opportunities for local and longer distance collaboration, increased communication among students and instructors, access to the large global community, and access to "other" views of the world (Sheingold, 1990). Interactive televised education is one form of distance education that provides students with the opportunity to interact with instructors and other students in real time. The following section introduces this mode of delivery.

**Interactive Televised Education (ITV)**

ITV distance education is an instructional delivery that does not constrain the students to be physically present in the same location as the instructor but provides direct interaction between students and instructor in real time. It offers an opportunity for the creation of shared learning and maximizes communication, not isolation (Garrison, 1993). ITV education also provides opportunities for instructors to illustrate their presentations, supplement their lessons and provide learning resources and reference material (Schwier, 1994). ITV education could overcome the barriers of adult students' access to higher education and the cost for commuting or relocating, while it also offers an interactive environment similar to traditional education (Hezel & Derr, 1991).

In this learning environment students have the chance to interact with other students and share the educational resources. ITV education maintains a strong diverse curriculum in spite of operating costs, funding cuts and declining enrollment (Hezel & Derr, 1991).
The literature has revealed that college students viewed ITV education as an opportunity to learn in a new and exciting way, as a chance to interact with other students, and as an enjoyable experience with a variety of technologies while pursuing a higher degree (Larson, 1991). In addition, instructors believed that teaching an ITV course is as effective as it is in a traditional classroom. This is because in an ITV environment, the instructor and students can interact with each other in real-time (i.e., synchronous). According to Piirto (1993), ITV education is successful because it meets students’ needs for convenience and quality in education.

According to Lochte (1993), an advantage of ITV education is that the instructor could provide immediate feedback on the learning process and students felt they were being cared for and involved in that process. In the ITV environment the instructor has the main role in facilitating the learning process. Cyrs (1993) noted that students never have learned from the technology. They learned from competent instructors who teach through the technology.

There are many differences between traditional classroom teaching and interactive televised instruction. The main differences between these two forms of instruction are related to planning, delivering, and logistics. Teaching an ITV course requires a considerable amount of advance planning. According to Graf (1993), advance planning and organization by the instructor have increased the independent learning opportunities of remote site students and maximized the interactive capabilities of the telecommunication system.

Students in the ITV course should be more responsible and organized in their learning process. Students need to be prepared for each class in advance and be familiar with the use of technology at their individual sites. ITV education is a student-centered environment
where instructors facilitate the learning process by providing study materials and references, and by reinforcing the students to be critical and reflective in their learning process. In the state of Iowa, ITV education is conducted via the Iowa Communications Network. The next section introduces the Iowa Communications Network interactive system.

**The Iowa Communications Network Interactive System**

The Iowa Communications Network (ICN) interactive system is an example of a synchronous delivery system. It is a statewide, two-way full motion interactive fiber optic telecommunications network, with at least one point of presence in each of Iowa’s 99 counties (Simonson, Sweeney, & Kemis, 1993). This system enables instructors to deliver the course content through interactive televised education. Synchronous instruction encourages and motivates distance students to continue with their education and keep up-to-date with the course by receiving quick feedback from both the instructor and classmates through direct interaction.

A synchronous system such as the ICN provides a unique opportunity for the student to develop group cohesion and the sense of being part of the learning community (Moore & Kearsley, 1996). The ICN is based on Keegan’s theory of distance education, in which the distance learning system must artificially recreate the teaching-learning interaction and reintegrate it back into the instructional process (Schlosser & Anderson, 1994).

The development of a fiber optic communication system such as the ICN enabled the expansion of a live, interactive, two-way high quality audio and video system in education. This system has several advantages over other systems: (a) durability which results in low maintenance cost; (b) resistance to electronic currents and radiation; (c) resistance to
fluctuations in the weather; and (d) two-way communication between students and instructors and among students at multiple sites in real-time.

The ICN operates its telephone, video and audio transmission by using fiber optic cable. This is the nation's first and only two-way full motion interactive fiber optic network reaching over 566 endpoints in the state of Iowa. It is designed to be used by students and instructors in learning situations where they can interact with each other in real-time similar to the traditional classroom. Instructors use two-way interactive teleteaching to provide students at both site-types with experiences so that they will learn through their own active involvement (Iowa Distance Education Alliance, 1992).

**Theories of Distance Education**

A review of distance education literature has indicated that, although the application of distance education has existed in many forms since the 1920s, it lacks a clear theoretical base. According to Moore (1993), there is no national policy, nor anything approaching a consensus among educators of the value, the methodology, or even the concept of distance education.

The existence of a strong distance education theory should guide curriculum planners and instructors in making decisions on methods, media, financing, and student support systems. A theory of distance education also should indicate, in student-centered instruction, how students, the instructor, and technology should collaborate to provide an effective learning environment. Early theoretical approaches have attempted to explain the important role and the unique attributes of distance education (Moore, 1993).
Keegan (1990) organized distance education theories into three areas. First is the theory of autonomy, or independence, formulated by Moore (1973) and Wedemeyer (1977). Autonomy is the extent to which the student in an educational setting has the opportunity to select the resources, to set the objectives, and to evaluate his/her learning process. The theory of autonomy reflects the essential component of the independence of the student.

Second is the theory of industrialization developed by Peters (1988), who found similarities between the industrial production process and the teaching/learning process in distance education. Based on this theory, the teaching process is gradually restructured through increasing mechanization and automation. The industrial techniques include planning, division of labor, mass production, automation, standardization, and quality control (Kearsley, 1996).

The third distance education approach integrates the theories of interaction and communication (Holmberg, 1989). Based on this theory, successful distance education systems involve interactivity between instructor and students, between students and the learning environment, and among students. According to Holmberg's (1989) theory, the personal relationship between students and the instructor promotes the students' motivation for learning, and establishes a sense of membership. This interaction also fosters well-developed instructional material based on the individual needs of the students.

Based on the theory of interaction among students, instructor and learning environment, Moore (1993) formulated a theory of transactional distance, which provides a richer understanding of the students at a distance. Transactional distance is a function of two factors called dialogue and structures. Dialogue describes the extent to which, in educational
settings, the students and the instructor are able to communicate and respond to each other.

Based on Moore's (1993) theory, when an educational program is more structured and there is less student-instructor dialogue, a greater transactional distance occurs. Therefore, the effectiveness of instruction is based on the amount of transaction between the student and the instructor, not the geographic distance or the location. Systematic dialogue between the instructor and the student is the main factor in minimizing the transactional distance.

Theories of interaction and transactional distance have important application in teaching adult students in an ITV environment. These theories provide a framework within which researchers can locate numerous variables of structure, dialogue, and student autonomy, and then ask questions about the relationships among these variables (Moore & Kearsley, 1996). Based on these theories students should be active in their learning processes.

These theories in distance education placed emphasis on the role of adults in their learning processes by providing an active two-way communication between the students and the instructor. The theories indicated the importance of the adult student's feelings of being socially present in a mediated situation. A review of the literature revealed that the success of adult student programs depends on understanding adult student characteristics, and the important role of interaction in the learning processes of adults.

**Adult Students Learning Theories**

Theories and ways of thinking about higher education in the 20th century have undergone dramatic change, and there has been a complete paradigm shift in how instructors
and students view education and the nature of learning (Cooper, 1993). Theories of learning have evolved from a teacher-centered to a student-centered philosophy. With this current framework, students are viewed as creators of their reality and not just recipients of knowledge. A review of adult learning theories revealed that adult students learn differently from younger students and adolescents and that the learning process is greatly enhanced in situations where real-world, empirical uses are provided (Cross, 1981; Glickman, Gordon, & Ross-Gordon, 1995; Knowles, 1983; Schell & Rojewski, 1993).

Knowles' (1970) theory of learning for adults, called andragogy, emphasizes that adults are self-directed and expect to take responsibility for their decisions. The theory of andragogy has important implications for teaching adult students at ITV settings. According to Knowles (1970), Brookfield (1990), and Kearsley (1996), adult learning has four main characteristics. First, adults need to know why they should learn something. Second, they learn experientially. Third, they approach learning as problem solving. Fourth, they have immediate application for the subject they learn. Thus, this group of students is very task-oriented, and they want and expect their learning to be applicable to problems with which they are being confronted daily. The life experiences that adult students bring to the classroom should not be overlooked. Learning for adults involves a constant reorganizing and restructuring of information. For adult students the difficulty is not in learning something new, it is in connecting it to what has been learned previously.

Knowles' (1970) theory includes a major component of Dewey's (1938) learning theory. Dewey (1938) presented two fundamental elements of the learning process. According to Dewey's theory of learning, in each educational setting two types of activities are taking place: (a) the accumulation of experience; and (b) the transformation of these new
experiences to the other similar situations, or the reflection upon these experiences. Knowles used these two elements in developing a theory of adult students.

In his book, *The modern practice of adult education: Andragogy versus pedagogy*, Knowles (1970) introduced the concept of andragogy, or the art and science of helping adult students learn. Knowles contrasted andragogy to pedagogy and noted that because adult students have specific characteristics, the theory of pedagogy does not meet the adult student’s needs. Therefore, it is not appropriate for teaching this group of students. These characteristics separate adult students from younger students. For example, adult students and younger students differ mostly in their reaction time. Younger students have the tendency to complete assigned tasks faster but with limited attention given to accuracy. On the other hand, adult students want to take their time and do the task right. This difference in orientation may be due to the fact that adults operate in environments where accuracy is critical.

Kearsley (1996) summarized what andragogy means to instructors in practical terms. According to Kearsley, andragogy addresses the need for adult students to focus more on the process and less on the content being taught. Teaching strategies such as case studies, role playing, simulations, and self-evaluation are most useful for teaching adult students.

The theory of andragogy has a direct application in distance education instruction for graduate level programs, which are student-centered environments. Adult learning theories are focused on social and group activities that encourage students to be critical and reflective of their learning processes and of what they have learned. Based on the theory of andragogy, adjustment must be made in educational programs to meet the characteristics and the needs of adult students who are the main participants in distance education programs. In this way,
adult students are encouraged to develop their own interpretations and meanings from what they learn.

Mezirow (1991) developed the transformative theory to explain the way learners interpret the learning materials and make their own personal meanings. Based on this theory, to make meaning is to construe or interpret experience and all meanings are based on the individual student's interpretation. Mezirow defined learning as the process of using the previous interpretation to construct a new or revised interpretation of the meaning to guide future action. Transformative learning theory is, indeed, rooted in constructivism. Constructivist learning environment has been defined as a learning environment in which the people can draw upon resources to make sense out of things and to find solutions to problems. In a constructivist learning environment the emphasize is on the importance of meaningful and authentic learning activities that help the student to develop skills relevant to solving problems. (Wilson. 1995, p.23)

Both transformative and constructivist views aim to create environments that put the students in greater control of the learning situation, by empowering them with the tools and information to make decisions about their own directions based on critical thought and reflection (Martin, 1997). Transformative learning theory is the expansion of Dewey's and Knowles' theories of learning. Mezirow's theory is focused on how adults learn and how they reconstruct their previous knowledge. According to Mezirow (1991), the program planner and curriculum developer should implement the curriculum that allows for adult student control (technical skill), communicative action (practical skill), and self reflection (emancipatory action).
According to Martin (1997), constructivism is both a theory of learning and a strategy for education. It states that learning is an active process, in which people actively construct knowledge from their experiences in the world. Based on these theories adult students construct different meanings from what they learn or experience based on their past history and background. Theories of constructivism and transformative learning have direct application in teaching adult students in an ITV setting that is a student-centered environment.

A review of the literature revealed that various adult learning theorists have attempted to identify generalizable principles of adult learning (Brookfield, 1990; Kolb, 1984; Rollins & Yoder, 1993; Smith, 1982). These theorists summarized the principles of adult learning as follows: (a) adults learn throughout their lives; (b) they exhibit diverse learning styles; (c) they want their learning activities to be meaningful for them; (d) their past experience will affect their present learning; and (e) they exhibit a tendency toward self-directedness in their learning processes. There are some factors in common among different adult learning theories, such as the individual characteristics of adult students, adults' past experiences, their needs and developmental stages. The next section introduces the characteristics of adult learners who pursue higher education degrees through distance education.

**Characteristics of Distance Education Graduate Students**

The research has revealed that the demographics of distance students are changing. Graduate students who are pursuing higher degrees through distance education are typically older than traditional students. study part-time and often at a geographic distance from the
campus. As a result of these demographic shifts, changes in instructional design, student support services, and teaching methods are required.

A review of the literature revealed that distance education has traditionally attracted older students who have full-time jobs and other social and personal commitments. Most distance education students are adults. According to Kay and Rumble (1981), the more one understands the nature of adult learning, the better one can understand the nature of distance learning.

An adult student is defined as any adult who is engaged in some type of activity, formal or informal, for the acquisition of knowledge or skill, in an examination of personal attitudes, or in the mastery of behavior (Brockelt & Hiemstra, 1990; Knowles, 1980). Adult students must have a sense of ownership of the learning (Savey & Duffy, 1995). The amount of effort which the adult students will invest in learning a task depends on their own perception of two factors, the relevance of both the medium and the message and their ability to make something meaningful out of the materials presented (Saettler, 1990).

A distance student is one who is physically separated from the instructor (Rumble, 1989), has a planned and guided learning experience (Holmberg, 1986), and participates in a two-way structured form of distance education which is distinct from the traditional form of classroom instruction (Keegan, 1988). Studies have shown that adult students have specific characteristics that differ from traditional students. Keegan (1986) identified four characteristics of adult distance students in the area of experiences: (a) they usually have a full-time job; (b) their study milieu (i.e., learning) takes place off-campus, often at a distance; (c) their aspirations (usually work and family) come before study; and (d) their educational investment is often self-financed.
Researchers have suggested that distance students have some basic characteristics that influence their attitude, satisfaction, and success in coursework. Most adult students have a sense of self-direction and personal responsibility. Charp (1994) noted that student characteristics such as active listening and the ability to work independently in the absence of an instructor become crucial for success.

Distance education requires certain skills from students that may not necessarily be required in other traditional settings, most notably: self-direction, self-motivation, self-reflection, and self-evaluation. These skills are most often associated with active, self-directed students (Moore & Kearsley, 1996). A majority of distance education students are voluntarily seeking higher education. Most adult students who are pursuing post-secondary education expect to have high academic achievement. They are highly motivated and self-disciplined, and they are older than traditional students. They also are engaged in multiple roles which impact both the time and the energy they can devote to their role as student.

For several reasons, the process of learning in distance education at the graduate level is more complex than found in traditional settings. Schuemer (1993) summarized these reasons as follows:

- Many distance education students are older, have jobs and families. They must coordinate the different areas of their lives such as families, jobs, spare time, and studies that influence each other.

- In distance education settings, technology is typically the conduit through which communication flows. Until the instructor and the student become comfortable with the technical delivery system, communication will be inhibited.
• Distance students and their instructor often have little in common in terms of backgrounds and experiences; therefore, it takes longer for student-instructor rapport to develop. Without a face-to-face relationship, the students may not feel comfortable relating to their instructor. Time is needed to overcome this problem.

• Distance students have a variety of reasons for taking courses. Many take courses to broaden their education and are not really interested in completing a degree. On the other hand, some may enroll to compensate for a neglected education while others are pursuing a higher education degree.

• Distance students may feel isolated and have a high anxiety about learning and their performance.

• The motivational factors arising from the contact or competition with other peers is absent for students at remote sites.

• The student also lacks the immediate support of the teacher.

Thus, there seems to be a great diversity in distance students' characteristics with regard to their age, educational background, marital status, motivation for pursuing a higher degree, and employment. Program planners, curriculum developers, and instructors should understand the needs and motivations of this group of students for participating in the distance education programs and be able to accommodate the adult students' concerns in the distance education programs. Acknowledging the needs and concerns of adult students in distance education settings will have many positive outcomes, such as student satisfaction with the program and higher motivation for participating in the program (Biner et al., 1994).

Therefore, distance educators should accommodate the characteristics of adult students in their program planning and teaching. According to Biner (1993), identifying the
adult students’ profiles will allow instructors to adapt the process and design of their course to more specifically meet the needs of this particular group of students. Meeting student needs will increase their satisfaction and participation in interactive televised course.

**Student Satisfaction with Distance Education**

Student satisfaction is an important criteria and dimension in assessing the effectiveness of programs for distance students. Biner, Dean, and Mellinger (1994) suggested that, in judging the effectiveness of a course, student satisfaction is as important as distance student performance. There have been numerous studies on the effectiveness of distance education, and comparisons made between delivery media and student achievement level. Earlier studies focused on whether distance education was as effective as traditional classroom instruction. The vast majority of these studies found no overall differences in student outcomes (Biner, Dean & Meillinger, 1994; Gehlauf, Frye, & Shatz, 1991).

Feedback from students can be helpful in redesigning the program and making instruction more effective (Reed & Sork, 1990). Biner (1993) and Biner et al. (1994) suggested that assessing the effectiveness and success of educational programs should start with measuring student satisfaction with the programs rather than assessing learning outcomes. They argued that assessing student satisfaction helps distance education program developers to fine-tune or modify programs to provide better learning environments to increase student motivation for learning and positive attitude toward the programs. Johnson and Silvernail (1994) noted that student satisfaction with the course and the ITV system have the greatest effect on course evaluation, rather than other student related factors such as demographic characteristics, motivation, or distance (Johnson & Silvernail, 1994).
Biner et al. (1994) studied graduate and undergraduate student satisfaction with ITV courses. They identified three factors as the most effective factors in student satisfaction with ITV courses: instruction, logistics, and course management. In a study conducted with community college students who participated in two-way ITV courses, Sorensen (1994) identified predictors of student satisfaction with ITV courses and found that students, in general, were satisfied with their distance learning experience. The results supported previous findings that factors such as instruction, membership, course management, support functions, and quality of technology are strong predictors of student satisfaction, and that these factors need the most attention of the educators and program planners.

In Sorenson's (1994) study of college students, a majority of the respondents at the remote sites agreed that the instructor paid attention to remote sites students and stated that they felt they were part of the classroom. The majority also indicated that they would take another ITV course. On the other hand, the remote sites students appeared to be less satisfied than students at the origination site and gave significantly lower ratings to instruction than students at the origination site.

Bland, Morrison, and Ross (1992) examined graduate students' attitudes toward ITV courses at Memphis State University. The areas examined included study habits, use of equipment, technical quality of sound and video, instructor's questioning techniques, the distance education environment, the nature of distance education courses, teaching strategies, effect of the equipment on student academic performance, and student preferences for teaching methods. The results showed that, although a majority of the students in both site-types rated the equipment somewhat distracting, the students were satisfied with the ITV courses overall.
Studies have revealed that student demographic characteristics impact attitude and satisfaction with ITV courses, but the direction varied individually. Jegede and Kirkwood (1994) investigated the constructs that contribute to student learning and satisfaction with ITV courses. The results of this study indicated that the content of the course, employment, time, finances, readiness, and family support affected student learning, attitude, and satisfaction with ITV courses.

Paugh, Siantz and James (1995) assessed graduate student satisfaction in the context of slow scan interactive television courses. The assessment survey was organized into three dimensions: instruction/ instructor characteristics, technological characteristics, and course management and coordination. The research findings indicated that the level of student satisfaction tended to increase as the semester progressed. Students at the origination site were more satisfied with quality of technology than students at the remote sites. Overall, students were satisfied with ITV courses.

The review of literature revealed that students in general are satisfied with ITV courses. Constructs such as quality of technology, instructor's teaching and communication skills appeared to be important factors in influencing student satisfaction. In none of the studies did students respond that they preferred ITV courses to traditional classroom settings.

**Student satisfaction based on site-type**

In comparing student satisfaction in the remote sites and origination site, results from the literature were inconclusive. Pool (1996) conducted a study to examine teaching effectiveness and student satisfaction with ITV courses. In this study two main areas of teaching effectiveness were compared: performance on exams by students in remote and origination sites and teacher satisfaction as a component of teaching effectiveness. The
research findings indicated that the students generally considered the ITV course a good alternative even though there was no difference in student performance based on site-type.

Paugh et al. (1995) noted that there has been an acknowledgment on the part of investigators that, when it comes to instructional techniques, there is a difference between face-to-face instruction and ITV instruction. Hassenplug (1995), Miller (1991), and Ritchie and Newby (1989) investigated whether interaction with the instructor was reduced in the remote sites even though the technical capacity for such interaction was available. These studies found a significant difference in student mastery of content and positive attitude based on the site-type where the students participated. In addition, the students at the remote sites did not feel themselves to be a part of the class.

The literature provided evidence of differences in student satisfaction based on the site-type where the student participated. Studies have indicated that there is a difference in the amount of interaction between the instructor and students and among students based on the site-type where the students participated. According to Souder (1993), students at the remote sites appeared to bond more with their peers at the remote sites and the instructor.

There are also mixed results when comparing student satisfaction with ITV courses at remote sites and the origination site. Some studies reported that students at the origination site are more satisfied than those at the remote sites (Sorensen. 1994; Wang, 1997). However, other studies (MacFarland, 1996; Smith & McNeils, 1993) found that students at the remote sites had more positive attitudes toward their televised courses and appreciated the opportunity to obtain a higher education degree.

MacFarland (1996) compared graduate student satisfaction based on site-type and found that the overall quality of the academic program received a slightly higher rating from
remote site students than from origination site students. The remote sites students provided higher mean ratings than origination site students for approximately two-thirds of the survey questions. Students at the origination site indicated a higher level of satisfaction with the technology-based information resource infrastructure of the university. The remote sites students appreciated the chance to pursue a higher education degree.

Britton (1993) investigated graduate student perception toward the course, student satisfaction with the instructional delivery methods, and student outcomes in an ITV course. Results of the data analysis indicated no differences in perceptions of content or instructional delivery methods based on the site-type.

Hilgenberg (1997) investigated graduate students' perceptions of satisfaction and opportunities for critical thinking in distance education through ITV courses. Results suggested that students perceived a positive level of satisfaction and they perceived opportunities for critical thinking with the two-way audio, two-way video delivery system.

A review of the literature revealed that results in student satisfaction with ITV courses based on the site-type in which the students participated are inconclusive. The remote site students believed that, although there are many negative elements that affect ITV courses, the convenience of attending classes near home outweighed the perceived benefits of classroom experiences. Nevertheless, they did favor the conventional way of teaching.

**Student satisfaction based on gender**

Investigations into student satisfaction with distance education also have considered gender differences. The results of the few studies that included gender as a variable in distance education have been inconclusive. The results indicated that a majority of students
who participated in ITV courses were females, were older than traditional students, and had enrolled for convenience and personal or career related reasons (Dexter, 1995; Garrison, 1990; Hezel & Derr, 1991; May, 1993).

The effect of student demographic characteristics and their satisfaction was studied by Stone (1990) and Biner et al (1995). The results indicated that demographic characteristics such as gender had no impact on student satisfaction. The students placed a greater emphasis on the quality of the course content.

Price (1994) conducted a study to examine the correlation between student satisfaction and student demographic characteristics. The results of this study did not show any relationship between student satisfaction and gender. However, Biner, Summers, and Dean (1996) conducted a similar study to examine the extent to which demographic variables predicted student satisfaction with ITV courses. The participants in this study were undergraduate students who were enrolled in at least one of 33 ITV courses. The results showed that gender reliably predicted student satisfaction with the logistic/management aspects of the telecourses. They also indicated that male students were significantly more satisfied with these aspects than female students.

**Student Motivation**

Graduate students in distance education need to be highly motivated to be successful in their individual study. The few studies that included student motivation as a variable in distance education revealed that there is a correlation between the student motivation for enrollment in an ITV course and the level of satisfaction. Scheiderman (1992) cautioned all
instructional designers and instructors to begin with an understanding of the adult students' needs and motivation, and to recognize them as individuals whose outlook is different from the instructional designer and their instructors.

The results of a study conducted at the University of South Carolina (Price, 1994) showed that those who enrolled in an ITV course because the course topic interested them reported the highest level of satisfaction. The major reasons for participating in an ITV course included: convenience, job-related, and personal interest. Student motivation for participation and the number of hours they worked did influence their satisfaction with the program.

In a statewide study of factors related to the successful implementation of distance education, Hassenplug (1995) indicated that the majority of remote site students took the course because it was required for their program. The second most often reported reason was that the course was offered at a convenient time or place. Other reasons, in the order of importance, were: liked instructor, curious about televised courses, friend or counselors had recommended it, and other reasons.

**Interactive Televised Courses and Professional Training**

Adult students have specific characteristics and differing conditions as compared to traditional students. These differences make the teaching of adults unique. Therefore, different ways of teaching and special training are required for instructors who are involved with teaching this group of students through ITV courses.
Distance instruction is different from traditional education. Effective distance education requires extensive course preparation, as well as adapting traditional teaching strategies to a new learning environment. Instructors need systematic training in the use of technology which they are expected to use (Sherry & Morse, 1995). Distance education enterprises are partnerships. They are characterized by the integration of a great many parts working toward a common goal (Schlosser & Anderson, 1994). The literature in the area of professional training described that the need for a faculty development program for teaching ITV courses is viable. Meeting the instructional needs of students is the cornerstone of an effective distance education program, and the test by which all efforts in the field are judged.

Beaudoin (1990) explained that distance education revolves around a student-centered system with the instructor in a facilitator role. The instructor should have the required certification for the appropriate educational level, be knowledgeable in the subject area, and trained in effective distance education strategies. Nevertheless, as more ITV instruction is offered, more and more instructors who are experienced only in traditional teaching modes are being asked to adapt to ITV instruction. For most instructors, this is a difficult transition (Derr, 1991; Kromholz & Johstone, 1988; Ross, 1992; Shepard, 1992). The most important factor for successful ITV course delivery is a caring, concerned instructor who is confident, experienced, at ease with the equipment, uses the media creatively, and maintains a high level of interactivity with the students (Sherry, 1996).

Instructors who taught a class by distance education reported that the preparation is different and takes longer than traditional classroom instruction (Dillon & Price, 1990; Moore & Kearsley, 1996). The ITV course instructor is an important element throughout the distance learning process. Bland, Morrison, and Ross (1992) indicated the need for
instructors to be more systematic and be provided with on-going support while teaching the ITV course.

Student satisfaction is affected by an instructor's communication skills and methods of teaching, therefore, the ITV course instructor should be trained in facilitating interactivity and in operating the technology. A review of the literature indicated that the instructor needs different skills and plays different roles in televised teaching than in traditional settings (Porters, 1994; Willis, 1992). Providing appropriate training would help instructors change their teaching methods and place more emphasis on advance preparation, student interaction, visual materials, activities for independent study, and follow-up activities (U.S. Congress, 1989, p. 11).

A study by Gehlanf, Frye, & Shatz (1991) on the reaction of instructors to teaching courses in a traditional classroom compared to ITV courses, showed that instructors in the ITV course wanted to shift to more traditional approaches but found these methods not as effective. The instructors perceived that they needed to be better organized and to be trained to teach ITV courses. The instructors believed that ITV courses are more time consuming.

Derr (1991) surveyed 419 full-time instructors at 13 campuses of the Minnesota technical college system on barriers to the use of distance learning methods. The majority of respondents did not consider themselves very familiar with distance learning technology. Derr noted that the lack of knowledge about the effective use of technology was a significant barrier to the adoption of distance education in Minnesota technical colleges.

Levinson (1984) noted that ITV instructors also need personal characteristics such as positive attitudes toward televised courses, excellent interpersonal skills, adaptability and versatility, excellent organizational skills, and interest in trying new forms of communication
with students. The effective teaching of ITV courses requires both knowledge about students and advanced preparation on the part of the instructors. The implication is that teaching in ITV settings requires instructors to reassess their teaching methods and overall course planning.

According to Willis (1992), the strategies that are effective in ITV learning environment are: developing appropriate methods of feedback and reinforcement, optimizing content and pace, and adapting to different student learning styles and needs. Price, Repman, and White (1994) examined the different strategies in planning for effective instruction through televised courses and made the following recommendations: (1) provide an overview of the technology and how it works; (2) provide hands-on guided practice; (3) establish the amount of time needed to prepare and teach ITV courses; and (4) use strategies that encourage group cohesion and motivate students. The students and instructors also were advised to adapt themselves to the medium.

Therefore, teaching courses through distance education requires greater organization than a traditional course. Teaching an ITV course requires ongoing training in the form of regular observation of a master teacher, training in the use of carefully selected print, audio, graphic, and video materials. In addition, the instructor needs to pursue different ways to provide feedback to the students through the systematic and planned interactions.

**Interaction in Distance Education**

Effective communication is important in student satisfaction with distance education. Interaction is the catalyst for instruction. Studies have shown that interactivity is a complex variable that has many different facets (Kearsley, 1996). Most forms of distance learning
traditionally have suffered from too little interaction (Dempsey & Sales, 1994; Fulford & Zhang 1993). According to Hackman and Walker (1991), systematic interaction between students and instructor allows adult students to engage in a form of personal involvement that is essential to effective mediated learning. A way to ensure that active learning is taking place is to use technology that allows for two-way interaction at a distance with focus on seeing, listening, and being involved in action.

Moore (1989) identified three types of interaction: student-student, student-instructor, and student-content. Student-student interaction is the exchange of ideas through dialogue between students, student-instructor interaction provides motivation, feedback, and dialogue between the instructor and the student. Student-content interaction is the method by which students obtain intellectual information from the course content.

Gunawardena (1992) added a new component to the interaction, called student-interface interaction. Student-interface interaction is the interaction between the student and technology. In this form of interaction the student should have the skill to use a communication medium in order to make successful interactions with technology.

Each type of interaction has different effects on a student’s learning outcomes and the effectiveness of the course. In a traditional teaching environment, the main focus is on student-instructor interaction and the interaction is normally immediate. In distance education settings, the interaction can be immediate with some media (e.g., teleconferences) or delayed (e.g., correspondence or computer networks). This distinction between delayed or immediate interaction is very significant because it determines the logistics and feel of the distance learning experience (Kearsley & Moore, 1996).
Scholdt, Zhany, and Fulford (1995) investigated the phenomenon of asking and answering questions because “... if students perceived barriers to asking and answering questions, interaction may be seriously curtailed” (p. 535). Their study revealed that the perceived ease of asking and answering questions varied with the location of the student and instructor. Sending answers was perceived to be easier when the answers were going to a different site, but asking questions was rated to be easier when the question was asked at the same site. They explained this difference by hypothesizing that answers are prompted and would be generally easier to transmit, while asking questions from remote sites are more difficult because the situation is further complicated by the distance between instructor and students.

Successful distance education systems involve interactivity between student and content, instructor and student, student and technology, and among students. The significance of the interaction in distance education is that it provides students with the means to receive immediate feedback from the instructor and peers. Thus, an effective ITV course should not be an independent and isolated form of learning; it should approach Keegan’s idea of an authentic learning experience (Sherry, 1996).

In distance education settings the nature of interaction is varied based on the types of delivery systems. The responsibility for creating interaction in distance programs rests with the instructors. In teaching ITV courses, the instructors should plan for all forms of interaction based on the types of delivery systems being used.

Instructors should build interactive sequences into their classes through simple question and answer sessions, problem-solving in the form of group activities, and role playing (Kearsley & Moore, 1996). McNabb (1994) noted that, although students feel that
the accessibility of distance learning courses far outweighs the lack of dialogue, there is still a considerable lack of dialogue in telecourses when compared to face-to-face classes.

In ITV courses the students should be active participants in the learning process, work together on group presentations and role-playing activities, and be involved in group discussion (Egan, Welch, Page, & Sebastin, 1992; Hegge, 1993 Shepard, 1992; Willis, 1989). In an ITV course, students also should be engaged in group problem-solving activities and be encouraged to interact via technology with their peers (Shepard, 1992; Willis, 1994). Studies by Millbank (1994) and Porter (1994) revealed that when adult students were engaged in real-time interaction, the retention rate and their satisfaction were raised.

Garrison (1990) argued that the quality and integrity of the educational process depends upon sustained, two-way communication. Without effective communication in ITV settings, distance education will degenerate into a correspondence course model. Holmberg (1995) noted that two-way communication between the instructor and the student supports the student's motivation, facilitates learning, and provides on-going assessment of the student's progress.

Research has revealed that interaction in ITV instructional settings may be negatively affected by the novelty of technology, the number of participants, number of sites involved, and the decreased ability to receive non-verbal cues from the students (Fulford & Zhang, 1993; Garrison, 1990; Willis, 1994). In some cases the lack of an opportunity to have access to the instructor after the class and the disruption of being on the TV monitor make interaction harder for both the instructor and the students.
Reflection from the Literature

A review of the literature in the area of student satisfaction with ITV courses revealed that few studies had been conducted in this area and these studies either were to either a small sample size or were targeted to audiences other than graduate students. The majority of studies, related to student attitude and satisfaction with ITV courses, to date have been implemented at the K-12, community college, or undergraduate level.

Graduate students who are pursuing higher degrees through ITV courses are older than traditional students and work full-time. The flexibility of the schedule, curriculum, and methods of teaching are the main reasons why a majority of adult students are pursuing higher degrees through ITV education. The literature review also indicated that distance education is basically concerned with the education of adults.

Adult students who pursue higher degrees through ITV courses have their own characteristics that make them different from traditional students. These students are different in terms of life circumstance, physical and psychological development, and experiences. Therefore, the adult learning theories have a direct implication in teaching adult students in an ITV setting.

The research in the area of graduate student satisfaction with ITV courses has several limitations. There are many unanswered questions, particularly regarding the role of interaction in student satisfaction, and the effects of variables such as gender, site-type, student motivation for participation, and student demographic characteristics in their satisfaction with ITV courses. Nevertheless, the literature does confirm the long-standing view that distance education students are predominately adults who are pursuing higher education degrees on a part-time basis.
Many authors have noted that student satisfaction and positive attitudes are important predictors of program effectiveness and will increase student attrition rates. The review of literature revealed that these assumptions rarely are questioned, and when they are, no hard data are offered. Research into reasons why students participate in distance education has basically focused on barriers that inhibit access to on-campus courses rather than on the attractions of distance learning.

In general, relatively little research has been conducted in the area of graduate student satisfaction with ITV courses and the results are inconclusive with regard to the influence of student gender and the site-type where students have participated. For the purpose of this study, based on the review of literature in the area of graduate student satisfaction with ITV courses, some constructs were identified. A conceptual schema was proposed to illustrate the contribution of each construct to student satisfaction and the outputs of student satisfaction and positive experiences with ICN courses (Figure 2.1).

Based on this conceptual schema, six constructs will influence student satisfaction in distance education. Among the six constructs, accessibility of instructor out of classroom and course management will affect remote sites students more than origination sites students. Other constructs affect student satisfaction at both site-types equally. Other outputs are positive experiences of students, establishing new friendships and professional relationships, and sharing knowledge and resources.
Figure 2.1. Conceptual schema for measuring student satisfaction with ICN courses

Summary

Today, the assessment of student satisfaction with distance education has become an integral component in the accountability of higher education. There are two primary reasons for the continued interest in student satisfaction. First is measuring program effectiveness and the second is assessing student retention rate. Distance education delivery via the ICN system is clearly the predominant means of providing instruction to students at a distance in Iowa.

Distance education is seen as a medium to provide for a wider range of student skills, requires a reliance on high quality instructors, and provides greater opportunities for students than that which is available in traditional classrooms (Dede, 1991). A review of the literature in the area of ITV courses revealed that there are some constructs that contribute to student
satisfaction. In a majority of the studies the logistical aspect of the course, adequacy of the instructor's training in use of the technology, course management, and the promptness of material transferred between sites are important factors that contribute to student satisfaction with ITV courses.

Relatively few studies have been conducted to investigate graduate student satisfaction with ITV courses. However, these studies have indicated that students, in general, are satisfied and would like to continue this form of education. A few studies investigated student satisfaction with ITV courses based on the site-type of participation, gender, and motivation, but the results were inconclusive.

Studies have revealed that there are no significant differences between students at the remote sites and origination sites based on academic achievement. However, a few studies compared student satisfaction at the origination and remote sites. Some of those studies indicated that students at remote sites are less satisfied with the ITV course than the students at the origination site. Their dissatisfaction is mainly in areas such as: instruction/instructor, course management or coordination functions, and the quality of technology.

Studies have indicated that teaching ITV courses requires a tremendous amount of training, preparation, and planning. To achieve effectiveness in course planning, the instructor needs to know the characteristics associated with the distance education system, the available resources, and the characteristics of the students. Knowing the characteristics of the students helps to increase the effectiveness of the instruction and delivery process.

In spite of the fact that students at remote sites appreciate the opportunity and convenience offered by distance learning, they prefer to participate in traditional classrooms if they have the chance. Although studies revealed that there are factors that affect ITV
courses negatively, the convenience of attending classes near home outweighs the perceived benefits of the traditional classroom experience.
CHAPTER III: METHODOLOGY

The purpose of this study was to measure constructs that contribute to graduate student satisfaction with ITV courses that have been taught via ICN. This was accomplished by using a questionnaire mailed to graduate students who had participated in different ICN courses offered by six colleges at Iowa State University. Graduate student satisfaction with ITV courses was measured by having students complete a Likert-type response scale questionnaire developed especially for this study. Six constructs were used to measure student satisfaction: (a) the instructor’s communication skills; (b) the instructor’s teaching skills; (c) accessibility of instructor out of the classroom; (d) course management; (e) course content; and (f) quality of technology. Other variables of interest were: site-type, gender, age and student motivation for participating in the ICN courses. An additional purpose of this study was to gather the students’ demographic information and their concerns with distance education courses that they had taken through the ICN delivery system. Concerns regarding distance education courses were gathered through five open-ended questions.

The decision on appropriate methods and procedures was based on the specific objectives of the study. The objectives were to measure student satisfaction with the six constructs and to gather the student comments and concerns about the ICN courses. In this study, student satisfaction with the graduate level ITV courses was compared based on the site-type (origination or remote) in which students had participated and on gender. The relationships between student satisfaction and age or motivation were investigated.
Population and Sample

The population for this study was 690 Iowa State University graduate students who participated in ITV courses that had been delivered through ICN delivery system from the start of spring semester 1996 through completion of spring semester 1997. The sample for this study was randomly selected from the population of students who took the ICN courses in different colleges at Iowa State University. A stratified random sample was used to ensure that the selected sample was representative of the target population. Three hundred students were randomly selected from 326 students who participated in classes held at the origination site on-campus and 364 students who participated in classes at remote sites. These students took the ICN courses either in spring 1996, summer 1996, fall 1996, or spring 1997. An equal number of students was selected from each site-type, 150 students from the remote sites and 150 from the origination site. A list of ITV course areas that had been taught through the ICN delivery system during spring 1996 through spring 1997, the number of courses offered, number of students enrolled, and number of students who were randomly selected are shown in Table 3.1.

The list of courses indicates the variation in the content areas (e.g., accounting, agriculture, business, education, social science, design, and art) that had been taught through the ICN. For any single course, the maximum number of students at the origination site was 24, and the maximum combined enrollment at the remote sites was 27 students. Thirteen courses had no participants at the origination site; therefore, these courses were offered only to remote sites students. Six courses had no remote sites students enrolled in them. The largest student enrollment in ITV courses was from the College of Liberal Arts and Sciences.
Table 3.1. List of ITV courses offered from spring 1996 through spring 1997

<table>
<thead>
<tr>
<th>Course</th>
<th>No. of times held</th>
<th>Enrollment</th>
<th>Sample selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>1</td>
<td>26</td>
<td>12</td>
</tr>
<tr>
<td>Agriculture</td>
<td>8</td>
<td>95</td>
<td>25</td>
</tr>
<tr>
<td>Art &amp; Design</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Astrophysics</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Curriculum &amp; Instruction</td>
<td>3</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>Economics</td>
<td>2</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>Educational Administration</td>
<td>1</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Family &amp; Consumer Sciences</td>
<td>5</td>
<td>61</td>
<td>29</td>
</tr>
<tr>
<td>Higher Education</td>
<td>4</td>
<td>62</td>
<td>28</td>
</tr>
<tr>
<td>Human Development</td>
<td>4</td>
<td>99</td>
<td>42</td>
</tr>
<tr>
<td>Marketing &amp; Business</td>
<td>3</td>
<td>40</td>
<td>17</td>
</tr>
<tr>
<td>Mathematics</td>
<td>2</td>
<td>34</td>
<td>14</td>
</tr>
<tr>
<td>Political Science</td>
<td>7</td>
<td>99</td>
<td>46</td>
</tr>
<tr>
<td>Statistics</td>
<td>2</td>
<td>63</td>
<td>24</td>
</tr>
<tr>
<td>Technology &amp; Social Change</td>
<td>1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Transportation</td>
<td>1</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>690</td>
<td>300</td>
</tr>
</tbody>
</table>

(266, 38.8%), followed by the College of Family and Consumer Sciences (167, 24.3%).

Table 3.2 shows a breakdown of the number of students enrolled by college.

Research Design

The research design used in this study was descriptive. Ary (1990) explained that “descriptive research studies are designed to obtain information concerning the current status of phenomena. They are directed toward determining the nature of the situation as it exists at the time of the study” (p. 381).

Data about the students' major concerns and recommendations to improve the quality of education through ICN were gathered through responses to five open-ended questions. A
Table 3.2. Number and percentage of students enrolled in ITV courses by college

<table>
<thead>
<tr>
<th>College</th>
<th>Enrollment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>98</td>
<td>14.3</td>
</tr>
<tr>
<td>Business</td>
<td>78</td>
<td>11.4</td>
</tr>
<tr>
<td>Design</td>
<td>5</td>
<td>0.8</td>
</tr>
<tr>
<td>Education</td>
<td>72</td>
<td>10.4</td>
</tr>
<tr>
<td>Family &amp; Consumer Sciences</td>
<td>167</td>
<td>24.3</td>
</tr>
<tr>
<td>Liberal Arts and Sciences</td>
<td>266</td>
<td>38.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>690</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

content analysis of the responses was performed. The information gathered from this descriptive research study could be used to assist educators and program planners as the plan for their ITV courses.

**Instrument Development**

To obtain the data necessary to accomplish the objectives of this study, a mailed questionnaire was the chosen format. This seemed to be an efficient method to gather the information needed. Measures of student satisfaction with ITV courses were obtained from 46 items using a 5-point Likert-type response scale. The questionnaire was developed by the researcher after an extensive review of literature and careful consideration of studies based on ITV courses.

A review of literature related to the different components of two-way ITV courses revealed that several constructs contribute to student satisfaction and attitudes toward televised courses. Based on the literature, six constructs were selected: (a) instructor's communication skills; (b) instructor's teaching skills; (c) accessibility of instructor out of classroom; (d) course management; (e) course content; and (f) quality of technology. The
operational definition for each construct was developed and a list of items was generated to measure each construct. Then a questionnaire was developed with 72 items. Over a period of three months these items were reviewed and revised to fit the objectives of the study. After several revisions, 62 items were selected for the survey instrument to measure Student Satisfaction with ICN (SSICN) courses.

In developing the SSICN questionnaire, the technique developed by Handerson, Morris, and Fitz-Gibbon (1987) was followed. This technique has seven steps:

Step 1: Identify specific information needed
Step 2: Choose response format
Step 3: Identify the frame of reference of the respondents
Step 4: Write the questions
Step 5: Critique questions by trying them out and revising them
Step 6: Assemble the questionnaire
Step 7: Administer the questionnaire

Step 1: Identify specific information needed

The purpose of this study was to assess student satisfaction with ITV courses. Six constructs were identified through a review of the literature (Biner, 1993; Biner et al., 1994; Garrison, 1990; Sorensen, 1994).

Step 2: Choose response format

Due to large sample size (300), it was determined that selected-response format items would be most appropriate. This format would allow students to complete the questionnaire quickly, and produce the summaries in a relatively short time. A five-point Likert-type response format was used, ranging from strongly disagree to strongly agree.
Step 3: Identify the frame of reference of the respondents

According to Handersoo, Morris, and Fitz-Gibbon (1987) the appropriate reading level of respondents needs special consideration in writing the items. Because the respondents are graduate students, the reading level of the questionnaire could be high. A pilot test was given to test the clarity of the items.

Step 4: Write the questions

The questions were categorized based on each construct.

Step 5: Critique the questions by trying them out and revising them.

A panel of experts reviewed the items for inclusion in the constructs and evaluated the questionnaire for redundant, unclear, or unrelated items. A pilot test helped to refine all items that seemed to be too wordy or hard to understand. The instrument was validated by an expert panel of five Iowa State University faculty members from the College of Agriculture, College of Education, and the College of Family and Consumer Sciences. All five experts received copies of the instruments as well as copies of the objectives for the study and they returned the instrument with comments. The cover letter sent to the panel of experts to solicit their assistance is found in Appendix A. The panel’s task was to answer the following questions:

1. Does the instrument meet the stated research objectives?
2. Which items need clarification?
3. Are there errors in any items?
4. Do the items flow in logical order?
5. Are there essential content areas that are not addressed?
6. Are there items that are repeated or unnecessary?
Graduate students who participated in an ICN delivered workshop in the summer 1997 completed a pilot test of the instrument. The returned questionnaires from the panel of experts and students were examined for comments, questions, and ease in responding. Then minor changes in the instrument were made based upon evaluation of the pilot test and suggestions of the panel of experts.

*Step 6: Assemble the questionnaire*

Sixty-two items were selected to be pilot tested after several revisions. The questionnaire was titled: Student Satisfaction with Iowa Communications Network (SSICN). The questionnaire had a total of four pages and was divided into three main sections. Section one was designed to identify demographic variables such as student gender, age, marital status, motivation, and number of graduate courses taken through ICN. Section two consisted of 47 items using a five-point Likert-type response scale that was rated from strongly disagree to strongly agree. The items in part two were designed to measure student satisfaction with the six constructs. Section three provided an opportunity for the respondents to add their comments concerning improvement of distance education through ICN. This part of the questionnaire consisted of five open-ended questions:

1. Two things that they found satisfying about ICN courses.
2. Two things that they found unsatisfying about ICN courses.
3. Description of unexpected experience (s) they had with ICN system.
4. Two things that they recommend for improving the use of the ICN system.
5. Additional comments.

*Step 7: Administer the questionnaire*
The SSICN questionnaires and a cover letter were mailed to all 300 students who had been selected by stratified random sample design. Approximately 10-15 minutes was required for completion of the questionnaire. Copies of the cover letter and the questionnaire are presented in Appendix B.

Human Subjects Review

Following federal law and university policy, the Iowa State University Committee on the Use of Human Subjects in Research reviewed the procedures and the SSICN used in this study. The committee concluded that there were no risks to participants, and that their rights and welfare were adequately protected. Confidentiality was assured that names would not be identified with individual or composite results, and each participant had the right to decline to participate in the study. A copy of the signed approval form is exhibited in Appendix C.

Data Collection

Following the approval to conduct the research by the Human Subjects Review Committee at Iowa State University, each student in the sample was sent a personalized and signed cover letter which explained the purposes and importance of the study, requested participation, and assured confidentiality of responses. In the cover letter directions for completing the questionnaire as well as the date for mailing it back were provided.

Questionnaires were coded and numbered with two different colors for origination site and remote sites students to expedite the follow-up procedures. From the 300 survey instruments that were sent out, 20 were returned with no useable data for different reasons such as change of student’s address (10 cases), receiving questionnaire twice because they
were selected in the sample more than once (5 cases), signed up for courses but never attended the ICN classes (5 cases). Therefore, the adjusted invited sample size was determined to be 280 students.

Data collection began on September 25, 1997, and lasted until November 25. Follow-up letters (Appendix B) were sent on October 20 to all students who had not returned their questionnaire by that time. At the end of the first phase of the follow-up, the 50 students who still had not responded were sent an additional questionnaire. After second follow-up, on November 5, 35 students returned the questionnaires. From these 280 students, 150 returned the questionnaires after the second follow up, for the response rate of 54.7%. On November 15, a third follow-up reminder postcard was sent to all nonrespondent students. In this step no response was received from any of the nonrespondent students. Data collection ceased on November 25th.

**Data Analysis**

Data from the returned questionnaires were transferred to a computer file. Statistical analysis was performed using the SPSS for Windows version 7.5 computer program. Means and standard deviations were calculated for each item. Frequencies and percentages were tabulated for each item to summarize agreement with items related to the constructs. Inferential statistics, including t-tests, were used to examine differences in computed means for satisfaction with ITV courses based on site-type and gender. Spearman rho correlation was used to study the relationship between student satisfaction and age or motivation for taking an ICN course. Two-way ANOVA was conducted to investigate the possible interaction between site-type and gender.
The consistency of a measure, or the degree to which it can be expected to provide similar results for the same subjects, is called reliability. The reliability of a test is usually expressed as a coefficient. The reliability coefficients reflect the extent to which a test is free of error variance. The more closely the reliability coefficients are to the value of 1.00, the higher is the reliability coefficient. Reliability coefficients can be obtained by several different approaches.

Reliability for the six constructs was established by calculating the Cronbach’s alpha to estimate the reliability of the composite score from the responses to a number of items. The reliability was calculated on data from 150 responding students. Examination of item-total construct correlation indicated two items that did not contribute to the construct and therefore were eliminated from further analyses. Table 3.3 indicates the final number of items and reliability coefficients for each construct.

Table 3.3. Reliability of the constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s alpha</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor’s communication skills</td>
<td>.81</td>
<td>8</td>
</tr>
<tr>
<td>Instructor’s teaching skills</td>
<td>.80</td>
<td>8</td>
</tr>
<tr>
<td>Accessibility of instructor out of classroom</td>
<td>.76</td>
<td>4</td>
</tr>
<tr>
<td>Course management</td>
<td>.75</td>
<td>11</td>
</tr>
<tr>
<td>Course content</td>
<td>.94</td>
<td>7</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>.84</td>
<td>7</td>
</tr>
</tbody>
</table>
The result of the reliability analysis showed that the internal consistency of the instrument constructs was very high (over .75). The computed Cronbach’s alpha for each construct indicated that the items in the constructs were highly consistent, with coefficients ranging from .75 to .94. These constructs were judged to be reliable measures of student satisfaction with graduate level ITV courses. Therefore, the instrument was deemed an appropriate measure for the study.

Data analysis was conducted by using the student satisfaction total average item score across the six constructs. Computing the total average item score of student satisfaction was done in two steps. First, for each construct a construct average item score was computed by adding together the student satisfaction scores for each item in one construct and dividing the sum by the number of items in that construct. Second, the values from each construct average item score were added together and divided by number of constructs (6) to obtain the student satisfaction total average item score.

Six construct scores were computed, each as a construct average item score for related items in the specific construct. T-tests were used to investigate the student satisfaction with each construct by examining differences in ratings based on site-type and gender. The correlation procedure was used to investigate the relationships between student satisfaction and their age or motivation. For the aforementioned statistical analyses (i.e., the t-test, correlation, and two-way ANOVA), the level of significance was 0.05. The responses to open-ended items were compiled to ascertain the students’ suggestions for improvement and their concerns related to ICN courses. Then a content analysis of the responses to the open-ended questions was performed to describe student satisfaction with the ITV courses.
Summary

A questionnaire was developed to measure student satisfaction with graduate level ITV courses. Statistical measures provided evidence to support the reliability of the questionnaire. The constructs identified for this study appeared to be consistent with the literature. Cronbach's alpha coefficient estimates indicated that the constructs were reliable in measuring graduate student satisfaction with ITV courses that had been taught through the ICN delivery system. The findings of the study are provided in the following chapter.
CHAPTER IV: FINDINGS AND DISCUSSION

The purpose of this study was to measure constructs that contribute to graduate student satisfaction with ITV courses that have been taught via ICN. This was accomplished by using a questionnaire mailed to graduate students who had participated in different ICN courses offered by six colleges at Iowa State University. Graduate student satisfaction with ITV courses was measured by having students complete a Likert-type response scale questionnaire developed especially for this study. Six constructs were used to measure student satisfaction: (a) the instructor's communication skills; (b) the instructor's teaching skills; (c) accessibility of instructor out of the classroom; (d) course management; (e) course content; and (f) quality of technology. Other variables of interest were: site-type, gender, age, and student motivation for participating in the ICN courses. An additional purpose of this study was to gather the students' demographic information and their concerns with the most recent distance education course that they had taken through the ICN delivery system. Concerns regarding distance education courses were gathered by asking the students to respond to five open-ended questions.

The population for this study consisted of 690 graduate students who participated in 46 courses, through the ICN system. These courses were offered in six colleges at Iowa State University from spring 1996 to spring 1997. The sample size for the study was 300 graduate students who were selected by stratified random sampling from the origination and remote sites. Adjusted invited sample size was 280 students who met criteria for being included in the study. One hundred fifty students returned the completed questionnaires for a response rate of 54.7%. Usable data from 150 students were analyzed using descriptive and inferential
statistics. The research findings are presented in five subsections: (a) Description of the Sample; (b) t-test Analysis; (c) Course Analysis of Students Comments; (d) Summary and Discussion; and (e) Conclusions.

**Description of the Sample**

A total of 150 students answered the SSICN questionnaire, 80 from remote sites and 70 from the origination site. There were 68 male and 82 female students in the study. Of the 150 respondents, 116 (68%) were married and 34 students (31.4%) were single. Half of the respondents (50.7%) who were married were childless whereas 44.7% had from one to three children. Of the 150 students who responded to the questionnaire, 49 (32.7%) were between 21 and 30 years old. The second highest percentage (30%) was in the 41 to 50 year age group. Only one student was over 60 years old.

From 150 students, 99 students (66%) had full-time jobs, 43 students (28.7%) had part-time jobs, and 8 (5.3%) were unemployed. In a separate question, the majority of students (59.3%) indicated that they worked more than 30 hours a week. Data indicate that 34.0% of the students studied 3 to 5 hours per week for their ICN courses. The maximum credit hours that the students had taken through the ICN delivery system was 13 whereas the minimum was 3.

In this study the students had different motivations for participating in the ICN courses. In general, students (32.7%) took ICN courses for professional development. Availability of the courses was another reason that attracted 42 (28%) students to take ICN courses (Table 4.1). For most students the ICN was the only available choice to pursue a higher education degree.
To better understand the characteristics of the sample, comparisons were made on demographic attributes based on site-type. In this study students were categorized into five age groups: 21-30, 31-40, 41-50, 51-60, and over 60 years old. Most students (47.1%) at the origination site were 21 to 30 years old, whereas at the remote sites only 20% of students were in this age group. Most remote site students (37.5%) were in the age group of 41 to 50 years old (Table 4.2).

Table 4.1. Student motivation for study through the ICN based on site-type

<table>
<thead>
<tr>
<th>Student Motivation</th>
<th>Origination</th>
<th></th>
<th>Remote</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Professional qualification</td>
<td>24</td>
<td>34.3</td>
<td>25</td>
<td>31.3</td>
<td>49</td>
<td>32.7</td>
</tr>
<tr>
<td>Promotion at work</td>
<td>7</td>
<td>10.0</td>
<td>8</td>
<td>10.0</td>
<td>15</td>
<td>10.0</td>
</tr>
<tr>
<td>Availability of courses</td>
<td>14</td>
<td>20.0</td>
<td>28</td>
<td>35.0</td>
<td>42</td>
<td>28.0</td>
</tr>
<tr>
<td>Personal interest</td>
<td>19</td>
<td>27.1</td>
<td>7</td>
<td>8.8</td>
<td>26</td>
<td>17.3</td>
</tr>
<tr>
<td>Flexibility of time and distance</td>
<td>6</td>
<td>8.6</td>
<td>12</td>
<td>15.0</td>
<td>18</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Table 4.2. Student age groups based on site-type

<table>
<thead>
<tr>
<th>Age group</th>
<th>Origination</th>
<th></th>
<th>Remote</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>21-30</td>
<td>33</td>
<td>47.1</td>
<td>16</td>
<td>20.0</td>
<td>49</td>
<td>32.7</td>
</tr>
<tr>
<td>31-40</td>
<td>20</td>
<td>28.6</td>
<td>24</td>
<td>30.0</td>
<td>44</td>
<td>29.3</td>
</tr>
<tr>
<td>41-50</td>
<td>15</td>
<td>21.4</td>
<td>30</td>
<td>37.5</td>
<td>45</td>
<td>30.0</td>
</tr>
<tr>
<td>51-60</td>
<td>2</td>
<td>2.9</td>
<td>9</td>
<td>11.3</td>
<td>11</td>
<td>7.3</td>
</tr>
<tr>
<td>Over 60</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>1.2</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100.0</td>
<td>80</td>
<td>100.0</td>
<td>150</td>
<td>100.0</td>
</tr>
</tbody>
</table>

A majority of students had a grade point average (GPA) of 3.51-4.00 (Table. 4.3). In addition, a majority of students (66.7%) at both site-types had full time jobs. When
compared to origination site, more students at the remote sites had full-time jobs (Table 4.4). Conversely, this study indicates that more students at the origination site had part-time jobs.

Table 4.3. Student GPA based on site-type

<table>
<thead>
<tr>
<th>GPA</th>
<th>Origination</th>
<th></th>
<th>Remote</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>3.51 - 4.00</td>
<td>57</td>
<td>81.4</td>
<td>54</td>
<td>67.5</td>
<td>111</td>
<td>74.0</td>
</tr>
<tr>
<td>3.01 - 3.50</td>
<td>10</td>
<td>14.3</td>
<td>23</td>
<td>28.8</td>
<td>33</td>
<td>22.0</td>
</tr>
<tr>
<td>2.51 - 3.00</td>
<td>3</td>
<td>4.3</td>
<td>3</td>
<td>3.8</td>
<td>6</td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100.0</td>
<td>80</td>
<td>100.0</td>
<td>150</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.4 Employment status based on site-type

<table>
<thead>
<tr>
<th>Employment</th>
<th>Origination</th>
<th></th>
<th>Remote</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Currently not employed</td>
<td>6</td>
<td>8.6</td>
<td>2</td>
<td>2.5</td>
<td>8</td>
<td>5.3</td>
</tr>
<tr>
<td>Employed part-time</td>
<td>31</td>
<td>44.3</td>
<td>11</td>
<td>13.8</td>
<td>42</td>
<td>28.0</td>
</tr>
<tr>
<td>Employed full-time</td>
<td>33</td>
<td>47.1</td>
<td>67</td>
<td>83.8</td>
<td>100</td>
<td>66.7</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100.0</td>
<td>80</td>
<td>100.0</td>
<td>150</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The results of the data analysis revealed that a majority of the students (59.3%) were pursuing Masters degrees through the ICN delivery system. At the origination site, 31.4% of the students were pursuing Ph.D. degrees whereas only 7.5% were seeking Ph.D. degrees at the remote sites. In considering alternative professional goals, 11.3% of the students at the remote sites were pursuing licensure, while none reported this goal at the origination site (Table 4.5). In this study 68 male and 82 female students participated. The distribution of male and female students based on site-type is listed in Table 4.6.
Table 4.5. Degree or program goal based on site-type

<table>
<thead>
<tr>
<th>Type</th>
<th>Origination</th>
<th></th>
<th>Remote</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Licensure</td>
<td>9</td>
<td>11.3</td>
<td>9</td>
<td>6.0</td>
<td>18</td>
<td>12.0</td>
</tr>
<tr>
<td>Certificate</td>
<td>4</td>
<td>5.7</td>
<td>8</td>
<td>10.0</td>
<td>12</td>
<td>8.0</td>
</tr>
<tr>
<td>Master</td>
<td>48</td>
<td>60.0</td>
<td>48</td>
<td>60.0</td>
<td>89</td>
<td>59.3</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>6</td>
<td>7.5</td>
<td>28</td>
<td>18.7</td>
<td>32</td>
<td>21.3</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>11.3</td>
<td>12</td>
<td>8.0</td>
<td>21</td>
<td>14.0</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100.0</td>
<td>80</td>
<td>100.0</td>
<td>150</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.6 Student demographic information

<table>
<thead>
<tr>
<th>Site-type</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origination</td>
<td>27</td>
<td>43</td>
<td>70</td>
</tr>
<tr>
<td>Remote</td>
<td>41</td>
<td>39</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>82</td>
<td>150</td>
</tr>
</tbody>
</table>

**Student Satisfaction Constructs**

In the second part of the questionnaire, the students answered 46 questions to indicate their degree of satisfaction with the six constructs: (1) Instructor's communication skills; (2) Instructor's teaching skills; (3) Instructor's accessibility out of classroom; (4) Course management; (5) Course content; and (6) Quality of technology. The average item scores for the six constructs were compared by total group, remote sites and origination site. The percentage of student agreement with each item was determined by the number of students responding with a 4 (agree) or 5 (strongly agree) to the item. Percentages for each item by site-type and for the total group are shown in Table 4.7.
Analysis of individual items

An analysis of the individual items indicates that a majority of the students (87.3%) would recommend other students or friends to take an ICN course (Table 4.6). Student satisfaction with each item was calculated by adding together the agree and strongly agree options. Nearly all of the students (91.4%) perceived that the instructor made them feel they were part of the class. They also perceived that the use of interactive multimedia was helpful to understand the content of the courses. The students were satisfied with the amount of interaction they had with the instructors and with the other students at the different sites. Most of the students (90%) felt that instructors provided them enough opportunity to ask questions and to participate in classroom discussion and activities.

A majority of the students (82%) found that the assignments were effective and helpful in understanding the concepts of the courses. The students at the remote sites felt that the instructors were accessible out-of-classroom, either by e-mail or phone (92.6%). Most of the students (88%) believed that the course content was meaningful and had immediate application in their professional setting.

When considering the remote sites only, where the instructor was not present, the results of the study revealed that there were three areas that the students had indicated a lower level of satisfaction compared to other areas. Students at the remote site were less satisfied with the following items:

1. Instructor contacted me after I missed a class (15.1%).
2. Back-up tape was delivered to sites if a broadcast failure occurred (30.0%).
3. I had access to inter-library loan materials (30.0%).
Table 4.7. Percentage of students who agreed * with each item by site-type

<table>
<thead>
<tr>
<th>Construct</th>
<th>Site</th>
<th>Origination</th>
<th>Remote</th>
<th>Both site-types</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructor’s communication skills:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor made me feel I was part of the class.</td>
<td>92.8</td>
<td>90.0</td>
<td>91.4</td>
<td></td>
</tr>
<tr>
<td>In each session there was opportunity for me to ask questions.</td>
<td>90.0</td>
<td>91.0</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>Instructor encouraged me to participate in the class.</td>
<td>88.6</td>
<td>80.0</td>
<td>84.0</td>
<td></td>
</tr>
<tr>
<td>I knew what was expected from me in this class.</td>
<td>78.5</td>
<td>82.5</td>
<td>80.7</td>
<td></td>
</tr>
<tr>
<td>I received feedback related to class assignments in a reasonable time.</td>
<td>68.7</td>
<td>67.6</td>
<td>67.5</td>
<td></td>
</tr>
<tr>
<td>Instructor was sympathetic and supportive to my needs.</td>
<td>68.6</td>
<td>78.8</td>
<td>74.0</td>
<td></td>
</tr>
<tr>
<td>Instructor was enthusiastic in teaching ICN course.</td>
<td>61.4</td>
<td>81.3</td>
<td>72.0</td>
<td></td>
</tr>
<tr>
<td>Instructor contacted me after I missed a class.</td>
<td>15.8</td>
<td>15.1</td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td><strong>Instructor’s teaching skills:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The assignments were effective in promoting learning.</td>
<td>85.7</td>
<td>78.8</td>
<td>82.0</td>
<td></td>
</tr>
<tr>
<td>I had enough opportunity to interact with other students.</td>
<td>68.6</td>
<td>77.6</td>
<td>73.4</td>
<td></td>
</tr>
<tr>
<td>The instructor’s teaching skills made me feel satisfied with the course.</td>
<td>64.3</td>
<td>76.3</td>
<td>70.7</td>
<td></td>
</tr>
<tr>
<td>Instructor was well prepared in using the ICN equipment.</td>
<td>62.8</td>
<td>72.5</td>
<td>68.0</td>
<td></td>
</tr>
<tr>
<td>Instructor was well prepared in the content.</td>
<td>57.1</td>
<td>80.1</td>
<td>68.0</td>
<td></td>
</tr>
<tr>
<td>Previously developed presentation aids helped me to understand content.</td>
<td>58.5</td>
<td>75.1</td>
<td>67.7</td>
<td></td>
</tr>
<tr>
<td>Cooperative learning was encouraged through group project.</td>
<td>67.1</td>
<td>56.3</td>
<td>61.4</td>
<td></td>
</tr>
<tr>
<td>Instructor used different methods to assess my progress.</td>
<td>61.4</td>
<td>55.1</td>
<td>58.0</td>
<td></td>
</tr>
<tr>
<td><strong>Accessibility of instructor out of classroom:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor was accessible outside of class (through e-mail, fax, etc.).</td>
<td>84.3</td>
<td>92.6</td>
<td>88.6</td>
<td></td>
</tr>
<tr>
<td>I am satisfied with the amount of individual contact I had.</td>
<td>80.0</td>
<td>65.1</td>
<td>72.0</td>
<td></td>
</tr>
<tr>
<td>I was able to have access to instructor during his/her office hours.</td>
<td>81.4</td>
<td>53.8</td>
<td>66.7</td>
<td></td>
</tr>
<tr>
<td>Instructor returned my phone calls.</td>
<td>37.1</td>
<td>61.3</td>
<td>49.0</td>
<td></td>
</tr>
<tr>
<td><strong>Course management:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textbooks for the ICN course were available.</td>
<td>71.4</td>
<td>78.8</td>
<td>75.3</td>
<td></td>
</tr>
<tr>
<td>Distribution and collection of course documents were organized.</td>
<td>78.6</td>
<td>61.3</td>
<td>74.7</td>
<td></td>
</tr>
<tr>
<td>Tests were administered adequately.</td>
<td>72.9</td>
<td>76.3</td>
<td>74.7</td>
<td></td>
</tr>
<tr>
<td>Registration for the course was well organized.</td>
<td>74.2</td>
<td>72.6</td>
<td>73.3</td>
<td></td>
</tr>
<tr>
<td>I had access to E-mail.</td>
<td>78.6</td>
<td>67.5</td>
<td>72.0</td>
<td></td>
</tr>
<tr>
<td>Papers and tests were graded and returned by instructor regularly.</td>
<td>87.1</td>
<td>63.8</td>
<td>68.7</td>
<td></td>
</tr>
<tr>
<td>Syllabus and other course materials were accessible.</td>
<td>55.7</td>
<td>60.0</td>
<td>58.0</td>
<td></td>
</tr>
<tr>
<td>Publicity about the ICN courses was accessible.</td>
<td>34.3</td>
<td>60.0</td>
<td>57.0</td>
<td></td>
</tr>
<tr>
<td>Reserve materials in the university library were accessible.</td>
<td>65.7</td>
<td>17.6</td>
<td>46.0</td>
<td></td>
</tr>
<tr>
<td>I had access to inter-library loan materials.</td>
<td>50.0</td>
<td>30.0</td>
<td>39.3</td>
<td></td>
</tr>
<tr>
<td>Back-up tape was delivered to sites if broadcast failure occurred.</td>
<td>20.0</td>
<td>30.0</td>
<td>25.3</td>
<td></td>
</tr>
<tr>
<td><strong>Course content:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course content was meaningful.</td>
<td>87.2</td>
<td>88.8</td>
<td>88.0</td>
<td></td>
</tr>
<tr>
<td>The content of the course was useful.</td>
<td>87.1</td>
<td>87.6</td>
<td>87.4</td>
<td></td>
</tr>
<tr>
<td>The course handouts were very useful.</td>
<td>84.3</td>
<td>85.0</td>
<td>84.7</td>
<td></td>
</tr>
<tr>
<td>Course materials were effective for me in learning the content.</td>
<td>82.8</td>
<td>85.1</td>
<td>84.0</td>
<td></td>
</tr>
<tr>
<td>I could apply the course content to my professional setting.</td>
<td>84.3</td>
<td>87.6</td>
<td>85.3</td>
<td></td>
</tr>
<tr>
<td>Course content met my personal needs.</td>
<td>81.4</td>
<td>80.0</td>
<td>80.3</td>
<td></td>
</tr>
<tr>
<td>Course content was lively and interesting.</td>
<td>78.6</td>
<td>78.8</td>
<td>73.0</td>
<td></td>
</tr>
<tr>
<td><strong>Quality of technology:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It was easy to see the TV monitor.</td>
<td>75.7</td>
<td>86.3</td>
<td>81.3</td>
<td></td>
</tr>
<tr>
<td>It was easy to use the microphone.</td>
<td>65.7</td>
<td>86.3</td>
<td>76.7</td>
<td></td>
</tr>
<tr>
<td>Photograph, diagrams, or charts were appropriately used.</td>
<td>70.0</td>
<td>81.3</td>
<td>76.0</td>
<td></td>
</tr>
<tr>
<td>The use of interactive multimedia was helpful to understand the content.</td>
<td>48.0</td>
<td>70.0</td>
<td>59.0</td>
<td></td>
</tr>
<tr>
<td>Graphics or other visuals were easy to read.</td>
<td>65.7</td>
<td>67.6</td>
<td>66.7</td>
<td></td>
</tr>
<tr>
<td>The amount of time graphics were left on the screen was sufficient.</td>
<td>62.3</td>
<td>68.8</td>
<td>66.7</td>
<td></td>
</tr>
<tr>
<td>Videos were appropriately used.</td>
<td>44.3</td>
<td>71.3</td>
<td>57.6</td>
<td></td>
</tr>
</tbody>
</table>

*Percentage determined as selection 4 (agree) or 5 (strongly agree) to the item
The results of the data analysis indicate that students were satisfied with their learning experiences, quality of instruction, and the sense of being a part of the class. For further comparisons of student satisfaction constructs based on site-type and gender, the student average item scores for the six constructs were calculated (Table 4.8). The students at the remote sites were slightly more satisfied than students at the origination site with four of the six constructs: instructor's communication skills; instructor's teaching skills; course content; and quality of technology. It appears that students at the origination site were slightly more satisfied with course management and instructor's accessibility out of classroom. Overall, the students were satisfied with all six constructs that contributed to their satisfaction with the ITV courses.

A comparison of the students' average item scores for each construct based on gender indicates that, in general, male students rated five of the constructs higher than female students: instructor's communication skills; instructor's teaching skills; instructor's accessibility out of classroom; course management; and course content. The female students were more satisfied with the quality of technology than the male students. In general, it appears that male students were slightly more satisfied than female students. The results of comparing male and female student satisfaction at the origination site indicate that the female students were slightly more satisfied than the male students (Table 4.8). At the remote sites however, the male students were slightly more satisfied than the female students, and they also rated all six constructs higher than female students.

When considering the origination site only, the female students rated four constructs higher than the male students did: instructor's communication skills; instructor's teaching
skills; course management; and quality of technology. The male students were slightly more satisfied with instructor's accessibility out of classroom and course content (Table 4.8).

When considering the remote sites only, there were differences between male and female students based on their satisfaction with the instructor's accessibility and course management. Students at the origination site were more satisfied with accessibility of instructor out of classroom and course management. Male students at the remote sites rated all six constructs higher than female students (Table 4.8).

Table 4.8 Satisfaction construct average item score based on site-type and gender

<table>
<thead>
<tr>
<th>Construct</th>
<th>Origination</th>
<th></th>
<th>Remotec</th>
<th></th>
<th>Both site-types</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>Instructor's communication skills</td>
<td>3.75</td>
<td>3.83</td>
<td>3.79</td>
<td>3.94</td>
<td>3.80</td>
<td>3.87</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td>3.59</td>
<td>3.81</td>
<td>3.70</td>
<td>3.91</td>
<td>3.75</td>
<td>3.83</td>
</tr>
<tr>
<td>Accessibility out of classroom</td>
<td>3.97</td>
<td>3.88</td>
<td>3.93</td>
<td>4.14</td>
<td>3.51</td>
<td>3.83</td>
</tr>
<tr>
<td>Course management</td>
<td>3.65</td>
<td>3.69</td>
<td>3.67</td>
<td>3.66</td>
<td>3.39</td>
<td>3.53</td>
</tr>
<tr>
<td>Course content</td>
<td>3.95</td>
<td>3.92</td>
<td>3.93</td>
<td>4.23</td>
<td>4.00</td>
<td>4.11</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>3.39</td>
<td>3.71</td>
<td>3.55</td>
<td>3.89</td>
<td>3.85</td>
<td>3.87</td>
</tr>
</tbody>
</table>

The results of the study revealed that, of the 150 students who participated, 19 will not recommend ICN course delivery to other students. Seventeen of these students were at the origination site and 2 students were at the remote sites. In addition, the group that will not recommend ICN course delivery to other students rated all the six constructs much lower than the group who would recommend ICN course delivery to other students.

**T-test Analysis**

In this study, t-tests were conducted to compare student satisfaction constructs based on site-type and gender. Use of the t-test enabled testing the variance of groups for each variable and, therefore, permitted the more appropriate t-value to be chosen based on whether
the assumption of equal variances appeared to be valid. For each construct, the average item score was calculated to indicate student satisfaction with each construct. T-tests for independent samples were used to compare student satisfaction with graduate level ITV courses for each construct by site-type and gender. The t-tests also were used to compare student satisfaction with the ICN courses within each site-type based on a student’s gender. The results of the equality of variance findings and t-test results are presented based on student gender and the site-type that the students had participated.

Site-type comparison

The results of a comparison of the two site-types revealed that there were significant differences between students at the remote and origination sites on their satisfaction with course management and quality of technology (Table 4.9). Students at the origination site were more satisfied with course management ($M = 3.67$) than students at the remote sites ($M = 3.53$). Conversely, students at the remote sites were more satisfied with the quality of technology ($M = 3.87$) than students at the origination site ($M = 3.58$).

The data analysis indicates that there were no significant differences between student satisfaction at the remote and origination sites on these constructs: instructor’s communication skills, instructor’s teaching skills, accessibility of instructor out of classroom and course content. Student satisfaction construct scores are illustrated by Box-and-Whisker plots for both sites (Figure 4.1), the remote sites (Figure 4.2), and the origination site (Figure 4.3). The lower boundary of the box represents the 25th percentile. The upper boundary represents the 75th percentile. The vertical length of the box represents the interquartile range. The line inside the box represents the median. The width of a box does not represent anything.
Table 4.9. T-test results comparing student satisfaction construct by site-type

<table>
<thead>
<tr>
<th>Construct</th>
<th>Origination</th>
<th></th>
<th></th>
<th>Remote</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>n</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Instructor's communication skills</td>
<td>70</td>
<td>3.81</td>
<td>.57</td>
<td>80</td>
<td>3.87</td>
<td>.52</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td>70</td>
<td>3.67</td>
<td>.66</td>
<td>80</td>
<td>3.84</td>
<td>.56</td>
</tr>
<tr>
<td>Accessibility of instructor</td>
<td>70</td>
<td>3.91</td>
<td>.56</td>
<td>80</td>
<td>3.84</td>
<td>.73</td>
</tr>
<tr>
<td>Course management</td>
<td>70</td>
<td>3.67</td>
<td>.39</td>
<td>80</td>
<td>3.53</td>
<td>.52</td>
</tr>
<tr>
<td>Course content</td>
<td>70</td>
<td>3.93</td>
<td>.63</td>
<td>80</td>
<td>4.11</td>
<td>.72</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>70</td>
<td>3.58</td>
<td>.69</td>
<td>80</td>
<td>3.87</td>
<td>.57</td>
</tr>
</tbody>
</table>

*significant at α = .05.

If the line representing the median is not in the center of the box, the distribution of data values is not symmetric. If the median is closer to the bottom of the box than to the top, there is a tail toward larger values (positive skewness). If the line is closer to the top of the box, there is a tail (negative skewness) toward small values (Norusis, 1997).

Comparing total student satisfaction scores at both site-types indicates that students at the remote sites are more satisfied than students at the origination sites and there is greater dispersion among students at the remote sites. Figure 4.2 indicates that male students at the remote sites are more satisfied than female students and there is less variation among male students when compared to female students. At the origination site (Figure 4.3) female students are more satisfied than male students, however the variation among female students is greater than for male students. Figure 4.4 indicates student satisfaction total score based on site-type and gender. Male students at the remote sites are more satisfied than male students at the origination site, whereas female students at the origination site are more satisfied than female students at the remote sites. Figure 4.5 also indicates that the variation
among students at the remote sites is greater than the variation among origination site students.

The average item scores for each construct and the results of the t-tests for comparing student satisfaction constructs at the remote sites (Table 4.10) and the origination site (Table 4.11) are presented. In addition, total satisfaction average score across all constructs and t-test results for site-type and gender are listed in Table 4.12. The results of the t-tests indicate that there were no significant differences between student satisfaction based on site-type and gender. Student satisfaction is illustrated in Figure 4.4 based on site-type and gender.

![Figure 4.1. Student satisfaction based on site-type](image-url)
Figure 4.2. Dispersion of student total satisfaction average score at the remote sites

Figure 4.3. Dispersion of student total satisfaction average score at the origination site
Figure 4.4. Student satisfaction grouped by site-type and gender

Table 4.10. Levene's test and t-test data for student satisfaction constructs at the remote sites by gender

<table>
<thead>
<tr>
<th>Construct</th>
<th>Assumption of variance</th>
<th>Levene's test for equality of variance</th>
<th>t-test for equality of means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor's communication skills</td>
<td>equal</td>
<td>0.311, .578</td>
<td>1.139, 78, .258</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td>equal</td>
<td>0.488, .478</td>
<td>1.257, 78, .213</td>
</tr>
<tr>
<td>Accessibility of instructor</td>
<td>equal</td>
<td>3.143, .080</td>
<td>4.228, 78, .000*</td>
</tr>
<tr>
<td>Course management</td>
<td>equal</td>
<td>0.614, .208</td>
<td>2.370, 78, .020*</td>
</tr>
<tr>
<td>Course content</td>
<td>unequal</td>
<td>8.156, .005</td>
<td>0.339, 77, .736</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>equal</td>
<td>0.948, .333</td>
<td>0.338, 78, .736</td>
</tr>
</tbody>
</table>

*significant at α = .05.
Table 4.11: Levene’s test and t-test data for student satisfaction constructs at the origination site by gender

<table>
<thead>
<tr>
<th>Construct</th>
<th>Assumption of variance</th>
<th>t-test for equality of variance</th>
<th>t-test for equality of means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Instructor's communication skills</td>
<td>equal</td>
<td>0.318</td>
<td>.073</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td>equal</td>
<td>2.134</td>
<td>.149</td>
</tr>
<tr>
<td>Accessibility of instructor</td>
<td>equal</td>
<td>0.160</td>
<td>.285</td>
</tr>
<tr>
<td>Course management</td>
<td>equal</td>
<td>0.600</td>
<td>.441</td>
</tr>
<tr>
<td>Course content</td>
<td>equal</td>
<td>5.618</td>
<td>.021</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>equal</td>
<td>2.546</td>
<td>.115</td>
</tr>
</tbody>
</table>

Table 4.12: Levene’s test and t-test data for student satisfaction total average score based on site-type and gender

<table>
<thead>
<tr>
<th>Comparison Group</th>
<th>f</th>
<th>Mean</th>
<th>SD</th>
<th>Levene’s test for equality of variance</th>
<th>t-test for equality of means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td></td>
<td>2-tail sig.</td>
<td>t</td>
</tr>
<tr>
<td>Site-type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Origination</td>
<td>70</td>
<td>3.77</td>
<td>.50</td>
<td>0.011</td>
<td>0.916</td>
</tr>
<tr>
<td>Remote</td>
<td>80</td>
<td>3.85</td>
<td>.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>148</td>
<td>3.85</td>
<td>.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>68</td>
<td>3.87</td>
<td>.46</td>
<td>1.017</td>
<td>0.315</td>
</tr>
<tr>
<td>Female</td>
<td>82</td>
<td>3.77</td>
<td>.53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*significant at α = .05

Gender comparison

The t-tests analysis revealed that when considering all students at both site-types, there was a significant difference between male and female students in their satisfaction with accessibility of instructor out of classroom (Table 4.13). Although the mean scores for males were slightly higher for each construct, no significant differences were found between male and female student satisfaction with the instructor's communication skills, instructor's teaching skills, course management, course content, and quality of technology.
Table 4.13. T-test data for student satisfaction constructs by gender at both sites

<table>
<thead>
<tr>
<th>Construct</th>
<th>Gender</th>
<th></th>
<th></th>
<th></th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>M</td>
<td>SD</td>
<td>Female</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Instructor's communication skills</td>
<td></td>
<td>3.86</td>
<td>.52</td>
<td>3.83</td>
<td>.57</td>
<td>3.540</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td></td>
<td>3.79</td>
<td>.53</td>
<td>3.78</td>
<td>.67</td>
<td>0.023</td>
</tr>
<tr>
<td>Accessibility of instructor</td>
<td></td>
<td>4.07</td>
<td>.65</td>
<td>3.71</td>
<td>.61</td>
<td>3.520</td>
</tr>
<tr>
<td>Course management</td>
<td></td>
<td>3.66</td>
<td>.46</td>
<td>3.55</td>
<td>.47</td>
<td>1.426</td>
</tr>
<tr>
<td>Course content</td>
<td></td>
<td>4.12</td>
<td>.46</td>
<td>3.95</td>
<td>.81</td>
<td>1.440</td>
</tr>
<tr>
<td>Quality of technology</td>
<td></td>
<td>3.69</td>
<td>.60</td>
<td>3.78</td>
<td>.66</td>
<td>-0.809</td>
</tr>
</tbody>
</table>

*significant at α = .05.

When considering only the students at the origination site, no significant differences were found between male and female student satisfaction with the constructs (Table 4.14).

Female students at the origination site were slightly more satisfied with the instructor's communication skills, instructor's teaching skills, course management, and quality of technology than male students. Male students at both site-types were slightly more satisfied with the instructor's accessibility out of classroom and with course content, but the differences were not significant.

Table 4.14. T-test data for the six constructs by gender at the origination site

<table>
<thead>
<tr>
<th>Construct</th>
<th>Gender</th>
<th></th>
<th></th>
<th></th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>M</td>
<td>SD</td>
<td>Female</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Instructor's communication skills</td>
<td></td>
<td>3.75</td>
<td>.48</td>
<td>3.85</td>
<td>.62</td>
<td>-0.762</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td></td>
<td>3.59</td>
<td>.54</td>
<td>3.81</td>
<td>.72</td>
<td>-1.332</td>
</tr>
<tr>
<td>Accessibility of instructor</td>
<td></td>
<td>3.97</td>
<td>.53</td>
<td>3.88</td>
<td>.58</td>
<td>0.632</td>
</tr>
<tr>
<td>Course management</td>
<td></td>
<td>3.66</td>
<td>.34</td>
<td>3.69</td>
<td>.41</td>
<td>-0.382</td>
</tr>
<tr>
<td>Course content</td>
<td></td>
<td>3.95</td>
<td>.38</td>
<td>3.92</td>
<td>.75</td>
<td>0.275</td>
</tr>
<tr>
<td>Quality of technology</td>
<td></td>
<td>3.39</td>
<td>.50</td>
<td>3.71</td>
<td>.77</td>
<td>-1.919</td>
</tr>
</tbody>
</table>
When considering only students at the remote sites the t-test analysis indicates that there were significant differences between male and female students based on their satisfaction with course management and accessibility of instructor out of classroom (Table 4.15). For both constructs, male students were significantly more satisfied than female students. In fact, for each of the six constructs, mean scores for male students indicated that they were slightly more satisfied than female students.

Table 4.15. T-test data for student satisfaction constructs by gender at the remote sites

<table>
<thead>
<tr>
<th>Construct</th>
<th>Gender</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Instructor's communication skills</td>
<td>3.94</td>
<td>.54</td>
<td>3.80</td>
<td>.51</td>
<td>1.139</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td>3.91</td>
<td>.50</td>
<td>3.75</td>
<td>.62</td>
<td>1.257</td>
</tr>
<tr>
<td>Accessibility of instructor</td>
<td>4.14</td>
<td>.72</td>
<td>3.51</td>
<td>.59</td>
<td>4.220</td>
</tr>
<tr>
<td>Course management</td>
<td>3.66</td>
<td>.53</td>
<td>3.39</td>
<td>.48</td>
<td>2.370</td>
</tr>
<tr>
<td>Course content</td>
<td>4.23</td>
<td>.49</td>
<td>4.00</td>
<td>.89</td>
<td>1.412</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>3.89</td>
<td>.57</td>
<td>3.85</td>
<td>.52</td>
<td>0.338</td>
</tr>
</tbody>
</table>

*significant at α = .05.

ICN recommendation comparison

The t-test results indicate that students who will not recommend the ICN course to other students rated all six constructs lower than students who will recommend the ICN course delivery. There also were significant differences between these two groups on their satisfaction with all six constructs (Table 4.16).
Table 4.16. Student satisfaction construct scores based on recommending or not recommending the ICN course delivery to other students

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean Yes</th>
<th>Mean No</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor's communication skills</td>
<td>3.91</td>
<td>3.40</td>
<td>3.98</td>
<td>.000*</td>
</tr>
<tr>
<td>Instructor's teaching skills</td>
<td>3.86</td>
<td>3.26</td>
<td>4.21</td>
<td>.000*</td>
</tr>
<tr>
<td>Accessibility of instructor</td>
<td>3.91</td>
<td>3.59</td>
<td>2.03</td>
<td>.043*</td>
</tr>
<tr>
<td>Course management</td>
<td>3.63</td>
<td>3.40</td>
<td>2.09</td>
<td>.000*</td>
</tr>
<tr>
<td>Course content</td>
<td>4.10</td>
<td>3.50</td>
<td>3.70</td>
<td>.000*</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>3.82</td>
<td>3.17</td>
<td>4.42</td>
<td>.000*</td>
</tr>
</tbody>
</table>

*significant at $\alpha = .05$.

Interaction between Site-type and Gender

In order to determine significant differences on student satisfaction with ICN delivery system based on site-type and gender, t-tests analyses were performed. The results of t-tests did not reveal any significant difference. Two-way analysis of variance was used to examine the effects of site-type and gender together on student satisfaction average score. The result of the analysis of variance did not reveal significant differences in student satisfaction average score based on the main effects of site-type and gender. However, a significant two-way interaction between gender and site-type was found. The results of the two-way ANOVA between site-type and gender are shown in Table 4.17.

Figure 4.5 indicates the interaction effect of site-type and gender on student satisfaction. Male students at the remote sites were more satisfied than male and female students at both site-types. At the origination site male students were less satisfied than female students. Compared to the origination site students, students at the remote sites varied more widely on their satisfaction scores. Figure 4.5 also indicates that female students at the origination site are as satisfied as the male students at the remote sites.
Table 4.17. Results of two-way ANOVA for site-type and gender

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>f</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site-type</td>
<td>0.488</td>
<td>2</td>
<td>0.244</td>
<td>1.004</td>
<td>.345</td>
</tr>
<tr>
<td>Gender</td>
<td>0.122</td>
<td>1</td>
<td>0.218</td>
<td>0.898</td>
<td>.362</td>
</tr>
<tr>
<td></td>
<td>0.203</td>
<td>1</td>
<td>0.203</td>
<td>0.837</td>
<td>.362</td>
</tr>
<tr>
<td><strong>2-Way interaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site by Gender</td>
<td>1.022</td>
<td>1</td>
<td>1.022</td>
<td>4.206</td>
<td>.042*</td>
</tr>
<tr>
<td><strong>Explained</strong></td>
<td>1.504</td>
<td>3</td>
<td>0.501</td>
<td>2.064</td>
<td>.108</td>
</tr>
<tr>
<td><strong>Residual</strong></td>
<td>35.474</td>
<td>146</td>
<td>0.248</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36.978</td>
<td>149</td>
<td>0.248</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at α = .05.

Figure 4.5. Interaction effect of site-type and gender on student satisfaction
Correlations between Student Satisfaction and Age or Motivation

There were five age groups in this study: 21-30, 31-40, 41-50, 51-60, and over 60. (Table 4.18) (Figure 4.6). Most students (47.1%) at the origination site were between 21 and 30 years old (Figure 4.7), while in remote sites most students (37.5%) were between 41 and 50 years old (Figure 4.8). Older students had rated the constructs slightly higher than younger students. The results of the correlation coefficient revealed that a statistically significant correlation exists between student's age and their satisfaction with ITV courses, but the relationship is not practically significant (Table 4.18). In this study only one student at the remote site was older than 60 years old. The older students rated four constructs (instructor's communication skills; instructor's teaching skills; accessibility of instructor out of classroom; and course content) slightly higher than younger students. The Spearman rho correlation revealed a very low and positive relationship ($r = .227$) between student satisfaction and age (Table 4.19). The results did not reveal any relationship between student satisfaction with ITV courses and their motivation for participation.

Hinkle, Wiersma, and Jurs (1994) recommended interpreting correlation coefficients less than .30 as indicative of little if any relationship and those from .30 to .50 as of low correlation. Because the correlation coefficients were less than .30, no practical relationships were found between student satisfaction, age or motivation. Therefore, these two variables (age and motivation) are not considered to have a significant impact on student satisfaction.
Table 4.18. Construct average item scores based on the age group of the students

<table>
<thead>
<tr>
<th>Construct</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor’s communication skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 – 30 yr. old</td>
<td>49</td>
<td>3.70</td>
<td>.45</td>
</tr>
<tr>
<td>31 – 40 yr. old</td>
<td>44</td>
<td>3.78</td>
<td>.58</td>
</tr>
<tr>
<td>41 – 50 yr. old</td>
<td>45</td>
<td>4.05</td>
<td>.59</td>
</tr>
<tr>
<td>51 – 60 yr. old</td>
<td>11</td>
<td>4.02</td>
<td>.42</td>
</tr>
<tr>
<td>Instructor’s teaching skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 – 30 yr. old</td>
<td>49</td>
<td>3.66</td>
<td>.62</td>
</tr>
<tr>
<td>31 – 40 yr. old</td>
<td>44</td>
<td>3.71</td>
<td>.62</td>
</tr>
<tr>
<td>41 – 50 yr. old</td>
<td>45</td>
<td>3.94</td>
<td>.61</td>
</tr>
<tr>
<td>51 – 60 yr. old</td>
<td>11</td>
<td>4.01</td>
<td>.53</td>
</tr>
<tr>
<td>Instructor’s accessibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 – 30 yr. old</td>
<td>49</td>
<td>3.75</td>
<td>.57</td>
</tr>
<tr>
<td>31 – 40 yr. old</td>
<td>44</td>
<td>3.86</td>
<td>.74</td>
</tr>
<tr>
<td>41 – 50 yr. old</td>
<td>45</td>
<td>3.98</td>
<td>.68</td>
</tr>
<tr>
<td>51 – 60 yr. old</td>
<td>11</td>
<td>4.02</td>
<td>.50</td>
</tr>
<tr>
<td>Course management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 – 30 yr. old</td>
<td>49</td>
<td>3.60</td>
<td>.42</td>
</tr>
<tr>
<td>31 – 40 yr. old</td>
<td>44</td>
<td>3.47</td>
<td>.46</td>
</tr>
<tr>
<td>41 – 50 yr. old</td>
<td>45</td>
<td>3.68</td>
<td>.48</td>
</tr>
<tr>
<td>51 – 60 yr. old</td>
<td>11</td>
<td>3.80</td>
<td>.54</td>
</tr>
<tr>
<td>Course content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 – 30 yr. old</td>
<td>49</td>
<td>3.82</td>
<td>.65</td>
</tr>
<tr>
<td>31 – 40 yr. old</td>
<td>44</td>
<td>3.69</td>
<td>.67</td>
</tr>
<tr>
<td>41 – 50 yr. old</td>
<td>45</td>
<td>4.27</td>
<td>.68</td>
</tr>
<tr>
<td>51 – 60 yr. old</td>
<td>11</td>
<td>4.25</td>
<td>.51</td>
</tr>
<tr>
<td>Quality of technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 – 30 yr. old</td>
<td>49</td>
<td>3.62</td>
<td>.68</td>
</tr>
<tr>
<td>31 – 40 yr. old</td>
<td>44</td>
<td>3.62</td>
<td>.64</td>
</tr>
<tr>
<td>41 – 50 yr. old</td>
<td>45</td>
<td>3.94</td>
<td>.53</td>
</tr>
<tr>
<td>51 – 60 yr. old</td>
<td>11</td>
<td>4.01</td>
<td>.56</td>
</tr>
</tbody>
</table>
Figure 4.6. Student age groups at both site-types

Figure 4.7. Student age groups at the origination site
Table 4.19  Relationship between student satisfaction and age or motivation for taking an ICN course

<table>
<thead>
<tr>
<th>Variable</th>
<th>Spearman rho correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student satisfaction-Age</td>
<td>.227*</td>
</tr>
<tr>
<td>Student satisfaction-Motivation</td>
<td>.070</td>
</tr>
</tbody>
</table>

*Significant at $\alpha = .05$.

Content Analysis of Student Comments

In the third part of the questionnaire, students were asked to describe their experiences with their interactive televised courses. Students were asked to describe two things that they liked and two things that they disliked about their ICN courses, and to offer their suggestions for improvement of distance education course instruction. Of the 150
students who responded to the survey, 142 students answered the open-ended questions. A content analysis of the responses to the open-ended questions reflects student satisfaction with their positive learning experience using interactive televised courses through the ICN (Table 4.20)

A content analysis of the student comments was performed by reviewing the individual responses and classifying them in larger categories. In several comments, students indicated that the ICN course provided them with the opportunity to interact with students in different sites and to establish professional relationships. A majority of the students appreciated the opportunity to share their views, knowledge, expertise, and experiences with students at other sites. They also found that the use of different technologies was very interesting as a means of communication and to understand the content of the courses.

Students at the remote sites appreciated the convenience provided by the interactive televised courses through the ICN delivery system. They perceived that the ICN delivery system provided them with a chance to pursue a higher education degree without daily commutes, losing their jobs, and relocating their families. Students at the remote sites felt that the two-way, interactive televised courses by the ICN delivery system provided them with opportunities that may not otherwise exist. A majority of the students felt that ICN courses provided new learning experiences, the instructor feedback seemed equal to other traditional courses, and they found the methods of teaching the ICN courses as effective as traditional courses.

Improving the quality of technology, course management, transporting materials to other sites, receiving immediate feedback from the instructors, and providing an on-site facilitator were the main concerns of students at the remote sites. These findings support
other studies (Barker & Barker, 1995; Thach & Murphy, 1994; Wagner, 1994) which found that students at the remote sites indicated that accessibility to course materials before the first session and access to reserved materials in the library were their main concerns.

A majority of the students perceived that the push-to-talk microphone system was inconvenient to use and suggested a voice-activated microphone. Students also indicated that the camera should be more adjustable. In this way, the instructors would not be confined to one location during the class period. In general, students believed that instructors should be more concerned about the content of the course and methods of teaching rather than the technology.

Overall, the students' comments at remote sites were more positive than the students' comments at the origination site. One explanation for this could be that students at the remote sites were more appreciative of possibilities for the convenience and accessibility of distance education. A few students at the remote sites commented that they would prefer a traditional classroom if they could have access in their hometown location. Students in both sites perceived that technological problems were their most unexpected experiences with the ICN classes. Students at the origination site perceived that logistical problems were time-consuming.
Table 4.20 Categories of student comments for improving the ICN delivery system

A. Teaching aspects:
- The first ICN class should provide the opportunity to learn about technology, peers, and instructors.
- Starting class with reviewing the previous class session.
- Instructors need more preparation and technical knowledge.
- Improving the level of participation and group interaction among students.
- Using more active learning strategies.
- Conducting different methods to retrieve student’s feedback to the material that has been taught.
- Using variety of evaluation techniques to assess students’ learning.
- Providing immediate feedback with less delay.
- Personalizing assignment based on students’ needs and professional settings.
- Providing handouts for each class.

B. Technological aspect:
- Changing the camera view frequently will hold and direct student’s attention.
- Improving camera capacity.
- Students should be able to see other sites all the time.
- Making visuals more clear.
- Using voice activated microphone rather than push-to-talk microphone.
- Using less text that should be copied from the screen. Providing more handouts.
- Decreasing the technical problems.

C. Course management and logistical aspects:
- More organization is needed in course management.
- Providing 5 to 10 minutes before each class to take care of logistical problems.
- Making sure that all sites received the designated materials for each class session.
- Providing on-site facilitator to help students with technology and other logistical problems.
- Providing easier way to have access to library loan, and purchasing the course materials.
- Using more effective ways of disseminating the information about the ICN courses.
- Offering more courses through ICN.

D. Aspects of the ICN courses that satisfied students the most:
- The technology enhanced students’ involvement in the distance education classes.
- Opportunity to ask questions and communicate with other students.
- Using variety of visual materials that enhance student’s learning.
- Using effective teaching methods, and new learning experiences.
- Establishing new friendships and professional bonds with other students.
- Availability, convenience, and time saving are appreciated.
- Receiving the degree while working full-time with family.
Summary of Findings Based on Research Questions

1. Are there significant differences between students at the remote sites and the origination site based on satisfaction with regard to the six constructs?

   T-test was run to examine the first major research question. The results of the t-test revealed that there is no significant difference in student overall satisfaction with the six constructs based on the site-types. When considering each construct individually the results of t-tests indicate that there are significant differences between student satisfaction at the remote and origination sites with the course management and the quality of technology. Students at the origination site were more satisfied with the course management. However, students at the remote sites were more satisfied with the quality of technology.

2. Are there significant differences between male and female students based on their satisfaction with graduate level interactive televised courses with regard to the six constructs?

   To examine the second research question a t-test was run. The results of the test revealed no significant difference in student overall satisfaction based on gender. When considering student satisfaction with each individual construct based on gender, the results indicate that there is a significant difference between male and female students on their satisfaction with accessibility of instructor out of classroom.

3. Are there significant differences between male and female students at the remote sites based on their satisfaction with regard to the six constructs?
T-tests were run to examine the third research question. The t-test analyses indicated that there are significant differences between male and female students at remote sites on their satisfaction with course management and accessibility of instructor out of classroom. Male students were more satisfied with these two constructs than were female students.

4. Are there significant differences between male and female students at the origination site based on their satisfaction with regard to the six constructs?

To examine the fourth research question again t-tests were run. The results of the t-tests indicate that at the origination site there were no significant differences on student satisfaction with the six constructs based on gender.

5. Do significant relationships exist for student satisfaction with graduate level interactive televised courses and age or motivation of students?

To examine the fifth research question, Spearman rho coefficient was computed. The resulting correlation coefficients revealed that there were no relationship found between student satisfaction and age ($r= 0.227$) or motivation ($r= .070$) for participating in the ICN courses.

**Summary and Discussion**

The purpose of this study was to measure the constructs that contribute to student satisfaction for participating in graduate level interactive televised courses delivered by the Iowa Communications Network (ICN). In this study, student satisfaction with the instructor's communication skills, instructor's teaching skills, instructor's accessibility out of
classroom, course management, course content, and quality of technology were measured by using the Student Satisfaction with ICN (SSICN) questionnaire. Student satisfaction with the six constructs was compared based on site-type where the students participated, their gender, and age group. Student concerns and suggestions for improving the quality of education through ICN were identified through five open-ended questions. An overview of the major findings of this study follows.

Students generally agreed that the facilities and technologies at both sites promoted effective communication and learning environments, course content was well organized and relevant to the students needs, instructional materials were adequate, teaching methods and external communication with the instructor also were sufficient. An analysis of the individual items indicated that the majority of the students will recommend that other students take an ICN course. A majority of students perceived that the instructor’s communication skills made students feel they were part of the class. Most of students found that using interactive multimedia helped them to understand the content of the courses better. Students were satisfied with the amount of interactions they had with instructors and other students at different sites. They also appreciated the opportunity to complete their degree programs with little disruption to their full-time jobs and family life. Overall, the students were satisfied with their learning experiences using the ICN delivery system.

Student satisfaction with ICN delivery system also was measured by the extent to which they will recommend the ICN courses to other students. Of the 150 students who responded to questionnaire, 19 students will not recommend the ICN course delivery to other students. Most students who will not recommend ICN course delivery to other students were at the origination site, whereas only two were at remote sites. The students who will not
recommend ICN course delivery had rated all six constructs significantly lower than those students who will recommend ICN courses to others.

The relationship between gender and student satisfaction from the televised courses has been the subject of a few studies, with mixed results (Brent & Bugbee, 1993; Ross & Powell, 1990). Some of these studies indicated that female students were more satisfied than male students with televised courses. The results of the current study did not support the literature in this regard. The data related to gender comparison in this study revealed that, in general, male students were slightly more satisfied with the constructs than female students, but the differences were not significant.

A few studies have investigated student satisfaction at remote and origination sites and the results varied. In these studies, distance students at remote sites generally had more favorable attitudes and higher satisfaction with distance education than traditional students at the origination site. In several previous studies the distance students perceived that they learned as well as if they were in a regular classroom (e.g., Brahman, 1994; Fast, 1995; Jurasek, 1993; MacFarland, 1996). The results of the current study support the literature in this regard. Students at the remote sites were more satisfied with their interactive televised courses than those at the origination site, but the differences were not significant. In this study 97.5% of the students at the remote sites and 75.7% at the origination site will recommend ICN course delivery to other students.

When comparing the origination and remote sites based on the six constructs, there were significant differences between the students at these two site-types on their satisfaction with course management and quality of technology. The comments of students at the remote sites provided suggestions for improving course management. Previous studies also
documented course management and quality of technology as the main concerns of distance students (Cyrs & Smith, 1990; Nealand, 1993). Students at the origination site were less satisfied with the instructor's methods of teaching. Students at the origination sites also perceived that the instructor put more emphasis on the use of technology rather than the content of the courses.

The literature indicated that, for older students, interaction is not as important as it is for younger students (Dill & Mezach, 1991). Previous studies have suggested that student satisfaction with interactive televised courses is affected by a student's age and motivation (Bernt & Bugbee, 1993; Hezel & Derr, 1990; May, 1993). In the current study no relationships were found between student satisfaction and age, or motivation. The results of the current study also support a study by Archer (1995) that indicated that student satisfaction was unaffected by the demographic characteristics of students. In addition, the results support a study by Souder (1993) that indicated remote sites students were typically older and married, had children, and were working full-time.

There are some areas in which students want to see course delivery improvement. In general, students at both site-types perceived that technical problems affected their learning. This finding supports other studies by Cyrs and Smith (1990) and Nealand (1993) where technical difficulties were perceived as a main deficiency of distance education courses. In the current study, students felt that repeated technical problems wasted their time and were frustrating.

Course management received the lowest level of satisfaction by the students at the remote sites. The students at the remote sites perceived they did not have access to interlibrary loan materials and reserved material for the courses. Students at the remote sites also
demanded more feedback from the instructors and more organized ways of exchanging the materials between the origination and remote sites. These findings support other studies (Dillnon, Gunawardena, & Parker, 1992; Garrison, 1990; Sorensen, 1994).

The data support the conclusion that, generally, students who have taken interactive televised courses through the ICN are supportive of this delivery system and they view the ICN-delivered classes to be a viable alternative to traveling to distant classroom sites. The results of this study also indicate that two-way interactive televised courses are an effective method for teaching and learning. Students at the remote sites were mainly concerned about the logistical aspects and technical problems of ICN courses.

**Conclusion**

Although the results of this study indicated that graduate students are satisfied with their interactive televised courses through ICN, there are several areas that need more attention. First, as the findings of this study indicated, among the students who were not satisfied with their experiences with ICN courses, the most dissatisfied students were at the origination site. This result should caution educators and program planners who are dealing with the ICN delivery system to assess the particular needs and the concerns of students at the origination site, and to assure that their needs will be accommodated when establishing effective learning environments.
CHAPTER V: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to measure constructs that contribute to graduate student satisfaction with interactive televised courses that have been taught via ICN. This was accomplished by using a questionnaire mailed to graduate students who had participated in different ICN courses offered by six colleges at Iowa State University. Graduate student satisfaction with interactive televised courses was measured by having students complete a Likert-type response scale questionnaire developed especially for this study. Six constructs were used to measure student satisfaction: (a) the instructor’s communication skills; (b) the instructor’s teaching skills; (c) accessibility of instructor out of the classroom; (d) course management; (e) course content; and (f) quality of technology. Other variables of interest were: site-type, gender, age and student motivation for participating in the ICN courses. An additional purpose of this study was to gather the students’ demographic information and their concerns with distance education courses that they had taken through the ICN delivery system. Concerns regarding distance education courses were gathered through five open-ended questions. This chapter presents a summary of the study, the major findings, conclusion, recommendations, and implications for development of ICN courses.

Summary

A review of the literature revealed that distance education is a vital strategy for educating students regardless of age or location. The literature also revealed that adult students have specific concerns that affect obtaining a higher education degree. With regard to limitations of adult students to access higher education due to their family and job
commitments, distance education appears to be the best opportunity for this group of students.

One of the major characteristics of distance education is the separation between the students and instructor. In Iowa, the Iowa Communications Network (ICN) provides residents with access to many educational programs through a highly advanced distance education system. The ICN is the nation's first two-way, full motion interactive fiber optic network reaching all counties in the state (Iowa Public Television, 1996). Currently there are 566 sites connected to the network. Measuring students satisfaction with their learning experience may provide valuable information about the aspects of the ICN program that work well and about the parts that need improvement.

This study focused on graduate level courses that were taught at Iowa State University through the ICN delivery system. The purpose of this study was to measure constructs that contribute to graduate student satisfaction with interactive televised courses that have been taught via ICN. The six constructs, identified through an extensive review of literature, are: instructor's communication skills; instructor's teaching skills; instructor's accessibility out of classroom; course content; course management; and quality of technology. A secondary purpose of this study was to gather students' comments and concerns for improving the quality of teaching through the ICN.

A stratified random selection approach was used in order to select a large number of respondents from diverse groups such as different academic areas and different colleges within Iowa State University. The population of this study was comprised of 690 graduate students who took 46 different courses from seven colleges at Iowa State University during the time period from Spring 1996 to Spring 1997. Three hundred of the 690 graduate
students identified were selected by a computerized stratified random selection technique, 150 from the origination site and 150 from the remote sites. Of the 300 students, 20 did not meet criteria to participate in the study. Therefore, the adjusted invited sample size for the study was 280.

Data for this study were gathered through a questionnaire mailed to the selected sample of students. The questionnaire contained three parts. Part I requested demographic information about the respondents. Part II assessed student satisfaction with the six constructs that contributed to their participation in the interactive televised courses. Part III asked students to share their concerns and suggestions as well as their positive and negative experiences with the ICN delivery system. After two follow-up processes, 150 questionnaires were returned with usable data, for a response rate of 54.7%.

Means, standard deviations, frequencies, and percentages were calculated to summarize the data. Spearman rho correlation was conducted to investigate the relationships between student satisfaction and age or motivation. T-tests were computed to compare student satisfaction with each construct on site-type, gender, and age groups. A content analysis was done to analyze the students' concerns and comments regarding their learning experiences with ICN delivery system.

An analysis of the demographic information revealed that the students at the origination site and remote sites had different profiles. At the origination site most of the students were female, but at the remote sites the gender representation was more balanced. The average age at the remote sites was higher than at the origination sites. Most of the students at both sites had a GPA between 3.50 and 4.00. A majority of the students at the remote sites worked full-time. Student motivation for participating in the ICN classes varied.
Most students at the remote sites perceived that the availability of courses motivated them to pursue a higher education degree, while at the origination site, most were motivated by their need for professional qualifications. These findings are important in understanding the characteristics of the students and their motivation to take ICN courses.

An analysis of the data from the second part of the questionnaire revealed that students, in general, were very satisfied with their learning experiences from the ICN delivery system. The majority (91%) perceived that the instructor made them feel they were part of the classroom. A majority of students at the origination site and remote sites will recommend other students to take an ICN course. Students at the remote sites rated the constructs of course management and quality of technology lower than the students at the origination site.

The results of the t-test indicated that there were significant differences in student satisfaction with the course content and quality of technology based on site-type. Students at the origination site were more satisfied with these two constructs than students at the remote sites. When comparing student satisfaction based on gender, there was a significant difference between male and female students in their satisfaction with accessibility of the instructor out of classroom. The male students were more satisfied with this construct than were the female students. With regard to the other five constructs, although the study did not reveal any significant differences between the male and female students, male students were slightly more satisfied with the other constructs.

T-test analyses for the remote sites revealed that there were significant differences between male and female students based on their satisfaction with course management and accessibility of instructor out of classroom. At the remote sites, male students were more
satisfied than female students with these two constructs. However, this study did not indicate any significant differences between gender when students from both site-types were included in the analysis.

In this study there were five age groups, which ranged from 21-30, 31-40, 41-50, 51-60, and over 60 years old. An analysis of the relationship between student age and satisfaction total average score indicated that, although older students rated all six constructs higher than younger students, the relationship was not significant. It appears that the older students appreciated the opportunity to have access to higher education more than the younger students.

An analysis of concerns and comments related to learning experiences with ICN delivery system revealed that a majority of the students perceived the ICN courses as a positive learning experience, and were willing to pursue their higher education degree through interactive televised courses. A majority of students perceived the ICN delivery system as an opportunity to share their knowledge and experiences and to use other sources that would not be available in traditional classroom settings. Utilizing the most advanced technology to communicate with other professional people, and establishing new friendships and professional networks were some reasons why the students liked the ICN delivery system.

In this study, 19 out of 150 students 17 from the origination site and 2 from the remote sites will not recommend the ICN course to other students. The study also revealed that students who will not recommend the ICN course to others rated all six constructs significantly lower than did students who will recommend ICN courses. A review of the student comments and concerns revealed that, in general, students at the remote sites had
more positive attitudes toward the interactive televised courses than those at the origination site. Students at the origination site perceived that the technical and logistical problems were very time consuming. The students have indicated that instructors need to emphasize the content of the courses rather than technology. Students at the remote sites were more satisfied with ICN delivery system than those at the origination site. Most students perceived the main problem with the ICN delivery system was in two areas: course management and quality of technology in delivering the course content. Although students at the remote sites generally were very satisfied with their learning experiences with the interactive televised course, some of them would prefer to participate in a traditional classroom if they could. An analysis of student open-ended comments by the respondents was consistent with results found in a study by Donnelly (1995).

Conclusions

Distance education is the only means by which many adult students can engage in formal education to pursue a higher education degree. Studies have indicated that students have generally positive attitudes toward all varieties of interactive televised education systems (Biner et al., 1994; Jurasek, 1993; Russell, 1995). While there has been a great deal of research on other aspects of distance education, there have been few studies that shed light on the issue of student satisfaction with interactive televised courses.

Today, assessment of student satisfaction has become an integral component in accountability for higher education. There are two primary reasons for the continued interest in student satisfaction: program effectiveness and student retention. Distance education delivery via the ICN system is clearly an effective means of providing instruction to students
at a distance. The capabilities of the ICN delivery system provide a satisfactory amount of interaction between the instructor and students, and among students. The ICN provides students and instructors with new teaching and learning environments. For effective instruction, instructors need to understand the ICN’s capabilities and know how to utilize these capabilities to foster instructional delivery.

Use of an interactive televised instructional system such as the ICN has several advantages. This delivery system is capable of providing immediate feedback to distance students and of conducting live interaction among all sites. This mode of delivery also provides students with learning experiences similar to what other students may receive in traditional classroom settings. Other advantages of the ICN system include its visual capabilities and sharing of valuable resources among different educational institutions.

Several researchers have indicated that using this mode of delivery requires a tremendous amount of training and planning for teaching. To develop and to teach a high quality course via the interactive televised system, the instructor needs to know the characteristics that are associated with the distance education system, the available resources, and the needs of the students. This information will help program planners and educators to increase the effectiveness of instruction. Appropriate course design, development, implementation, and evaluation will ensure that distance education students receive adequate benefits from the ICN delivery system.

Based on the results of this study, the following conclusions were drawn:

1. Overall, graduate students were satisfied with their learning experiences with ICN courses.
2. The ICN delivery system is an effective medium to deliver graduate degree programs
of study.

3. Satisfaction with the ICN delivery system is similar for students at the origination and remote sites.

4. Students at the origination and remote sites believed that the course content was relevant to their needs.

5. Students were satisfied with the amount of interaction with instructor outside and inside of classroom.

6. Students had sufficient opportunities to interact with other students and participate in class discussions.

7. Technological difficulties were distracting and interfered with learning course content.

8. Delivery of course material to the remote sites and access to reserved materials in the library were the main concerns of students at the remote sites.

9. Student demographic characteristics do not significantly influence satisfaction with the ICN delivery system.

10. The instructor's teaching skills and communication have a strong impact on student satisfaction with an interactive televised course.

11. Course management and quality of technology are major concerns for improvement at the remote sites.

12. In this study, students at the remote sites provided higher mean ratings for most of the constructs than their origination site counterparts.

13. Students at the origination site indicated a higher level of satisfaction for course management and accessibility of the instructor out of classroom.
Based on the results of this study, it might be concluded that distance education students who pursue a graduate degree via ICN delivery system are able to gain personal and professional advantages and they will receive the same content as their campus-based counterparts. In this study student ratings of satisfaction with courses and services indicated that regardless of some problems related to the course management and quality of technology, the majority of the students were satisfied with their learning experiences via the ICN delivery system. The results of this study support a study by Dexter (1995) in which distance students felt they had learned just as much in their interactive televised courses as on-campus courses.

For several reasons the findings from this research could be generalizable to other interactive televised education programs at similar institutions. First, the sample for this study was highly representative of the population of graduate students who took courses through the ICN delivery system. Second, the study was conducted at a large state university with an enrollment of more than 25,000 students. Finally, the sample was selected from all graduate students at Iowa State University and from different content areas and variety of settings. The diversity among the students who participated in this study and the selection of different content areas from different disciplines gives an expanded perspective for the results of this study.

Recommendations

Although the results of this study indicated that graduate students were satisfied with interactive televised courses through the ICN delivery system, there are several areas that need more attention, and indicate more research should be conducted. First, as the findings
of this study indicated, among the students who were not satisfied with their experiences with ICN courses, most of these dissatisfied students were at the origination site. A qualitative study may help to understand the nature and the reasons for this dissatisfaction.

Second, the results of this study should caution educators and program planners who deal with the ICN delivery system to assess the particular needs and the concerns of students at the origination site, and assure that their needs will be accommodated when establishing effective learning environments. And if used again, the instrument should be modified to address the unique needs and expectations of the students at the origination site.

Third, more studies should be done to investigate the effect of gender and age on student attitudes and satisfaction with interactive televised courses through ICN. The relationship between student satisfaction and academic achievements should be studied. This line of investigation could include identifying specific subject areas or learning behavior tasks that can best utilize the ICN delivery system.

Finally, the student comments indicated that they believe instructors need more professional training for teaching through the ICN delivery system. Providing systematic professional training for instructors will motivate and encourage instructors to function effectively in this new teaching environment. The instructors who are new to distance education need systematic professional training and support, including mentoring, observation by a master instructor, and hands-on experience.

Because both instructor and student need to be prepared for this new learning and teaching environment several recommendations were made based on the results of this study:

1. Implement course management and support function for remote sites.

2. Resolve technical problems as quickly as possible.
3. Provide access to course materials and resources through inter-library loan.

4. Provide training in ICN classroom for students to use the technology.

5. Make the same equipment available to both the origination and the remote sites.

6. Because students do not have direct contact with the instructor due to the nature of the ICN technology, increase student-student interaction as much as possible.

7. Provide systematic support system and professional training for instructors who want to teach through the ICN system.

8. Inform students upon registration that the course will be taught using the ICN system.
APPENDIX A. COVER LETTER TO PANEL MEMBERS
May 5, 1997
Fateme Zarghami
103C University Village
Ames Iowa, 50010

Dear Dr.

Enclosed is a survey designed to measure the constructs for students' satisfaction with graduate level interactive televised courses. You have been identified as a professional with expertise in distance education and/or evaluation. We are asking you to review the survey for its content-related validity and to respond with questions, concerns and suggestions for the items. Enclosed you will find the definitions for each construct that we want to measure. This survey will be mailed to 200 graduate students who have had courses through ICN (Iowa Communications Network), with the intent of meeting the following research questions:

1. Are there significant differences between students in remote sites and the origination site based on satisfaction with regard to the six constructs?
2. Are there significant differences between male and female students based on their satisfaction with graduate level interactive televised courses with regard to the six constructs?
3. Are there significant differences between male and female students at the remote sites based on their satisfaction with regard to the six constructs?
4. Are there significant differences between male and female students at the origination site based on their satisfaction with regard to the six constructs?
5. Are there significant relationships between student satisfaction with graduate level interactive televised courses and age and motivation of students?

For your review of this questionnaire, please consider the following:

1. Does the survey meet the stated research goals?
2. Which items need clarification?
3. Are there errors in any of the items?
4. Do the items flow in logical order?
5. Are there essential content areas that are not addressed?
6. Are there items that are repeated or unnecessary?

You can make general comments on the accompanying sheet. In addition, feel free to write directly on the questionnaire for concerns related to specific items and sections. We look forward to your responses and truly appreciate your time and expertise with reviewing this survey. Please return the survey and your comments in the enclosed envelope by May 15, 1997. Thank you for assistance.

Sincerely,

Fatemeh Zarghami
Graduate Student
Department of Family & Consumer Sciences Education and Studies

Cheryl O. Hausafus Ph.D.
Associate Professor
Department of Family & Consumer Sciences Education and Studies
APPENDIX B. COVER AND FOLLOW-UP LETTERS, FOLLOW-UP POSTCARD AND QUESTIONNAIRE

Cover Letter
September, 1997

Student Questionnaire

We would like to ask your assistance in assessing the Iowa Communications Network (ICN) as a delivery system for graduate level courses. As a student who has been taught on the ICN, you have much to offer in identifying effective applications for this delivery system, either in the on-campus (origination) or the remote sites. The assessment study is being supported by Teacher Education Alliance Iowa’s Star School Project.

The attached questionnaire should take approximately 15 minutes to complete. Please complete this questionnaire and then tape it shut and place it in the mailbox, no stamps are required. We wish to know your recent experience with the graduate level course you have taken through ICN. All responses are voluntary and will be kept confidential. Please consider each question carefully and give your honest opinion. You may respond directly on the questionnaire. Your responses will be aggregated with similar participants, and the results reported as group data only. The code in your questionnaire helps us in the follow-up phase of the study to increase the questionnaire response rate. Please mail it by October 20, 1997.

If you have any questions, please feel free to contact Dr. Cheryl Hausafus at 515-294-5307 or Fatemeh Zarghami at 515-294-6367.

Again, thank you for filling out this questionnaire. Your unique and valuable experience will help us to provide you with an improved teaching-learning environment.

Sincerely,

Fatemeh Zarghami
Graduate Student
Family and Consumer Sciences
Education and Studies

Cheryl O. Hausafus, Ph.D, C.F.C.S.
Associate Professor
Family and Consumer Sciences
Education and Studies
October, 1997

Dear Student:

Three weeks ago a questionnaire about your assistance in assessing the Iowa Communications Network (ICN) as a delivery system for graduate level courses was mailed to you. If you have already completed and returned it, please accept our sincere thanks. If not, could you please do so today.

Because it has been sent to only a small, but representative sample, it is extremely important that your response be included. If by some chance you did not receive the questionnaire, or it got misplaced, please call us at (515) 294-6367 or send an email to Fatemah Zarghami at bijan@iastate.edu and we will get another one in the mail for you.

Again, thank you for filling out the questionnaire. Your unique and valuable experience will help us to provide you with an improved teaching-learning environment.

Sincerely,

Fatemeh Zarghami
Graduate Student
Family and Consumer Sciences Education and Studies

Cheryl O. Hausafus, Ph.D, C.F.C.S.
Associate Professor
Family and Consumer Sciences
Education and Studies
Dear Student

Three weeks ago, a questionnaire regarding student satisfaction with graduate level course which had been taught by ICN delivered system were mailed to you. As of today, we have not yet received your response. Have you mailed them? If so, thank you very much. If not, could you please complete and return them today?

If you are having trouble completing the questionnaire, please call us at 515-294-5307, or 515-294-6367. Your participation is vital to the success of this study. Thank you for your time and assistance.

Cheryl O. Hausafus        Fatemeh Zarghami
Associate Professor      Graduate Student
QUESTIONNAIRE

Direction: Please circle your response based on your most recent student experience with a graduate level ICN course.

General Information

1. In which site-type did you attend for the ICN course?
   A) remote sites B) origination site (on-campus)

2. With which college at ISU was the ICN course affiliated?
   A) Agriculture B) Business C) Design D) Education
   E) Engineering F) Family & Consumer Sciences G) Liberal Arts &
   Sciences H) Veterinary & Medicine

3. What program or credential goal are you pursuing?
   A) licensure B) certification C) master D) Ph.D.E) other

4. What is your gender?
   A) male B) female

5. What is your overall graduate level GPA?
   A) 4.0-3.51 B) 3.50-3.01 C) 3.00-2.51 D) not applicable

6. How many graduate level semester credit hours have you completed using ICN delivering system?
   A) 1-3 B) 4-6 C) 7-9 D) 10-12 E) 13 or more

7. How many courses have you taken through ICN?
   A) one B) two C) three D) four E) more

8. What is your employment status in an employed position?
   A) not current employed B) employed part-time C) employed full-time

9. How many hours a week do you work as an employee?
   A) 0 B) 1-10 C) 11-20 D) 21-30 E) 31 or more

10. What is your marital status?
    A) married B) never married C) divorced D) widowed

11. How many children under 18 live in your household?
    A) none B) 1 C) 2 D) 3 E) 4 or more

12. What is your age?
    A) 21 to 30 B) 31 to 40 C) 41-50 D) 51-60 E) over 60

13. How many hours a week did you have available to study for the ICN course?
    A) 0-2 B) 3-5 C) 6-8 D) 9-11 E) 12 or more

14. What is your primary motivation for taking courses through ICN?
    A) professional qualification B) promotion at work
    C) availability of course in my local area D) personal interest
    E) flexibility of time and distance

15. Would you recommend other students to take ICN course?
    A) yes B) no
Please identify your degree of satisfaction with various aspects of your recent ICN course by using the following scale:

A (or 1) = Strongly Disagree/ SD
B (or 2) = Disagree/ D
C (or 3) = Neither agree nor Disagree/ N
D (or 4) = Agree/A
E (or 5) = Strongly Agree/ SA

In my ICN graduate level interactive televised course

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Instructor made me feel I was part of the class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. Instructor was sympathetic and supportive to my needs.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>18. Instructor was enthusiastic in teaching ICN course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. Instructor returned my phone calls.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. Instructor encouraged me to participation in the class.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>21. Instructor was well prepared in the content.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>22. Instructor was well prepared in using the ICN equipment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. I received feedback related to class assignments in a reasonable time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. The assignments were effective in promoting learning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. I knew what was expected from me in this class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. Instructor used different methods to assess my progress.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>27. Instructor was accessible outside of class (through e-mail, fax, etc.).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. I was able to have access to instructors during his/ her office hours.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>29. I am satisfied with the amount of individual contact I had with the instructor.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>30. Registration for the courses was well organized.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31. Papers and tests were graded and returned by instructor regularly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>32. Distribution and collection of course documents were organized.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>33. Instructors knew how to handle technical emergencies.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>34. Back-up tape was delivered to sites in the event of broadcast failure.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35. I had access to inter-library loan materials.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>36. Textbooks for the ICN courses were available.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>37. Syllabus and other course materials were accessible before the first session.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>38. Tests were administered adequately.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>39. Reserve materials in the university library were accessible.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>40. I was trained to use the classroom technology.</td>
<td>1</td>
<td>2</td>
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</tr>
<tr>
<td>41. Publicity about the ICN courses was accessible.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>42. I had access to E-mail.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>43. Cooperative learning was encouraged through group project.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>44. The instructor's teaching skills made me feel satisfied with this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>45. The content of the course was useful.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>46. I could apply the course content to my professional setting.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>47. The course handouts were very useful.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>48. Course materials were effective for me in learning the content.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>49. Course content was meaningful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>50. Course content met my personal needs.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>51. Course content was interesting.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
In my ICN graduate level interactive televised course

<table>
<thead>
<tr>
<th>Question</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>52. The amount of time graphics were left on the screen was sufficient.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>53. Photograph, diagrams, or charts were appropriately used.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>54. Previously developed presentation helped me to understand the content.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>55. The use of interactive multimedia was helpful to understand the content.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>56. Videos were appropriately used.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>57. It was easy to use the microphone.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>58. It was easy to see the TV monitor.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>59. Graphics or other visuals were easy to read.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>60. Instructor contacted me in the case that I missed the class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>61. I had enough opportunity to interact with other students.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>62. In each session there was opportunity for me to ask question.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Please indicate your thoughts and concerns related to the following:

1- Two things that you are dissatisfied with ICN courses.

2- Two things that you liked about ICN courses.

3- Two things that you recommend for improving the use of the ICN system.

4- Tell us about your unexpected experience(s) with ICN courses.

5- Other comments you like to share.
APPENDIX C. HUMAN SUBJECTS APPROVAL FORM
Last Name of Principal Investigator: Zarghami

Checklist for Attachments and Time Schedule

The following are attached (please check):

12. □ Letter or written statement to subjects indicating clearly:
   a) purpose of the research
   b) the use of any identifier codes (names, #’s), how they will be used, and when they will be
      removed (see Item 17)
   c) an estimate of time needed for participation in the research and the place
   d) if applicable, location of the research activity
   e) how you will ensure confidentiality
   f) in a longitudinal study, note when and how you will contact subjects later
   g) participation is voluntary; non-participation will not affect evaluations of the subject

13. □ Consent form (if applicable)

14. □ Letter of approval for research from cooperating organizations or institutions (if applicable)

15. □ Data-gathering instruments

16. Anticipated dates for contact with subjects:

<table>
<thead>
<tr>
<th>First Contact</th>
<th>Last Contact</th>
</tr>
</thead>
</table>

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual data will be erased:

   Nov 30, 1998

18. Signature of Departmental Executive Officer: Date

   [Signature]

   [Date]

   [Department or Administrative Unit]

   [FCS Educ. Studies]

19. Decision of the University Human Subjects Review Committee:

   □ Project Approved   □ Project Not Approved   □ No Action Required

   [Signature of Committee Chairperson]

   [Date]

   [Name of Committee Chairperson]
REFERENCES


Schuemer, R. (1993). *Some psychological aspects of distance education.* Hagen, Germany: Institute for Research into Distance Education. (ERIC Document Reproduction Service No. ED 357 266)


ACKNOWLEDGEMENTS

A journey of this magnitude is not taken alone. Along the way, one encounters individuals who serve as helper in our quest to the ultimate goal and who leave their own indelible mark on our lives. I would like to thank my committee for their support and understanding: Drs. Margaret Torrie, Mike Albright, Wade Miller, Greg Miller. A special thanks to Dr. Cheryl Hausafus, my major professor, for her patience, kindness and paying attention to details.

I am grateful to the Iowa Distance Education Alliance (IDEA) and the College of Family and Consumer Sciences for funding this study. Most importantly, I would like to thank my family members for their unconditional love and support. To my father Bijan and my brother Ali who supported me through this journey. To my dear son Jafar, who patiently waited for me to complete my graduate studies. To my friends who supported me with their guidance and care for me. To Pat Hahn who did all the hard work of editing.