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TESTING THE SYSTEMS MODEL IN MEXICAN DISTANCE EDUCATION: 
THE CASE OF THE VIRTUAL UNIVERSITY AT THE 
INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY

A Dissertation Presented

by

LUIS GALARZA PÉREZ

Submitted to the Graduate School of the 
University of Massachusetts Amherst in partial fulfillment 
of the requirements for the degree of 

DOCTOR OF EDUCATION

February 1997

School of Education
TESTING THE SYSTEMS MODEL IN MEXICAN DISTANCE EDUCATION: THE CASE OF THE VIRTUAL UNIVERSITY AT THE INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY

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George E. Urch, Member

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School of Education
DEDICATION

I dedicate this work to my family. My mother is proud of this accomplishment.

so is my wife Gabriela. Had my late father seen it, he would have been so too.
ACKNOWLEDGMENTS

The completion of this work has been possible thanks to several people. I would like to recognize their participation in making this happen. Without them, it would not have been such a joy to pursue my doctoral degree.

I thank Bob Miltz for his dedicated counsel in my tenure as a doctoral student at the Center for International Education. He always listened patiently to my ideas, concerns, and dreams.

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gone, some others have stayed and keep in touch. They should all know I thank them
much. I learned a great deal from all.

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completed.
ABSTRACT

TESTING THE SYSTEMS MODEL IN MEXICAN DISTANCE EDUCATION: THE CASE OF THE VIRTUAL UNIVERSITY AT THE INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY

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This study is concerned with the systems approach in distance education. As a modality of instruction, distance education has grown in importance rapidly in the last thirty years. Most theories in the field have been solidified and are part of a sophisticated body of literature addressing learning issues, technologies, administration of programs, instructional design, and models. Systemic thinking has been proposed as a way to operate in distance education to obtain good results in the practice of distance education.

Because most theories and models of distance education have been developed in industrialized nations, this dissertation looks at the systems approach in the context of a Latin American university. Some of its postulates are examined to determine if success areas at the Virtual University are the result of systemic practices. The larger context of this dissertation is the analysis of a distance education model within a university in the developing world.
The Virtual University of the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) in Mexico serves as a case study for this work. In eight years, the unit has grown dramatically offering several graduate degrees, undergraduate courses, and continuing education programs in 26 national campuses and in other locations of North, Central, and South America. Its success and problem areas are worthy of analysis looking at a distance education model developed in the US.

Through the use of surveys, review of literature, institutional evaluations, and unstructured interviews, the study looks at the interconnectedness of different process parts of the Virtual University. An assessment of success and problem areas is presented.

Through the analysis of data and discussion, I propose that distance education success in this Mexican university is perhaps related to cultural perceptions or the sophisticated technological infrastructure in the 26 campus system.

The result questions the adoption of external models in developing countries. It suggests that, rather than continuing to explain practices in distance education with foreign schemes, local approaches need to be developed as the basis for research in the modality. This idea may be of interest for distance educators in developing nations and elsewhere.
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CHAPTER 1
INTRODUCTION

1.1 Introduction

Distance education is in an accelerated transition process. It is occurring as a result of changes in communication technologies, which serve as the primary means of material delivery and interaction among students, instructors, and institutions. Within the last 30 years, there have been numerous studies researching different aspects of distance education systems. They have included independent learning, appropriate technologies, student satisfaction, evaluation techniques, and program delivery, among others. Trends indicate that distance education continues to grow in importance and recognition. New teaching models using communication technologies are being explored all over the world by different universities and schools. Distance education continues to be a priority for many developing countries today as well.

The field of distance education is living in a special historic stage today. Garrison (1993) stated that, from a historic point of view, the field could be divided in three generations: correspondence education, teleconferencing, and computer based learning. Although in technology generation terms this division is appropriate, distance education is practiced in many different ways and with several technological combinations today. While some institutions use correspondence as their medium exclusively, others combine television broadcast with computer conferencing, audiographics with express delivery services, and so on. In developing countries, it is likely to see these combinations used in
distance education systems too. Today's distance education tends to incorporate telecommunication technologies with multiple delivery methods.

The beginning of distance education may be traced back 150 to 160 years. It flourished mainly in Europe and the United States. Later in the 20th Century it became popular in other parts of the world. Correspondence study is now understood as part of a greater disciplinary field known as distance education. New media have shaped traditional views and expectations of studying through correspondence, particularly because of fast interaction possibilities, scope of programs, increased international participation, and other features alike. Distance education is now considered as a field of study in itself, which, while still a form of education, it presents special unique characteristics as a result of its basic premise: The separation in time and/or space of instructor and student.

Schlosser and Anderson (1994) explained that the notion of distance had multiple meanings in the context of education. In addition, distance education as a term, had been used to define many different programs that relied on multiple media designed to serve several different audiences. Even though confusion on terminology and exact definition had been and continued to be an area of debate and concern, there had been important theoretical postulates developed.

Today, it is known that "most distance education students are adults between the ages of 25 and 50" (Moore & Kearsley, 1996, p. 153). Perhaps the most analyzed aspects by theorists in the field are the reasons why distance education institutions have emerged. At the university level the following such reasons are discussed:
• the need felt in many countries to increase the offerings of university education generally
• a realization that adults with jobs, family and social commitments contributed a large group of prospective part-time university students
• a wish to serve both individuals and society by offering study opportunities to adults among the disadvantaged groups
• the need found in many professions for further training at an advanced level
• a wish to support educational innovation
• a belief in the feasibility of an economical use of educational resources by mediated teaching. (In Schlosser and Anderson, 1994, p. 5)

The first 130 years of experience in distance education gave the field a solid collection of different programs and experiments tried in many parts of the world. Keegan (1986) pointed out, "academic research in distance education reached a level of maturity compatible with the emergence of a new field within education by the early 1970s" (p. 7). Today, consolidated and widely accepted theories of distance education dominate the research spectrum known by distance educators.

The need for research in distance education had consistently been expressed by Childs (1971), Walsh (1971), and others. Later in the 1970s, other authors advocated for theoretical grounds in the field, but it was not until the 1980s that they acquired recognition. Contemporary distance education theories have emerged in different parts of the world. Some attempts have been made to categorize them all, including earlier proposals. Keegan (1986) offered the following categorization:

• *Theories of autonomy and independence*. These contributions come mainly from the late 1960s and early 1970s and the major representatives are Rudolf Manfred Delling (FRG), Charles A. Wedemeyer and Michael G. Moore (USA).

Theories of interaction and communication. More contemporary views from Börje Holmberg (Sweden, Federal Republic of Germany), John A. Bååth (Sweden), David Sewart (UK), Kevin C. Smith (Australia), and John S. Daniel (Canada). (p. 52)

Recent approaches escape the clusters mentioned above, including Keegan's own reintegation of the teaching acts (1983), the 14 principles supporting theoretical work by Perraton (1983), Garrison's learning control, communications and quality and access considerations (1993), Amundsen's emphasis on learning and understanding, Bates dealing with the development of technology (1993), and the system's approach by Moore and Kearsley (1996), Gibson (1993), and Boyd (1993).

The theories of distance education have focused on different aspects of the education program, here referred to as subsystems of the general distance education system. This is to say that autonomy and independence theorists have devoted much of their attention to the learner. While they look at other units of the process their main subsystem of study are learners. Successful distance education programs seem to be those which operate under a systemic umbrella, where all subsytems take equal part in the process. This theoretical approach was proposed as a systems model postulate in the 1990s.

The systems approach serves as the underlying component of this dissertation study. Moore and Kearsley (1996, p. 6-7) advocate for this theory because:

A common misperception among educators who are not familiar with a systems approach is that it is possible to benefit from introducing technology into
education without doing anything to change the other ways in which education is currently organized. They think that by moving cameras, computers, and microphones into the classrooms, schools, universities, and training departments, they can increase enrollments, provide new curricula, and save money without doing anything else. According to this view, once the technology is in place, there is little else to be done except to let teachers get on with practicing their craft as they have always done. They decide what to teach, prepare the lessons, and interact with the students via the camera, computer, telephone, or some combination of these.

From a systemic point of view, there are several aspects of the distance education process to consider with equal importance, including but not limited to: student needs, history, theory, philosophy, organization, instructional design, media, program, evaluation, technologies used, software, staff, interaction mechanisms, workplace, home, classroom, cultural context, and learning centers.

In an effort to further understand this theoretical approach, this study examines specific ways to discuss how a systemic view of distance education works. This study contributes to the field of distance education by testing the systems approach in a Latin American university. It looks at it as a case study according to its successes and problem areas. The study illustrates that complex interrelationships of different subsystems that take place within distance education programs.

1.2 Statement of purpose

The purpose of this study is to look at the systems model in distance education programs in the context of a developing country. To accomplish this task, a case study is examined. The Virtual University of the Instituto Tecnológico y de Estudios Superiores
de Monterrey (ITESM) System, a 26 campus university throughout the Mexican territory, serves as a distance education system for analysis.

The Virtual University of ITESM has grown dramatically in only seven years, partly as a result of an integrated effort to consolidate course offerings throughout the system. Previously known as the Interactive Satellite Education System (SEIS), this distance education unit of the ITESM organization, offers a solid collection of experiences that are worthy of attention, especially if looked at from a systems approach. A study conducted at ITESM based on data made available by the organization and on observation, surveys, and interviews covering different areas of importance is used.

1.3 Rationale and significance of the study

This study contributes as a supporting research effort to determine if a systemic approach to distance education is appropriate. It has become popular that many universities and institutes, particularly of higher education, start programs at a distance by injecting technological resources into their programs. Because the systems model to distance education has only been popularized in the last few years, this research effort will present a case study illustrating a contextual test of the theoretical approach described here. This in turn will help determine if large technological investments are the most important effort for distance education to be successful. The model under study proposes that there are other investments that need to be considered in an integrated fashion, such as the influx of special designers, evaluators, and others.
This study also contributes to knowing more about distance education in a developing country. It is known that most distance education theory has been produced in industrialized nations, sometimes taking Third World contexts as the subjects of research. Rather than an experiment, this is a descriptive study looking at the systems approach to distance education in the developing world. From the perspective of nationals of the Third World, this study may be seen as a way to test assumptions about distance education, which are commonly developed in industrialized nations. From the perspective of distance educators, primarily in the West, the study is a practical addendum to a theoretical postulate.

In this study it is recognized that a systems model also alludes to the context in which a distance education program takes place, be it a university, a state, a nation, or the world. Distance education may be looked at from different perspectives. At the macro level, it can be studied looking at its promise in national development (Arger, 1987). At a micro level, one could look at a particular distance education program, analyzing such entity as a system itself, ultimately a subsystem of a larger set of organized components in society.

ITESM is a university system that houses a division operating as a distance education organization, not only in Mexico but in other parts of Latin America, the United States, and Canada as well. Recent consortia have been negotiated among ITESM and universities in South and North America. The case should serve as reference for other researchers, institutions, educators, and students interested in exploring a systemic
approach that is conducive to cooperation in international distance education programs. It also helps as an experiment testing the use of the systems model.

In the field of education, this is an additional study within the distance education arena. It looks at assumptions made about processes, students, contexts, interaction, and instruction, among others. In Mexico, it illustrates an example of a large investment that fostered an alternative education method (Ornelas, 1995), which in turn is now financially feasible because of the large number of students it serves (Moore & Kearsley, 1996). In doing this, the study helps solidify distance education as a modality for learning today.

1.4 Statement of hypotheses

This study works under the following statement as a fundamental research question:

The application or use of the systems approach in distance education leads to quality distance education programs.

In using ITESM's Virtual University as the case study here, the following are considered as additional research questions:

First, where the Virtual University has been successful, there is evidence of a systemic approach surrounding the distance education process. Second, where the Virtual University has not been successful, there is no evidence of a systemic approach used in the distance education process.
1.5 Assumptions, theoretical rationale, explanatory material, and definition of terms

For the purposes of this study, it is important to understand the fundamental differences between distance education and traditional face to face education. Distance education is a form of education characterized by the separation of student and instructor in space and/or time. This means that while some distance education is contiguous, there are some programs that provide for non contiguous communication. In face to face education, the instructor is in charge of most or all instruction, as well as the preparation of materials, their evaluation, curriculum design, and the administration of class. In distance education, instruction is possible thanks to a complex coordinated system characterized by different activities taken by several individuals. This division of labor in education is a characteristic of distance education (Moore & Kearsley, 1996).

This study assumes that the separation of student and teacher is central to a definition of distance education. Communication media are used for dialogue and interaction between instructors and students and among students themselves. These media are a "set of symbols" (Moore & Kearsley, 1996, p. 10) that include text, television, audio, computing and their combinations. Communication technologies facilitate the delivery of media to, from, and among students and instructors. These include print, computers, cassettes, radio, telephone, broadcasting, videocassettes, videodiscs, cable, satellite, fiber optics, microwave, CD-ROM, videodisk, and Integrated Services Digital Network (ISDN) (Bates, 1993) and the "organization and the people who make them work" (Moore & Kearsley, 1996, p. 10).
The context of the study is a university system formed by 26 campuses throughout the Mexican territory. ITESM was founded in 1943 by a group of industrialists in the Northern part of the country. It was the first institution to be recognized as a member of the Southern Association of Colleges and Schools (SACS) outside the United States. As a result of its third self institutional study, conducted at ITESM in order to renew its membership at SACS, it was concluded that there were immediate needs for faculty development. ITESM's options under this demand were: First, to allow its faculty to pursue graduate degrees in and out of Mexico; second, to rehire an all new faculty platform; and third, to offer the graduate degrees needed for recertification by SACS. The institution opted to offer graduate education at a distance to its faculty, taking advantage of its prior experience with telecommunications technology. This is the way SEIS, renamed The Virtual University in March 1996, was born at ITESM (Galarza, Xotlanihua, & Galarza, 1995).

In this study, a distance education system is a collection of activities done by the distance institution and the learner geared towards learning. A program is referred to as a specific course or set of courses within the distance education system, although a program may also be a television documentary, a radio interview, and other media programs used in the system. Different activities and aspects of the distance education system are called subsystems and, normally, other subsystems are part of the program as well. Specific technologies used in the program under study are a combination of compressed digitized video delivered by satellite, computers, print, telephone, and CD-ROM.

Finally, it is appropriate to define what is meant by a systems approach. The idea or order, of organized sequential steps refers to a systematic process, procedure, or
activity. Here, *systemic* is used to allude to the whole, particularly looking at its different components or subsystems and their interrelationships, not necessarily arranged or organized in any particular order. By systems the reader should understand the concept of "wholes" with its implications for inquiry. This means that rather than looking at social systems, such as a distance education organization, in a causal, orderly fashion, a "whole" approach looks at the entire unit with certain characteristics that make it work. This underlying theoretical approach has its roots in general system theory as developed by Bertalanffy (1968) and later applied to several disciplines (Checkland, 1993), including education (Carr, 1996; Banathy, 1995a, 1995b, & 1991; Reigeluth, 1993; & Reigeluth and Garfinkel, 1994).

1.6 Limitations of the study

This study is a first look at the systems model within a distance education program in Mexico. ITESM is a private higher education institution and, as such, its constituents are different from those of state operated institutions. The educational and cultural contexts that surround Mexican distance education make it difficult to apply some findings to other Latin American nations. It is true that most distance education studies have been conducted in industrialized nations. That this one is conducted in a developing country does not mean it is always applicable to other contexts. It is only a study that looks at a theoretical approach to distance education in one of Mexico's leading private higher education organizations.
The study is not meant to compare distance education institutions in Mexico. In many ways, as the reader will see throughout this dissertation, ITESM is not comparable to other institutions in Mexico, Latin America, or even Canada and the United States. What this study does is to look at the systems approach undertaken in distance education efforts by investigating the Virtual University in detail. It offers some of its history, problems, success stories, learner and administrator opinions, and other systemic analyses to determine if an interrelationship of subsystems within good distance education exists. There is no attempt to suggest here that what ITESM has done is ideal, or that others should copy its model, but rather that in such institution the systems approach may be looked at to determine whether it is a proper approach to incorporate in other distance education efforts.

As a one time research effort, the study suggests some ideas based on findings of a very young system. In fact, the Virtual University's first formal system-wide student evaluations were consolidated only at the end of 1995 for the first time. More longitudinal studies may be appropriate to understanding some premises that will derive from this study. Only through dedicated research, badly needed in all Mexican higher education institutions, can the fruits of experimentation be tasted. While this dissertation will walk through that path, it is only a beginning. More sophisticated distance education research efforts can prove to offer better insights than a one time doctoral dissertation study.
1.7 **Outline of the remainder to the thesis and conclusion**

The remaining of this thesis is divided into four chapters. Chapter one was dedicated to introducing the reader to the study in a general form. It included a discussion of the problem under analysis, as well as the significance of the thesis and its research questions. A definition of terms was offered, along with assumptions and a theoretical rationale. Then, the limitations of the dissertation were outlined.

Chapter two reviews relevant literature, including those authors that have written on the systems approach to education, since it serves as the theoretical basis underlying this study. Chapter three outlines the methodology and procedures followed; chapter four offers findings, and the final chapter is devoted to recommendations and the conclusion of this thesis.

This dissertation contributes to the study of distance education as seen from a systemic point of view. It offers a working definition of distance education based on the separation of student and teacher; looks at successful and unsuccessful practices at the Virtual University of ITESM, and it is a look at the systems model in a developing country.
CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

To look at distance education as a systemic practice, it is imperative to first arrive to a general understanding of what is meant by distance education. Achieving this requires a short review of its history, so that the reader knows the origin of the modality, as well as the reasons why it is now known as the field of distance education. Then, a review of theories and their most important proponents is pertinent. This will help the reader comprehend the evolution of theoretical work until the most recent postulates. Rather than exploring all authors who have contributed to the development of distance education theory separately, the literature is handled in relevant clusters. They include independence and autonomy, interaction and communication, industrialization, and systems. Besides these clusters, this study also pays attention to Keegan's reintegration of the teaching acts (1983), the 14 principles supporting theoretical work by Perraton (1983), Garrison's learning control, communications and quality and access considerations (1993), Amundsen's emphasis on learning and understanding, and Bates dealing the development of technology (1993).

In the 1990s, the systems approach to distance education is the latest theoretical work developed in the literature. Its premises build upon other important distance education and systems theory principles and are taken a step beyond, defined as the interrelationship of subsystems to make the program work. A review of the systems
theory in education is pertinent to understand the theoretical base used throughout this study.

Finally, a summary is presented with the most important points learned. This in turn supports the design and procedures developed for this dissertation work.

2.2 Towards a definition of distance education

There is sufficient agreement today that the field should be called distance education and not distance learning, distance teaching, or correspondence education. One common characteristic discussed among authorities in the field is the separation between student and teacher. Although this is a fundamental principle of distance education, it is possible that some confusion may be associated with other forms of education, such as continuing education or open learning, since they, sometimes, feature the same distinction. It is because distance education requires a student-teacher separation component that the field exists, and it is because of this characteristic that many have formulated more distinctions that make it a unique area of study. Extension education, universities without walls, experiential learning, open education, and external degree programs are similar to distance education but they are not the same (Keegan, 1983). Moore and Kearsley (1996, p. 2) explained that "because distance education aims to provide instruction in places and times that are convenient for learners rather than teachers or teaching institutions", the field sometimes is called distance learning.

Definitions of distance education have been provided by several authors attempting to eliminate ambiguity and to set a framework for a sound theoretical base.
According to Schlosser and Anderson (1994), this has been particularly difficult because the word distance implies different meanings to different individuals. Moreover, the combination distance education has been used to allude to many diverse programs and audiences through various media.

Keegan (1983) argued that the nature of distance education might be better understood if some of its fundamental differences with traditional education are considered. He says that in distance education it is the institution that teaches and not the individual. This is especially true considering the number of people involved in producing educational packages or programs. He also argues that in distance education learning materials are directly linked to the learning process, since not much feedback and clarification can be obtained as in traditional settings. Motivation of the student is also different as most of the learning takes place individually without the opportunity to be personally guided through the learning process. As students and teachers and their staff are separated, there is great potential for education to be impersonal. Finally, based on Otto Peters' theory, depicting distance education as the most industrialized form of education, Keegan says that the management skills needed to run a distance education program are more as those found in industrialized contexts.

Once the fundamental differences between distance and traditional education are seen, Keegan (1983) proposes the following six elements as essential in a definition of distance education:

- separation of student and teacher
- influence of an educational organization especially in the planning and preparation of learning materials
• use of technical media
• provision of two-way communication
• possibility of occasional seminars
• participation in the most industrialized form of education. (p. 15)

As stated, Keegan's analysis includes more than the distinction of separation between student and teacher. In particular, there is some attention to the fact that distance education programs are commonly influenced by the organizations in which they are housed. Today, the majority of distance education programs in the world are still part, or divisions of, traditional education organizations. This is why the influence they put into distance education programs is noteworthy of attention. Finally, the use of media to facilitate interaction is also mentioned as a distinction, be it correspondence, telephone, audio or video tapes, electronic conferencing, and others and their combinations.

It is also appropriate to clarify the distinction between distance education and open learning, since some forms of distance education have been incorrectly defined confusing them with the former. While distance education refers to modes of instruction that separate student and teacher, open learning refers to flexibility. Keegan argued that open learning is a characteristic of an institution that is considerably flexible with its administrative procedures, such as exam scheduling, homework deadlines, and the like. Distance education does not enjoy such flexibility. Hence, even traditional education programs can be defined as open depending on their administrative restrictions. Many adult education programs have followed this model, but do not represent forms of distance education.

Keegan's definition of distance education is further enhanced by a distinction between distance teaching, or instructing at a distance, and distance learning, both of
which conform the notion of distance education. However, it is important to point out that not all forms of teaching and learning which are not face to face are part of the distance education definition. Distance teaching is one half of distance education and so is distance learning. A proper definition also includes the elements of separation, technology, organizational influence, two-way communication provision, occasional meetings, and participation in an industrialized mode of teaching.

Perraton (1983) proposed a definition of distance education as "an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner" (p. 34). Although not as extensive as Keegan's, the definition is expanded as it introduces the notion of time separation. In practical terms, what the time dimension explains is that distance students do not necessarily learn or study at the same time they receive a class. In fact, correspondence students are, by definition, separated by space and time from their instructors.

For Rumble (1989), there were specific elements when defining distance education, including: A student-teacher relationship, content, a contract acknowledging the learning objectives, a physical separation which could be supplemented by face to face instruction, a physical separation between the students and the organization providing the program, a structured form for two-way communication, a structured academic procedure of instruction and evaluation, and the opportunity to learn in groups or individually without the teacher being present. This definition attempts to cover more aspects of distance education, but implies that these are necessary elements of a program. The multiple combinations of motives, justifications, academic and administrative agreements, and diversity of learning styles, weaken the definition as stated. It provides.
however, a number of interesting points to keep in mind in the process of defining the field.

Sewart (1983) suggested that part of the difficulty in arriving to a widely accepted definition was because its practice had different origins throughout the world. Nevertheless, he said that in distance education learning is more individualized since the student does not have much support. He explains that this problem has provoked that institutions explore different forms of delivery and structure of programs; this is why the term distance teaching has become widely used. Besides his observations about the history and development of distance education, he also pointed out at other important considerations one needs to have in mind: a) that the educational package has limitations but that can probably be alleviated by tutors or facilitators; b) that institutions need to recognize the different contexts in which traditional and distance students perform as students; and c) the apparent contradiction between high drop-out rates in distance education settings and the discourse promoting how economical it is to study at a distance.

Finally, Sewart explained that "teaching at a distance will continue to rely now, and for the foreseeable future will continue to rely, upon the technology of printing" (p. 54). From 1983 until today, drastic changes in communication technologies have taken place. Printing has taken another shape in the 1990s thanks to the arrival and expansion of electronic publishing. In 1987, Garrison and Shale had already proposed that until then, it was difficult to accept definitions previously made. In particular, they referred to the unprecedented development of technologies used in distance education and cited the following essential aspects surrounding the field:
1. Distance education implies that the majority of educational communication between (among) teacher and student(s) occurs noncontiguously.
2. Distance education must involve two way communication between (among) teacher and student(s) for the purpose of facilitating and supporting the educational process.
3. Distance education uses technology to mediate the necessary two way communication. (In Schlosser and Anderson, 1994, p. 2)

The "non-verbal signs of normal communication" that Sewart considered as nonvital are possible to transmit with current multimedia technologies. Contiguous communication is now affordable thanks to the Internet and again an attempt to properly define distance education proved difficult. It is because of this reason that, although the technological phenomenon may have not mattered much in the past, it now places a different dimension over the umbrella of learning at a distance. Even the Open University, which started operations in 1971 under the modality of open education, is now making use of sophisticated and affordable networking technology to teach, train, and offer access to important banks of information. The technological revolution that distance education centers face has made a widely accepted definition even more difficult to achieve.

Definitions and theories of distance education are noteworthy of attention when they are explicitly developed to address the field on a world wide basis. In 1994, during the International Distance Education Conference held at Pennsylvania State University, participants from the Third World manifested their disagreement with a discourse constructed primarily in the industrialized world. Most literature on theory, along with most of the professional journals addressing distance education in the world, are
published in developed nations. This explains in part the inadequacy of definitions previously made for all. At the same time it calls for a new view of the field even at its conceptual stages. Perhaps a definition will never become a standard. Each country would maybe operate under its own guidelines.

1. The journals, according to the Distance Education Database of the International Centre for Distance Learning of the Open University in the United Kingdom, are:

- Open Learning (previously called Teaching at a Distance), Open Praxis (previously called International Council for Distance Education Bulletin), and Epistolodidaktikita in the United Kingdom.
- In Canada the Journal of Distance Education (of the Canadian Association of Distance Education) and Research in Distance Education (of the Center for Distance Education at Athabasca University in Canada).
- In Australia: Distance Education (of the Distance Education Centre at the University of Southern Queensland), Open Education, and Open Forum (last issue listed in 1993).
- The American Journal of Distance Education (of the American Center for the Study of Distance Education).
- The European Association of Distance Teaching Universities News based in the Netherlands.
- The newly launched Journal of Distance Learning in New Zeland starting in 1995.
- Istruzione a distanza in Italy (last issue listed in 1991).
- Never too far of the Sukhothai Thammathivat Open University in Thailand (last issue listed in 1992).
- The Korean Journal of Distance Education (two old volume listings only).
- The Pakistan Journal of Distance Education (last issue listed in 1987).
- The Indian Journal of Distance Education (last issue listed in 1989), the Indian Journal of Open Learning (last issue listed in January 1994), and the Kakatiya Journal of Distance Education.

Others not listed in the database include:

- Revista de Educación a Distancia and Revista Iberoamericana de Educación Superior a Distancia in Spain.
- Numerous newsletters and online sources may also be considered here, including: Bulletin D'Information in France, COMLEARN, COMMUNIQUE, and the Distance Education and Training Network Newsletter in Canada, DEANZ Bulletin of New Zeland, Distance Education in Health in Kenya, DEOSNEWS (An online journal published by the Distance Education Online Symposium at Pennsylvania State University as a service of the American Center for the Study of Distance Education), the Distance Education and Technology Newsletter in Maine, among others, including some in the developing world.
2.3 History of distance education

To better understand the philosophical grounds of distance education theories, it is appropriate to review the history of the field as documented in the literature. According to Garrison (1993), distance education can be divided in three generations: correspondence education, teleconferencing, and computer based learning.

Correspondence education is characterized by its economical means of production and its access opportunities. The technological medium of this generation is predominantly printed material. Teleconferencing is characterized by the expansion of services through mass communication technologies, where the student has less control of his learning pace but where interaction improves dramatically. The third one, a combination of the second one and computer technology in existence, provides for new opportunities of distance education development.

Garrison's division of distance education generations is probably the best place to start since it accounts for technological developments as the turning points in the field. In his definition, the third generation would probably need to be altered to explain the most recent technological developments. In particular, one should look at the Internet and the digitalization of all forms of communication as the latest achievements available to distance educators. Long distance voice transmission through telephone over the Internet, for example, including international points, was made available in February 1995. This technology will change the way distance education is conducted. Because of changes like this one it is difficult to consolidate a common understanding and definition
of the field, even though some predictions and hopes exist and have been made since the beginning of correspondence education.

2.4 Correspondence education in perspective

Correspondence education can be traced back 150 to 160 years. Not surprisingly, and given the distribution mechanisms available in the world in the mid 19th. Century, it flourished mostly in Europe and the United States. Later in the 20th. Century it became popular in other parts of the world, as a result of the expansion of industrial power from countries of the West.

In Sweden, Schlosser and Anderson (1994) report that in 1833 a newspaper announced the possibility to learn composition through the postal service. Correspondence education became prestigious as Swedish efforts were oriented to adult training and retraining, emphasizing two way communications by all possible means (Holmberg, 1971).

Towards 1840, in England, the "newly-established penny post allowed Isaac Pittman to offer shorthand instruction via correspondence" (Schlosser and Anderson, 1994, p. 2). Later the English efforts matured and expanded into the Isaac Pittman correspondence colleges. In Germany, two language instructors experimented with correspondence education in Berlin during those early days as well.

Harris (1971) proposed that the organization of correspondence education in the world occurred between 1880 and 1890. He attributed the growth of the International Correspondence Schools to the fact that the organization was a subsidiary of the
American International Textbook Company. Towards the end of the 19th Century correspondence schools had flourished in the British Commonwealth and its colonies. He cites four stages in the history of British correspondence education according to enrollments: The first stage, from 1885 to 1895; the second one, from 1910 to the early 1920's; the third one, throughout the 1930's; and the fourth one, consolidated after the Second World War.

The first documented distance education efforts in the United States were those of Anna Eliot Ticknor, a fifty year old woman, who founded a society encouraging studies at home in Boston, Massachusetts in 1873 (Agassiz, 1971). She pursued the goal of offering education opportunities primarily to women. She was the daughter of a Harvard professor who contributed to the founding of the Boston Public Library and was extremely interested in making the society the project of her life. In only 24 years, it had enrolled more than 10,000 students (Schlosser and Anderson, 1994).

William Rainey Harper, first president of the University of Chicago, is considered as one of the founding fathers of distance education as well. He was instrumental in the New York State authorization to issue academic degrees by the Chautauqua College of Liberal Arts in the 1880's (MacKenzie and Christensen, 1971). The issuance of degrees was authorized to correspondence study coupled with summer sessions that students had to attend. While in his presidency he institutionalized a department of correspondence education at the University of Chicago. He was an important precursor and supporter of correspondence education although he thought that traditional face to face education was better (Vincent, 1971). In addition, he was probably the first person to declare that each form of education had its own characteristics and that each served different audiences.
The University of Wisconsin also ventured into correspondence study in 1885 with the establishment of schools for farmers. Unfortunately, as in the University of Chicago, faculty lost interest and both institutions stopped ground braking work in the development of the field in the US very soon after.

The pioneering efforts in correspondence study generated a movement in the US that made people aware of the possibilities for education through the postal service. The modality was possible thanks to the process of industrialization and to the already sophisticated distribution systems that relied heavily on railroad networks. The process of industrialization promoted studying at a distance, since more demands on specialized knowledge evolved. An example of this expansion is that of Mr. Thomas J. Foster, a Civil War veteran who in 1870 began working in the printing of the Shenandoah Herald, later called the Mining Herald (International Correspondence Schools [ISC], no date). The paper was an information publication directed at mine workers to avoid on-the-job accidents. The success of his efforts led to the establishment of his International Correspondence Schools, which by 1920 had enrollments of over 2 million people (Schlosser and Anderson, 1994).

In Sweden, H. S. Hermond made considerable progress in his efforts to teach English under the modality of correspondence education. Towards the end of the 19th Century, "he founded the Hermond's, which would become one of the world's largest and most influential distance-teaching organizations" (Schlosser and Anderson, 1994, p. 3). On October 4, 1897, the United States would witness the founding of another important effort promoting the modality of correspondence study: The Calvert School of Baltimore, Maryland. The school offered the opportunity of supervised study at home to
children (MacKenzie and Christensen, 1971). Also in the 1880's, a consortium formed by Harvard University, John Hopkins University, and the University of Wisconsin, was formed under the name of The Correspondence University. The consortium would serve as a compliment to traditional instruction and not as a substitute of university education anywhere in the US. Lack of support by consortium members caused the project to fail.

In Australia, distance education efforts are documented as early as 1914. Later, they were consolidated as the Australian Broadcasting Commission with its radio schools of the air. In contrast to other world efforts, the Australian included programs at the elementary level from the beginning (MacLaine, 1971).

2.5 New media in correspondence education

Correspondence education flourished in the United States at the start of the 20th Century. With considerable developments in technology, it soon included other ways to transmit information, like photographs, tapes, films, and later computers. It was then that distance education started to be seen as a true alternative to traditional education. Lockmiller (1971) had already talked about his vision of national education standards in the US, advocating for recognition of correspondence bachelor's degrees. Interestingly, he was probably one of the first authors to declare that both distance and traditional education have strengths and weaknesses. From his writings one observes:

For the future, what a person knows and can and will do in a dynamic society will be more important than the place where he studied, earned credits, and served time. The age of electronics and satellites is here, and while it may be some time before we are talking with men on Mars, we shall soon share educational and
cultural programs between nations in the manner that news events of today are presented in television as they happen. (pp. 49-50)

Lockmiller was right in the early 1970s. He had seen about 190,000 students in correspondence universities at the beginning of the 1960s (Wedemeyer, 1971a). During those days, the success of correspondence study heavily emphasized the relationship between extension experts and academics.

Charles A. Wedemeyer, an important figure in distance education in the US, gave full recognition to technological changes affecting the practice in the field. Perhaps, thanks to his writings, a switch in terminology from correspondence study and learning to distance education occurred to resemble what the academic community alludes to today.

European work in distance education developed steadily in the private sector. Most programs included the latest available technologies making it sophisticated. Pioneering distance education efforts in Europe looked at language training and were successful in providing it (Schlosser and Anderson, 1994). According to Peters (1971a), distance education did not develop in a uniform fashion in Europe, it was different in each country. In addition, it arrived after progressing in the US, thanks to commercial interests of international publishing companies.

In the US, military training needs, as well as advancements in the development of electronic communications, contributed significantly to the new education modality. Schlosser and Anderson indicate that "in the 1920's at least 176 radio stations were constructed at educational institutions" (p. 4), which is a remarkable figure for the time referred to.
In 1929, the Bureau of Naval Personnel Correspondence was initiated and successfully contributed to the institution. In 1948, the Naval Correspondence Course Center in Brooklyn, New York (von Wantoch, 1971). Later, by the 1940's the United States Armed Forces started making use of correspondence education as well.

But the development of the field also includes other entities in society. Religious schools had been making use of the postal service since 1873. By 1962, for example, the Emmaus Bible School of Oak Park, Illinois, had already translated religious texts in nearly 80 languages and was able to ship them to 125 different nations (Witmer, 1971). Early in radio use for education, bible studies were already part of the spectrum in parts of the US.

Purdue University, the University of Iowa, and Kansas State College, were the first institutions to experiment with television programs, thanks to the rapid technological developments of the medium. According to Schlosser and Anderson (1994), Western Reserve University was the first to offer college credit courses through broadcast television in the 1950s.

2.6 The roots of complexity in recognizing distance education as a field of inquiry

The popularity of correspondence instruction in the world contributed to accelerated educational offerings at a distance. It was probably in the 1960s that more academicians and practitioners started searching for the philosophical base on which the field was operating. As a result, different conceptions and opinions about distance education were popular in the literature. Today it is possible to find some arguments
about distance education that were also problems in the past. Many of them deal with academic acceptance, quality of delivery, instruction modalities, and others.

Allen (1971a), justified correspondence study as an alternative to traditional education in the US, due to the imminent needs and problems associated with the geographical location of potential students. He characterized correspondence education as a learning form where the student had more control in a "convenient, practical, and economical" (p. 87) fashion. The notions of equal access to education, as well as emphasis on the student, were notorious in his arguments. Perhaps these preoccupations, which are still some of the strongest issues of today, contributed to current discussions present in today's literature.

Stein (1971) was perhaps the first individual to recognize that correspondence study had changed dramatically as a result of its natural development. He called the field "a content area of educational specialization" (p. 91). With this, Stein was making clear that, under then present circumstances, there was a need to conduct research. With the arrival of satellite technology many distance educators became technology illiterate, thus reinforcing the need to solidify the rapidly changing field. Childs (1971) alluded to problems of program design, communication, lack of familiarity with the media, and the much needed know-how to improve teaching and learning. Slowly, educators began to understand that while an emphasis in the instructor was crucial, there were other important elements in the process to consider, including students, media, organization, interaction, and evaluation.

Wedemeyer (1971b) looked at motivation problems, learning, and the subject matter to explain the problems associated with learning at a distance. Although his
approach to understanding these issues relied heavily on behaviorism, not too popular in today's literature, he was one of the first authors to state that the structure of the formal education process was in disagreement with correspondence education. In addition, Wedemeyer (1971c) explained that the tendency to export traditional formats of education into correspondence instruction was the result of an enormous appraisal to formal processes of the past. Before distance education the alternative was only formal instruction for hundreds of years. He eloquently described the new value of correspondence education as the result of contextual changes in society, such as population distribution, workforce standards, and the complexity of life, among others. Distance education became even more diversified, thus reinforcing the arguments of some theorists. Technology development fostered new visions and dreams for instruction at a distance.

Educational television was pioneered in Italy at the beginning of the 1960's with Telescuola (Peters, 1971a). Thanks to satellite technology, several instructional television efforts were seen in the United States as well, like the Appalachian Education Satellite Project and later, in 1980, the beginning of the pioneering Learn Alaska Network (McGrane, 1995).

In 1962, the University of South Africa decided to become a distance teaching university and in 1971 the Open University started operations in the United Kingdom (Schlosser and Anderson, 1994). Both efforts contributed to expanding distance education in a more solid form even into the Third World. Later in 1975, the German FernUniversitat was founded under a more formal and stricter administrative control.
As indicated before, the reasons underlying the birth of distance education programs in industrialized countries were not the same as those in the developing world. Coping with technical difficulties certainly contributed to offering better and more solid services, but many of the problems faced today in this new area of specialization have their roots in early practices.

Young (1971) proposed that even with the latest technologies available in his time and their use in distance learning programs, problems of education remained the same. He offered an interesting criticism of technologies dumped into the educational process. He argued that, because of the failures of educational technologies to solve fundamental problems of education, correspondence study needed to adapt to technology according to its context and not the opposite. He favored an organized form of instruction to cope with the rapid changes affecting the education process.

Arguments like Young's contributed to a formalized discourse of distance education. Many countries founding programs under this modality pressured the development of the field as it is known today. It is because the growth of distance education, as well as the sudden needs it created, that authors were prompted to integrate a theoretical base in which practitioners and researchers could reference their work. New ideas found their way into the literature and several remain as important guidelines.

2.7 Towards a theory of distance education

Distance education was born for adults and it continues to serve them as its main clients. Although some distance programs have been created for younger populations, it
is adults that most benefit from the field. Because of this reason, it is not unusual to find that many theorists base their arguments in their personal experience as adults. Hence, different theories point at specific distance education programs depending on their proponents' backgrounds.

Neale (1971) proposed that instead of looking at distance education in a sequential fashion, one ought to understand it as a system where all parts of the process are relevant. In addition, he suggested that distance education programs needed constant evaluation to be redesigned when appropriate. This alternative to evaluate in a formative way was central to improving different offerings from his point of view.

Much interest in the instructor as the single most important element in distance education programs lead McCraw and Yates (1971) to engage in a new argument. For them, emphasis should be shifted towards student attitudes and objectives. Goals set by students had to do with personality issues. From their argument, it is clear that they alluded to a different approach to understand the development of distance education.

In contrast to Neale's systems view and the individual personality approach argued by McCraw and Yates, Goldman (1971) suggested that distance education was better understood by looking at its design. He thought that upon understanding design, one could later select the communication medium to be used. He also advocated for combinations of different media. This multimedia approach contributed to the comprehension of distance education practices by offering another dimension: The design perspective.

Different administrative issues met by Morgan (1971) in the US Air Force, prompted him to warn distance education experts about the support needed by
organizations. In his experience, US Air Force administrative structures were worth his attention in getting institutional support. Although it would be inappropriate to parallel military distance education programs with other non-military projects, the issue of organizational support is a common denominator among practitioners. This notion contributed to understanding the field as well.

In broadcast media, the US did not develop its distance education programs as other countries during the 1960s and 1970s. In this sense, the use of such media was more popular in some developing nations and in other industrialized ones (Wellman, 1971). Perhaps it would have been appropriate to collect experiences from all points in the world experimenting with distance education then, but this was not the case. For the most part, as indicated previously, assumptions about the distance education process have been made by authors in the West. Conflicts with traditional education were encountered in defending the field by many, mostly in the industrialized world. In the process of solidifying distance education as a field of study, certain ambiguities can be observed.

Allen (1971b) argued on the appropriateness of the program to which students were submitted:

... I am somewhat disturbed that we have come to deal with man as a machine into which education can be poured and crammed, and on completion, after a special period of time, this educated machine can cap itself like a bottle of water. Actually, however, the method by which man becomes educated is no longer all-important. We know that man can learn from any well-organized program no matter what method is used. (pp. 182-183).

Clark (1971) reinforced the position that the success of distance education programs depended on the individual's personality. In particular, he alluded to
motivation as the focus of concern. Additionally, he justified and defended distance education based on equality and access of those at a disadvantage. However, he showed concern with the modern industrial society as the engine triggering the creation of programs to learn at a distance.

Once focused on the instructor, the student, the program, and the process, the next area of concern found in the literature addressing distance education is the medium. For Allen (1971c) radio and television were not educational media. Instead, they were designed for entertaining and their educational value was incidental. In addition, upon questioning on how to make distance education programs more active and less passive, he suggested that there was a need to conduct research for each medium.

Walsh (1971) was concerned with the bad image that distance education programs had in comparison with traditional ones. He suggested that in order for distance education to reach an adequate level of respect, and therefore sufficient support for research, it needed to be equivalent to face to face education with respect to the credits it offered.

A more sophisticated analysis and call for research were articulated by Peters (1971b) indicating that face to face education was not transferable to correspondence education. He alluded to the fact that traditional education was more an oral type of activity, whereas correspondence education was a written one. He advocated for theoretical work because, in his mind, correspondence education was an industrialized form of instruction characterized by rationalization, mechanization, automation, and the division of labor, among others. He argued that with the arrival of new technologies, correspondence education became more a process of mass instruction. These arguments
later solidified in one of the most interesting and comprehensive theories of distance education known today.

Like some other theorists, Peters (1971b) emphasized access as a justification for distance education to exist. He proposed that, perhaps, a good way to improve programs of distance teaching, as he once referred to distance education endeavors, was to include specialists of the media in the process. He advocated to avoid "transplanting" face to face instruction into distance education offerings. He said:

Most of educational scientists, and most practitioners of correspondence instruction, are still in a state of fascination and numbness. They have to find a new equilibrium. Meanwhile, they transplant the instructional techniques of the dialogue and of classroom teaching into distance teaching. Is it not much more reasonable to borrow the new forms of instruction from other mass media, like, for instance, newspapers, magazines, films, radio, and TV? Could it not be that sound principles of journalism could help us to devise new methods effective for mass instruction? (p. 226)

Moreover, he then offered the following criticism:

These distance teaching systems will never begin to tap their extraordinary potential, as long as they have to imitate the form of direct instructions which were patterned by traditional education institutions. These teaching systems will have to develop patterns of their own. (Peters, 1971a, p. 315)

Childs (1971) advocated for research by arguing how unprecise previous findings and recommendations were. In particular, although Otto Peters' theory of industrialization would crystallize later, he criticized studies due to their ambiguity in offering convincing data for practitioners. He was able to identify three major areas of work that had been researched in correspondence education: Completion rates, including the studies of the medium and the characteristics of students affecting the length of time
to conclude a program; methodology, which included one doctoral dissertation at the time by Robert Wilson at the University of Michigan; and achievement, characterized by early studies supporting the equivalency of learning in both face to face and distance education.

Other recommendations to improve distance education followed. Some contributed to the creation of a research discourse in the discovery of different theories. Woodring (1971) suggested that "teachers must be carefully selected" (p. 254) to have creativity and innovation. He emphasized the preparation of teachers as a central point. Arbolino (1971), instead, called for attention to different learning styles. He suggested that in doing so, correspondence education could very well be an opportunity of education equality for the disadvantaged.

Besides recommendations offered by some, there were accurate descriptions of different experiences that helped research to consolidate. Rowbotham (1971) explained that, in the US, correspondence education never really matured as an alternative but was rather seen as a public service activity at the university level. Administrative concern with feasibility and security of correspondence education was always a problem for different organizations. Although several new distance education programs continue to emerge in US universities his analysis can be applied today. In the same descriptive lines, Gardner (1971) was prompt to observe the following in contexts of traditional instruction:

... our institutional arrangements for lifelong education are ridiculously inadequate. Most educational institutions are still designed for young people who have nothing else to do. They are ill-suited to men and women who must fit their learning into a busy life. (p. 263)
The lack of appropriate arrangements for students who work was seen as a limitation by Gardner. He proposed that the route to success was to emphasize examinations as a critical part in the distance education agenda. In addition, he thought of group work as an alternative to passive learning with newer mass communication technologies. He placed much importance in the context of distance students and suggested efforts to provide them with adequate bibliographic support and interaction.

During the 1970s the interest in a theory increased significantly. Several authors (Moore, Peters, Holmberg, Perraton, among others) have advocated for the consolidation of theoretical grounds for distance education. In the past, practitioners could only look at experiences and recommendations of multiple experiments but did not have articulated theoretical principles to follow. In fact, although some theories emerged in the 1970s, it was not until the 1980s that some ones acquired recognition. The need to theoretically comprehend the practice of distance education grew and continues to grow as new communication modalities are becoming available. Contemporary theorists have taken experiences of the past in the process of proposing their visions.

2.7.1 **A theory of distance education as an industrialized form of teaching and learning** by Otto Peters

Otto Peters has been one of the most important theorists of distance education since the 1960's. Like some other authors, his thoughts have evolved from fundamental principles in the field to complex analyses of postindustrial societal characteristics of today. He proposes that traditional face to face education can be associated with non industrialized activities, whereas distance education is an industrialized form of teaching
and learning. His arguments are based upon a comparison made with aspects that depict the production of goods in the era of industrialization. For him, traditional face to face education practices are "forms of teaching derived from ancient rhetoric and practiced at medieval universities" (Peters, 1983, p. 95).

Peters established that for distance education to exist, as we know it and understand it today, industrialization was an absolute contextual pre-condition. He argued in favor of the following characteristics that describe distance education as the most industrialized form of teaching and learning:

1. *Rationalization*: A systematic use of "measures" with "lower input of power, time, and money" (p. 98) to produce results. Rationalization of distance education is possible thanks to new forms of thinking typical of the industrialization era, which translate into making it the vehicle for larger classes and enrollments with lower institutional efforts to produce graduates.

2. *Division of labor*: Contrary to traditional education, where the teacher has control of the entire "production" process, from the time of planning until the actual delivery date, in distance education, a complex team of experts is involved in different aspects of the program. Division of labor allows for tasks to be shorter and specialized, opening space for successful rationalization. In Peters' words, the "principle of division of labor is thus a constituent element of distance teaching" (p. 100).

3. *Mechanization*: While in traditional education many activities are still handled by one individual's power of his or her own hand and mind, in distance education the use of machines is exponential and, thus, a necessary tool for the production of educational materials used in the program.
4. *Assembly line:* In an industrialized society, the idea of assembly line refers to the fact that a worker is able to remain in the same location while the product is passing by his eyes and hands. In distance education, the educational materials used are traveling from designers to academic specialists, from artists to computer experts, from producers to administration, and so forth. The student ultimately receives the end product that has been submitted to a typical assembly line.

5. *Mass production:* The notion of mass production is "only possible where there is a sufficiently large mass of consumers" (p. 102), a fundamental characteristic justifying the need for distance education to exist. In principle, distance education is to serve the masses that do not enter traditional education institutions. Hence, distance teaching and learning are perfectly squared into the perception of a massive production of educational opportunity.

6. *Preparatory work:* The benefits associated with the division of labor and rationalization can only be possible if there is substantial preparatory work behind them. Experience has shown that this is the same for distance education programs, which are successful if there is adequate preparation to distribute work throughout the ramifications of the process. For Peters, it is imperative that thanks to preparatory work "distance tutors and advisers" be "easily exchangeable" (p. 104).

7. *Planning:* In industrial societies, the availability of products depends upon careful planning of each part of the production process, emphasizing decisions that are taken and that affect the entire systematic line of production. In distance education programs, particularly those that combine residential seminars and courses with distance classes,
require a sophisticated planning practice perfectly comparable to the one found in industrialized production for mass consumption.

8. *Organization:* Since planning is in great part responsible for the effectiveness of organization, it demonstrates that permanent arrangements in large distance education programs are the result of sound organizational principles, which in essence have a purpose due to the fact that they are a product themselves of the division of labor. In distance education, the principles of organization "make it possible for students to receive exactly pre-determined documents at appointed times, for an appropriate university teacher to be immediately available for each assignment sent in" (p. 105) and several other aspects that determine the effectiveness of the program.

9. *Scientific control methods:* In distance education results of systematic and scientific evaluation of courses contribute to better products. In industrialized settings, scientific control methods are a principle of management and are needed for the perfection and organization of the production process. Although in traditional education scientific control methods are not received positively because of humanistic views, this is not the case for distance education programs where a great deal of planning, organization, and coordination of activities depends on accurate and rigorous scientific evaluations of the process.

10. *Formalization:* This is the pre-determination of specific tasks so that the division of labor can always have a coordinated program. He establishes that in distance education "all the points in the cycle, from student to distance teaching establishment to the academics allocated, must be determined exactly" (p. 106).
11. **Standardization**: In industrial contexts the notion of standardization allows for the different parts of the process to be cheaper and replaceable. This is achievable by dividing the process itself into a limited "number of types of one product". In distance education standardization occurs in the context of formal correspondence, tests, and forms of teaching, so that their industrial principle is fulfilled.

12. **Change of function**: Changes in functions of traditional workers when replaced by machines are parallel to those changes that occur in distance education environments. This phenomenon is particularly true if one thinks in a teacher that changes over to the role of facilitator or counselor. Artist and producer change into quasi educators, and so on.

13. **Objectification**: In traditional university teaching an instructor "lectures from his chair or leads a seminar discussion" and "has the freedom and opportunity to allow his subjectivity to influence his way of teaching; he is free to decide how and how much to prepare, he determines his own academic aims and methods and is able to change them spontaneously during a lecture" (p. 109). In distance education room for subjectivity is lost to the mercy of objectification, which in turn allows for the teaching process to be reproduced and repeated over time.

14. **Concentration and centralization**: In distance education, as in other forms of industrial activity, the ability to engage in mass production activities has involved a concentration and centralization of administrative procedures. Examples of this trend are outlined by Peters when he describes enrollments and procedures of the Open University, the University of South Africa, and other distance teaching institutions in the former Soviet Union.
The development of the theory of distance education as an industrialized form of teaching and learning matured and reached popularity because of the many parallels found with industrial production activities. Peters' (1983) definition of distance education gave a full account of his observations:

Distance study is a rationalized method - involving the division of labor - of providing knowledge which, as a result of applying the principles of industrial organization as well as the extensive use of technology, thus facilitating the reproduction of objective teaching activity in any numbers, allows a large number of students to participate in university study simultaneously, regardless of their place of residence and occupation. (p. 111)

With the increased societal trend shifting its underlying industrial production basis towards the rapid development of the service sector and the availability of newer technology, Peters (1993) expressed concerns over the future of distance education in the postindustrial era. In recognizing the differences between industrial and postindustrial contexts, he illustrated the following aspects having an effect on distance education:

1. Demand: As society witnesses the creation of new and multiple jobs in the service sector, institutions of education in general will need to reconsider their programs to match the needs of their constituencies. In the future, and as a result of demand issues, "there could be an even greater demand for distance education than there was in the industrial era in which it developed" (p. 48).

2. Students: In postindustrial society students will have different motivations to enroll in distance education programs. From his experience, he argues that students look for personal development more than for recognition to achieve a better economical status.
Additionally, students of the postindustrial society may not be ready to commit extra time to school as newer societal demands are emerging everywhere.

3. Objectives: In postindustrial society "self-realization" will be, along with the need to improve specific skills of service jobs, the primary objectives of distance education. Education needs to observe the trends that contexts will ultimately be taking in the future to meet student objectives appropriately.

4. Structure: He argues that "- from the post-modern point of view - the double burden of a full-time job and a long intensive period of learning at a distance will be considered as 'inhuman' for two reasons. First, the students have to strain every nerve too long a time. Second, the additional demands on them divorce them more or less from their families, their neighbors and friends, and reduce their civic, social and political contacts" (p. 49). Clearly, given these considerations, institutions of distance education will need to re-structure their operations and demands to cope with the kind of change that a postindustrial reality is bringing.

5. Curricular aspects: As values and expectations change in postindustrial society, it can be expected that students would want to learn precise subjects to resolve present problems and not the future. Perhaps people would want to socialize and live peacefully in agreement with their environment. In his words, future students "will have a preference for social relations and social problems; will be open to aesthetic and ethical issues; will seek cultural satisfaction; and will like to live in harmony with nature" (p. 50). Under such conditions, he proposes a radical change in the curriculum necessary if distance education programs are to keep the interest of their students.
6. **Methods:** The nature of standardized course materials, typical of distance education in the industrial era, will need to be reformed. More group work and tutorials that stimulate self determination will be needed in the postindustrial era. Moreover, postindustrial students will not engage in routine work and will demand creativity, where "flexibility will be highly valued and that models of teaching and learning will be preferred that provide especially for this type of acquisition of knowledge and skills" (p. 51).

7. **Technical media:** Given the fact that education will rely more on advanced and sophisticated communication media, "the image of the learner in distance education as an extraordinary person who does not really belong to the mainstream of education will disappear" (p. 52).

8. **Organization:** He addresses the shifts in hierarchy expected in postindustrial contexts, arguing that the functions of organization that will most likely change will be planning, organizing, directing, and controlling. Planning will become "a function of the student individually", organizing will be determined by the student in terms of "how and when his work is done", directing will be a self activity, and controlling will "rely on self-control" (pp. 52-53).

9. **Institutional aspects:** Arguing that institutions will stop focusing on "sheer institutional greatness" (p. 53), he proposes that they will be listening to student needs and demands, necessarily decentralizing their administrations and services to serve in small units throughout the market.

The new vision outlined for distance education in postindustrial society contributes to a shift towards more literature addressing theoretical aspects in the field. New approaches will need to be taken if distance education programs are to continue.
Peters (1993) outlines three: The Lebenswelt perspective, characterized by its aims at building personality rather than better qualification for better jobs; the ecology perspective, later expanded by Gibson (1993), looking at the contextual aspects that affect students and particularly emphasizing the environment in which humans live; and the concept of instructional design, characterized by more than scientific research to include the artistic perspective in the process.

The natural evolution of the theory of distance education as an industrialized form of teaching and learning is perhaps the result of strong demands that new developments are placing over traditional distance learning environments (once considered and named correspondence education, and later referred to as distance education). While the theory offers an interesting comparison and analysis about typical issues found in industrialized nations, it does not address distance education in the Third World in a proper fashion. In some parts of the developing world truly industrialized processes are not even a reality. Today, in postindustrial society, technological infrastructure is not present all across the globe. The complexity of the development models adopted by developing nations, where it is not unusual to find a mixture of agrarian, industrial, and postindustrial sub-societies of the society at large, Peters' arguments are irreversibly weakened. How to assess the needs of students that distance education programs can address? How, if possible, to foster self determination in education in non-democratic countries? How to balance and justify investments in distance education infrastructures, especially in countries with high drop-out rates even with the presence of life-long learning organizations? How to cope with new demands in technological media when, to date for example, the majority of Africa has no Internet access?
Perhaps industrialization patterns are in need to be questioned again as the dominant model to adapt in the Third World. Perhaps postindustrialization is yet to fully arrive to developing countries, even though the new trading models promote it as the alternative to economic success. While the theory of distance education as an industrialized form of teaching and learning addresses important aspects in distance education, it does an unfair job at giving sound principles to follow by practitioners in the developing world. Native researchers might encounter in their work more satisfying answers to local areas of concern in their agrarian, industrial, and postindustrial worlds.

2.7.2 The reintegration of the teaching acts by Desmond Keegan

The need for theoretical work was extremely important for Keegan (1993) in order to avoid repetition. Because distance education as a field of inquiry is sufficiently mature, it calls for formal academic and professional approaches. He argued that the 10 million people learning through distance education modalities in the world made up a worthy cluster for research and experimentation. Like others, he defends theory as an institutionalized form of inquiry and framework of reference. He articulates it in the following manner:

A theory is something that can be reduced to a phrase, a sentence, or a paragraph and which, while subsuming all the practical research, gives the foundation on which the structures of need, purpose and administration can be erected. (In Schlosser and Anderson, 1994, p. 6)

Besides defending the need to conceptualize theoretical work, he proposed that even though practice in the field could be catalogued as an industrial activity, its
foundations "were within general education theory" (Schlosser and Anderson, 1994, p. 12). A characteristic central to understanding Keegan's arguments is that distance education is not interpersonal in nature. It is rather a privatized form of education, which is a characteristic of industrial societies. In addition its foundations are not found "within the theoretical structures of oral, group-based education" (Schlosser and Anderson, 1994, p. 12). For learning to occur, he is convinced that there needs to be some room for "intersubjectivity", which which he argues is the nature of human interaction in particular contexts that allows for verification, exchange, and demonstration. Because distance impedes room for intersubjectivity in education, distance learning is possible if there is a make up of the activities that are generally carried out in traditional education settings. Keegan referred to this idea as the reintegration of the teaching acts.

Keegan was convinced that up until the 1980s there was much confusion in the multiple definitions and attempts to theoretically understand the field. In his criticism of principles, he admits that there are problems with the practice of distance education alluding, for example, to drop-out rates. He accepts that while they are a problem for some, it certainly is not a generalized issue in the practice of distance education. He says that there are significant achievements in "children's distance education courses" (p. 115) and argues that this is the result of almost 70 years of observation. He exemplifies this aspect by referring to China's 40 open universities and their very low figures on drop-out rates. It is important to understand that although many still try to undermine the field of distance education, using arguments like drop-outs, the field has reached a point of maturity as "an educational process" (p. 120) with the following characteristics:
... the quasi-permanent separation of teacher and learner throughout the length of the learning process; the influence of an educational organization, both in the planning and preparation of learning materials and in the provision of student support services; the use of technical media - print, audio, video, computer - to unite teacher and learner and carry the content of the course, the provision of two way communication so that the student may benefit from or even initiate dialogue; the quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals and not in groups, with the possibility of occasional meetings for both didactic and socialization purposes.

Besides offering this precise view, Keegan is critical of slogans typically used to refer to distance education. He claims that distance education is not open nor does it offers equal access. Openness allows for student multiple interpretations, which are not the case in most programs. Equal access is a misconception as, more and more, there is substantial evidence that only the wealthiest and privileged few may access distance education programs. Alluding to slogans as traditional metaphors he says that "distance education is neither liberal nor illiberal" (p. 122). In reality there are cases of liberal and illiberal or boring, thus closing the road for independence and interpretation. He points out that because of these reasons, distance education is an alternative to formal education, it is neither a substitute nor better.

In order to understand arguments made by Keegan, the notion of distance should be conceived as separation. The only way to brake with this natural characteristic of distance education is to take apart teaching and learning. A student under the modality of distance education cannot be conceptualized the same way a formal education student is. In his words, this is "philosophically impossible ... for a human being to be in multiple locations or more colloquially you can't be in two places at the same time". (p. 125).
Students learn through a verification process often based on interpersonal contacts with teacher and other students; in distance education this is attempted through a reconstruction or reintegration of the intersubjectivity needed to learn. Different media are selected in accordance with needs.

Keegan also explains that cognitive communication is almost lost in distance education. Some have suggested that it is possible to achieve it by electronic media and the use of interactive learning materials, such as computer programs. His criticism on electronic media is based on the idea that they take away the possibility of self studying at any given time decided by the student. Additionally, he says that often times computer communication is not possible for everyone. Specifically, he says "one does not have to be rich to learn" (p. 128). While this argument holds true for many students in developing countries, it is important to recognize that more and more, thanks to digitalization, computers are making it possible to achieve real time communication in various ways.

Keegan's attention to the relationship between learning and teaching materials and practices, known as the reintegration of the teaching acts, could be expanded if observed under the framework of different media. While he recognizes that eye to eye contact is now achievable by means of fiber optic technology, he insists in reintegrating acts that are only possible in the classroom. The difficulty in understanding and accepting this standpoint as a guideline lies on the fact that, perhaps, traditional teaching acts are not at all proper to reintegrate.
2.7.3 Hillary Perraton's vision of distance education

Perraton (1983) recognized that there were a number of successful contributions to the field of distance education but do not offer a real theory. In her approach to distance education, and based on communication and diffusion theories, as well as on philosophies of education (Schlosser and Anderson, 1994), she established the following 14 principles. The first five allude to the way in which education can be optimized through distance education practices:

- You can use any medium to teach anything.
- Distance teaching can break the integuments of fixed staffing ratios which limited the expansion of education when teacher and student had to be in the same place at the same time.
- There are circumstances under which distance teaching can be cheaper than orthodox education, whether measured in terms of audience reached or of learning.
- The economies achievable by distance education are a function of the level of education, size of audience, choice of media and sophistication of production.
- Distance teaching can reach audiences who would not be reached by orthodox means. (Perraton, 1983, pp. 37-38)

To improve dialogue in distance education, Perraton said:

- It is possible to organize distance teaching in such a way that there is dialogue.
- Where a tutor meets distance students face-to-face, her role is changed from being a communicator of information to that of a facilitator of learning.
- Group discussion is an effective method of learning when distance teaching is used to bring relevant information to the group.
- In most communities there are resources which can be used to support distance learning, to its educational and economic advantage.

To improve the organization of the distance education program, the last statements deal with its methods:
• A multi-media program is likely to be more effective than one which relies on a single medium.
• A systems approach is helpful in planning distance education.
• Feedback is a necessary part of a distance learning system.
• To be effective, distance-teaching materials should ensure that students undertake frequent and regular activities over and above reading, watching or listening.
• In choosing between media, the key decision on which the rest depend concerns the use of face-to-face learning.

The quasi-prescribed way to understand distance education elaborated by Perraton covers a variety of ideas in distance education. Some are strong and some are not. Perraton advocated for a systems approach for planning. Although not fully developed, this represents one of the first arguments of systemic views. A more sophisticated explanation of distance education under a systems philosophy is the basic theoretical framework of this study in section 2.7.11.

2.7.4 Learner control, quality and access aspects in distance education by D. Randy Garrison

For Garrison (1993) distance education was historically defined and treated as a practice in which the issues of access and quality play a central role. With this in mind, access points out to those people who traditionally would not attend formal schools. Quality aspects are associated with the improvement of educational transactions over different media.

In his explanation he stated that the difference between formal and distance education is that in the latter communication is mediated. He also stated that the problems associated with defining the practice of distance education are directly linked to the emphasis that has been given to the separation of student and teacher. This has made
room for justifications of access and quality. Access, once thought of the most important characteristic of a program, gave the opportunity to explore independent learning. Traditionally, it has been assumed that promoting independence is a good practice in distance education, as independence diminishes the need for interaction. But for him, complex cognitive processes are only possible through education interaction. In addition, the development of new communication technologies are putting the idea of independent learning into question very much.

In defining quality, a major issue of concern for distance educators, Garrison explains that it has been extremely difficult to get to a common agreement on what quality is all about. For some, quality means better teachers while for others it means trying to imitate face to face teaching. It is fundamentally important to understand this difficulty to conceptualize a theory.

In his view, there is a new trend of analysis focusing on education transaction and the learning experience. For him, interaction can be defined as "how the student responds to the print package", while independence is the autonomy to learn. Much emphasis in these two concepts have lead the study of a new area: Control. For him, control is "the opportunity to influence educational decisions" (p. 14). Independence is for him a fallacy since all sophisticated learning requires interactions that go beyond simple reactions to texts. Control is the degree by which a student and/or a teacher can maintain effective interactions through a medium of communication. Too much control on any part can damage the balance, therefore making it impossible to achieve learning.

This unique assertion explores traditional theories and offers the idea of learning control, which very much depends not just on aspects outlined in traditional
independence and interaction theories, but on new communication media as well. The idea that independence is not a viable way to promote learning is definitely a breakthrough in traditional conceptions about learning at a distance.

2.7.5 Wedemeyer's foundations on independent study

To understand Charles Wedemeyer's discussion about learner independence and autonomy, it is important to know that he refers to non-traditional learning as all activities of natural self inquiry which human beings are capable of doing. With this in mind, it should be recognized that by defining and defending non-traditional learning in distance education contexts, Wedemeyer (1983) contributed to the development of some theoretical principles that build upon his work. His work is predominantly catalogued within the area of autonomy and independence.

Wedemeyer argued that "in the latter part of the 20th. Century ... being educated is equated with being productive" (p. 130). For this, a strong movement emphasizing self-learning erupted in the US as a result of a need for something better. He found its origins as far back as 1876, when the Chautauqua movement began. Chautauqua became a university in the State of New York in 1883.

During the early 1970s, the amount of practice and skill obtained through the great number of new institutions experimenting with this new modality (referred to with different kinds of terms) allowed for improvements in:

The how-to aspects of building and evaluating non-traditional programs; the design and development of instructional materials, the development of cooperative, apprentice and work-study programs; linking learning with
community resources beyond the schools; different ways of organizing knowledge and relating disciplines in curriculum building, materials development, and instruction; studies of adult learning projects, which have yielded new information on the learning of adults; the place of technology in providing opportunity and access to learners; the testing and employment of new technologies and media in teaching and learning (television, the telephone, blackboard by wire, the satellite, cable, the newspaper, cassettes); demographic and marketing studies to determine learner needs; coalitions and consortia of institutions combining resources to create non-traditional programs on national or regional bases. (p. 134)

He also explained that experience has proved that non-traditional learning programs housed in traditional academic institutions are likely to have problems because of their perceived inferiority. This is true for many distance education programs both in the industrialized and the developing world. He is critical of assumptions about non-traditional learning in the following way:

The a priori presumption that teaching and learning are inferior by any means other than the classroom is a cognitive-affective blend perilously close to the mechanisms of racial bias. Instead of skin color, the communications mode of an instructional system is prejudged as a mark of inferiority - all evidence to the contrary notwithstanding. The failures of the few are made the burden of many, and the successes are ignored or rationalized away as nonsubstantive. (p. 136)

In 1983, Wedemeyer suggested that non-traditional learning, including distance education, was only possible in new institutions and academic efforts. However, a new academic culture is rapidly evolving in the 1990s that, more and more, is likely to see alternative teaching modes in many education institutions. Combinations of formats and alliances among institutions are also becoming popular as well. The case study under analysis here is an example of such institutions. But as he explained, "non-traditional learning works for thousands of learners because they link it to their needs, concerns problems [sic] and aspirations" (p. 138).
Wedemeyer's contribution to autonomy and independence theories of distance education is a historical account in defense of non-traditional learning with specific emphasis on learner needs. The historical foundations and his logical predictions of modern theories are key to understand because distance education is in constant need of recognition and clarification. His arguments are based on his belief of human ability to learn in an independent fashion.

2.7.6 Independent study by Michael G. Moore


In his efforts to bring about a theory, Moore (1991) explained the benefits of an organized body of knowledge:

That's what a theory is: the summary and synthesis of what is known about a field. It is the reduction of our knowledge to the basic ideas, presented in a way that shows their underlying patterns and relationships. Understanding theory makes it possible for us to speak with a common vocabulary. Understanding it should have the effect of helping practitioners see where their piece of their action fits and interfaces with others and thus should lead to better ways of working with others. (p. 2)

Moreover, he defended theoretical work as the basis for research efforts:

The theory also helps us understand what we don't know and, therefore, is the only guide to research. Research that is not grounded in theory is wasteful. It might solve and immediate problem, but it doesn't fulfill its promise. Relating it to theory, however, increases its ability to solve other problems in different times
and different places. In our theorizing we rise above immediate and local concerns and find out what is general and long lasting. This gives us a broad perspective that enables us to analyze the particular instance more effectively; it helps us make decisions that are guided by fundamental teaching and learning principles rather than by the pressure of a particular crisis or the dazzle of a fresh opportunity. (p. 2)

Moore (1983) also explains that it is only during the last 30 years that there has been attention to the way students learn rather than to the way teachers teach. Out of this effort, there is now substantial agreement in the following three facts: There are different learning styles, the best learning is experiential, and learning ought to be lifelong due to rapid changes in society throughout all production sectors. Considering these findings, the instructor is now seen as a facilitator rather than the only source of information. This is especially true in distance education settings because there is a tendency to foster independent learning while structuring learning in very special ways.

On the basis of his experience, Moore started to generate a common discourse revolving around the importance of defining and theorizing the field of distance education. It is characteristic of his discourse the attention he gives to the educational attributes of distance education rather than to the media used to transmit messages. In his research, he categorized distance education as individualized or dialogic. Individualized is a characteristic where the student controls "the pace at which he received information and where he was compelled to make his response" (p. 76). Dialogue on the other hand, is defined as "the extent to which the media of a program made it possible or impossible for a learner to interact with the teacher" (p. 76). In this sense, he found that "in a theory of distance education, distance was not measured in physical terms, in miles or in
minutes, but in the extent to which a particular teaching-learning relationship was individual and dialogic" (p. 76).

Moore's conception of the field brakes with the common association of time and space made when trying to understand distance education. Moreover, in defining independent study through an extensive literature review, he found that the issue of learner responsibility was central in a theory, since the field assumed that: The learner was self-motivating and evaluating, chose the time of study, as well as the methods, space and location of his or her study.

For Moore, "in a program in which a high degree of dialogue is possible, it can be said that distance is less than one in which little dialogue is possible" (p. 80). Higher levels of dialogue could be achieved by using the appropriate medium that allows for such degrees of dialogue. The structure of a program is important in that it should cover all possible areas of misleading interpretations, so that there is opportunity for dialogue between student and teacher leading to educational transactions. He suggests that the more dialogue and structure in a program, the less distance there will be. Likewise, the less dialogue and structure in a program, the more distance there will be. In Table I, distance and structure are referred to with the letters D and S respectively. The symbols + or - are used to indicate more or less respectively.

Moore discussed learner autonomy as a fundamental objective of any distance education program. He alludes to learner independence as the set of activities and attitudes that are independently done to reach a point, an objective of self-improvement. This argument is based on the understanding that adults reach independence when they
Table 1. Types of telemathic teaching programs

<table>
<thead>
<tr>
<th>Distance</th>
<th>Type</th>
<th>Program Types</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most</td>
<td>-D-S</td>
<td>1 Programs with no dialogue and no structure</td>
<td>Independent reading-study programs of the &quot;self-directed&quot; kind</td>
</tr>
<tr>
<td></td>
<td>-D+S</td>
<td>2 Programs with no dialogue but with structure</td>
<td>Programs in which the communication method is radio or television</td>
</tr>
<tr>
<td></td>
<td>+D+S</td>
<td>3 Programs with dialogue and structured</td>
<td>Typically programs using the correspondence method</td>
</tr>
<tr>
<td>Least Distance</td>
<td>+D-S</td>
<td>4 Programs with dialogue and no structure</td>
<td>E.g., a Rogerian of tutorial program</td>
</tr>
</tbody>
</table>


have the capacity to make decisions. Moreover, he discusses, "... the point at which a person becomes an adult, psychologically, is that point at which he perceives himself to be wholly self-directing" (p. 86). This is a fundamental notion to understand a theory of independent study embracing distance education, primarily because the majority of its constituencies are adults.

He illustrated that the type of independent programs can be measured in terms of who decides over content, objectives, and evaluation. If the teacher decides most of these then the program tends to be less autonomous. If, on the contrary, the student makes the decisions, then the program is more autonomous and learner determined. Moore provides a typology of educational programs by incorporating degrees of distance, learner
autonomy, independence, and structure that hold true for many distance education contexts.

By the early 1990s Moore (1993a) had developed a more sophisticated view of distance education. For him, the separation between student and teacher is a "pedagogical concept" (p. 22). Such concept includes the complexity of factors associated with the relationship of student and teacher when they are separated in time and space, such as intentions, independence, interaction, medium, etc.. Separation provokes a different psychological and communicative space that is variable, since it is human in nature. This space, therefore, can never be the same. Moore also explains that such transactional distance is also present in face-to-face education, although distance education has it always.

Moore alluded to dialogue as positive interactions that depend on design, on personalities of the individuals involved, on subject content, and on environmental factors. For him, communication media are relevant in that adequate choices can help in increasing the quality of dialogue. For example, one way television or audiotape delivery services are media that do not allow for much dialogue. By manipulating media it is possible to generate or increase dialogic exchanges. One way television with computer communication is an example.

Although he had theorized on the structure and on design of the course before he offered his theory of transactional distance, he established that both are dependent on the medium used, the instructor, designers, and the institutional demands of the context. He expanded that the less transactional distance there was, the more structure would be needed. This is why self determination is sometimes necessary and emphasized.
him, presentation, motivation support, critical analysis simulations, counseling and help, evaluation, and student creation of knowledge are subject of structure.

In line with self determination, Moore questions distance education programs by asking the extent to which a learner can decide over what needs to be learned. He advocates for more and faster dialogue to improve distance education programs. Perhaps, with "the family of teleconference media - i.e., the use of interactive computer networks and audio, audio-graphic, and video networks, which may be local, regional, national and international ... linked by cable, microwave and satellite" (p. 32), dialogue could be significantly improved. Transactional distance is possible thanks to interaction that he eloquently describes to be of three types.

Moore (1993b) suggested that these three types of interaction in any distance education program are: Learner-content, learner-learner, and learner-instructor. He says it is pertinent to distinguish among them because some confusion may arise if they are not well defined. Learner-content interaction is the result of self analysis of messages through texts, video, broadcast, or any media involved in the process of transmitting the subject matter of the course. Learner-learner interaction is a new dimension possible in the 1990s, perhaps because he recognizes the strength of new communication technologies. He defines it as "inter-learner interaction between one learner and other learners, alone or in group settings, with or without real-time presence of an instructor" (p. 22). According to him, it is needed to stimulate and evaluate, as well as for the support of students, even though it was traditionally thought as non-necessary. Finally, learner-instructor interaction is the collection of activities through which teacher and student communicate and exercise influence on one another. There tends to be more
teacher influence if this type of interaction is present along with learner-content interaction only. He suggests that it is needed for the purposes of confrontation and "reality testing and feedback" (p. 22).

Moore recognizes that there is more awareness of interaction as a result of the development of communication technologies. He says that the difficulty is to determine what type of interaction is more needed in a program. Once this is done, the challenge is to increase it looking with available technology and media.

2.7.7 David Sewart's view of distance education

Sewart's (1983) account of distance education is a historical overview of its development after the 1970s. He explained that the practice of distance education has different reasons to have been originated in different parts of the world. It implies a more individualized learning style in contrast to face-to-face traditional group education. The package of information is a characteristic that has evolved over time, as it is now presented in multiple ways. In distance education intermediaries are necessary, such as facilitators and administrators in order to understand student perspectives.

The assumption of individuality in learning that Sewart makes is based on expectations of autonomy and self-learning styles placed on students. In this sense, traditional education is a more tutored group activity that differs much from distance education. The distance student:

...has no framework against which to judge 'doing well'. He can of course expect to receive comments on and perhaps grading for, his work from his tutor, but this interaction is strictly between teacher and student, and the student is therefore
always at a disadvantage. No comparison with the peer group is possible and the student learning at a distance lacks the usual bench marks for his self-assessment. (pp. 47-48)

He argues that most programs are concerned with the package to be received by the student, focusing on the media and its presentation, while the real challenge for him is to focus on the students and their needs.

His defends that in distance education there is a concrete need for intermediaries. It is impossible to fit all needs of students in one deliverable package. In other words, the potential for various interpretations of the subject matter make it necessary to search for alternatives that allow for multiple student variance. Targeting different packages for each student is not economically feasible and this is also why intermediary help is necessary.

Sewart believes, like other interaction and communication theorists, that educational packages may serve the functions of advice and support, but suggests that too much concentration in producing "a grandiose package of materials" (p. 51) has overshadowed other aspects of the program. In advocating for interaction and communication among participants, he calls for an understanding of the differences between distance and traditional students.

In general terms, the learning environment of a distance student tends to be individual while traditional students learn in groups. Distance education assists people on a part time basis while traditional education is mostly for full timers. Traditional students have sequentially developed through school in a linear fashion almost uninterruptedly, while distance students are mostly adults with different backgrounds, reasons, and stages.
of their lives; they often work at the same time they study, while most traditional students study on a full time basis. In terms of support and advice, face-to-face students have them readily available, while distance students ought to make complicated arrangements and decisions to get the necessary support mechanisms. And finally, how much and what's learned is often determined by the group-teacher relationship in traditional settings, while in distance education it is by teacher-individual arrangement. In distance education, most content is determined by the instructor.

Setting the background for a more sophisticated view of interaction and communication, Sewart suggests that the intermediary's role can be determined by the package. He defines the teaching process "as the transmission of subject matter and advice/support" (p. 54). He postulates that in order for learning to exist, it is not only necessary to have the tools of distance education (television, radio, print, and so on) but interaction as well. In times past, this was only possible with the telephone, but today, thanks to multimedia technologies and digitalization in general, the possibilities have increased.

Although difficult, according to him, it has been possible to change the tone of packages and materials so that they elicit internal dialogues, contributing with this to making a more autonomous learning style. He recognizes that there is a limit, since educational packages cannot substitute the instructor; he then advocates for dialogic materials independent of the media that is chosen. He defends the need for facilitators because, even though digitalization might be offering sophisticated communication opportunities, there exist non-verbal and visual indicators that can only be absorbed in the presence of intermediaries.
Sewart differs from other theorists since he sees a need to communicate in distance education programs. Autonomy is directly linked to interaction but dialogue is seen as more than verbal encounters. Materials, good structure, and possibly adequate media selection, can bring about dialogue, including self reflection to enhance learning.

2.7.8 Börje Holmberg's guided didactic conversation

The fundamental base of theoretical observations by Holmberg (1983) is formed by communication and interaction among human beings. In his words, "education is based on communication between educans and educandus and, in most cases, on peer-group interaction" (p. 114). He defines guided didactic conversation as the process by which a student internalizes conversations with him or herself through texts or educational content. He says, "the more a student is dependent upon guidance, support and encouragement, the likelier is the favorable influence of the guided didactic conversation" (p. 115).

Holmberg uses the term 'interaction' as a synonym of 'conversation'. His theory of guided didactic conversation is based upon the following postulates (pp. 115-116):

1. that feelings of personal relation between the teaching and learning parties promote study pleasure and motivation;
2. that such feelings can be fostered by well-developed self-instructional material and two-way communication at a distance;
3. that intellectual pleasure and study motivation are favorable to the attainment of study goals and the use of proper study processes and methods;
4. that the atmosphere, language and conventions of friendly conversation favor feelings of personal relation according to postulate 1;
5. that messages given and received in conversational forms are comparatively easily understood and remembered;
6. that the conversation concept can be successfully translated for use by the media available to distance education;
7. that planning and guiding the work, whether provided by the teaching organization or the student, are necessary for organized study, which is characterized by explicit or implicit goal conceptions.

His arguments, normally found within general interpersonal communication theory, do not deny that learning could be an individual process. For him, guided didactic conversation can facilitate learning. It is possible because of printed materials, or pre-produced courses, and the two-way communication activity. In reality, communication through any "means represents real communication" (p. 116). It is important to note that there needs to be some value in the exchange of information in distance education through any medium.

Holmberg discusses the characteristics of guided didactic conversation:

- Easily available presentations of study matter; clear, somewhat colloquial language, in writing easily readable; moderate density of information.
- Explicit advice and suggestions to the student as to what to do and what to avoid, what to pay particular attention and consider, with reasons provided.
- Invitations to an exchange of views, to questions, to judgments of what is to be accepted and what is to be rejected.
- Attempts to involve the student emotionally so that he or she takes a personal interest in the subject and its problems.
- Personal styles including the use of the personal and possessive pronouns.
- Demarcation of changes of themes through explicit statements, typographical means or, in recorded, spoken communication, through a change of speakers, e.g. male followed by female, or through pauses. (This is a characteristic of guidance rather than conversation). (p. 117)

Holmberg's theory states that if there is a tone similar to a conversation within the program, then the student will be more motivated and successful in his or her duties,
including assignments. He proposes the following hypotheses based on his theory (p. 118):

- The stronger the characteristics of guided didactic conversation, the stronger the students' feelings of personal relationship between them and the supporting organization.
- The stronger the students' feelings that the supporting organization is interested in making the study matter personally relevant to them, the greater their personal involvement.
- The stronger the students' feelings of personal relations to the supporting organization and of being personally involved with the study matter, the stronger the motivation and the more effective the learning.
- The more independent and scholarly experienced the students, the less relevant the characteristics of guided didactic conversation.

Holmberg (1993) also states that there have been two accepted components of distance education that the academic community has understood. On one hand, a pre-produced course or text, and on the other, a communication process between student and teacher through some medium. The ability to elicit a conversation, without actually having one as normally accepted and conceived, is explained in the following way:

One question is whether the offer of a pre-produced course only - without any real two way traffic - can constitute distance education. While I would not recommend this as an ideal model, I think it must logically be accepted as distance education if the pre-produced course resembles a kind of conversation in that the course addresses the student in a personal way, invites him/her to consider and query arguments, attempts to involve emotionally by referring to his/her experiences and interests, and generally stimulates communication. (p. 330)

He defends conversation in the form of consultation of subjects, for the theory is expected to work under such communication parameters. However, he warns that in the process conversation could turn to be autocratic and therefore could ruin learning. He also argues that there have been studies that suggest that independent students tend to
look for distance education programs, but at the same time, "they do not reject guidance" (p. 332).

For Holmberg, distance education can offer individualized projects (and could and should) as opposed to group projects. While certainly distance education can expand groups of people benefiting from a certain course or subject, it should also be concerned with:

... opportunities to study entirely individual what, when and where it suits them, to start and finish when they want to, to submit assignments and communicate with the distance teaching organization at any time, and generally to adapt their study to the conditions of adult life, including job, family and social commitments. In such cases the courses and the tuition address the individual, not a group. The student may have chosen a unique combination of courses and may work at a speed that is quicker or slower than that of any other student. (p. 333)

In order for communication to exist between the distance teaching organization and its students, which most happens in a noncontiguous way, media ought to be used. However, he has a clear preference, and defends, printed material as the dominant medium for communication. Critical of computer generated illustrations and text, he warns against difficulties associated in learning them. It is pertinent to mention that in the era of digitalization, as discussed by Negroponte (1995), most authors are still looking at how nice things look rather than at how easy is to present information.

Holmberg recognizes the value of time in distance education programs, particularly in terms of responses between teacher and learner. For this, electronic mail is an adequate technology. In his explanation he argues that there is empirical evidence suggesting that prompt responses (conversations) - a reduction in interaction time -
improves communication and contributes to completion of courses. He recognizes that the next issue to address is *how is it communicated and what is communicated*.

Holmberg explores the issue of empathy and defines it as "the power of projecting oneself into and understanding someone else's thinking and feeling" (p. 336). He argues that for empathy to occur, dialogue is necessary and distance education organizations need to pay attention to this. He justifies his theory, along with his views on technology and empathy, as one of the alternatives to understand distance education. In doing this, he also expects the following characteristics of other theoretical work in the field (pp. 338-339):

- have internal consistency as logical systems;
- establish functional relationships between the teaching and the outcomes of learning;
- be capable of generating specific hypotheses and predictions;
- be expressed in such a way that research data capable of possibly refuting (falsifying) the theory can be collected.

The theoretical approach that Holmberg brings to the literature of distance education elaborates consistently a preoccupation for the success of programs based on communication. Schlosser and Anderson (1994) describe guided didactic conversation as falling "into the general category of communication theory" (p. 11). Some assumptions about individuality and dialogue are actually pre-requisites or issues that the independence theorists argue about.
2.7.9 Learning and understanding by Cheryl Amundsen

Amundsen (1993) is probably one of the only contemporary authors that has summarized theories of distance education by their most important characteristics. For her, cultural sociology has influenced the central concepts of Peters' industrial and post-industrial views of distance education. Independent study has determined transactional distance and learner autonomy in Moore's arguments. Traditional pedagogy is base for Keegan's reintegration of the teaching acts. Communication theory and adult education are behind Garrison's educational transaction and learner control central ideas. Finally, Holmberg's guided didactic conversation, learner autonomy, and noncontiguos communication are apparently influenced by humanist approaches to education.

She argues that distance education theory needs further developments and perhaps looking at learning is the next aspect to focus on. Learner, teacher, and content are no longer emphasized as individual components. The emphasis is switched to learning where teacher and student are separated in time and space. Her vision of the distance that exists among the three components (learner, content, teacher) is best understood if attention is on the learning process (pp. 73-74):

In other words, distance education is a field of inquiry that should be well rooted in theories of teaching and learning. The primary contribution of the field could be seen as providing a systematic analysis of the meaning of distance to the teaching and learning process. It is in this sense that the proposed framework is intended to encourage inquiry and instructional thinking which begins with the intended learning and then considers the implications for the content, the learner and the teaching role within the distance education setting.
Amundsen recognized that her view of distance education is related to Keegan's reintegration of the teaching acts. However, in her model there are no definitions of the roles that each part plays. She proposes that such roles be determined based on what students would want to learn. In addition she says that "the notion of distance must remain central, but that its meaning or importance is in direct relationship to the type of learning desired" (p. 77). This view is interesting if it gives space for outcomes. In her postulates, her position opens the opportunity to include cultural aspects in the theoretical debate of each element that surrounds learning.

2.7.10 Technology development and the theory of distance education by Tony Bates

To understand the latest technological developments readily available for distance educators, Bates (1993) offered an analysis according to its trends. He recognized that until the 1980s "the vast majority of distance education throughout the world was still primarily print-based" (p. 213). Such context is changing and there are serious indications that there exists a greater emphasis on technology because:

- a much wider range of technology is becoming more accessible to potential distance education students;
- the costs of technological delivery are dropping dramatically;
- the technology is becoming easier to use, both by teachers and learners;
- technology is becoming more powerful pedagogically;
- distance education institutions will find it increasingly difficult to resist the political and social pressures of the technological imperative. (p. 213)

The technological imperative that Bates describes can be associated with interests of multinational companies that distribute and produce technologies. The 1990s are
comparable to the era in which correspondence education expanded thanks to the textbook industry; this time the telecommunications industry is driving different efforts in the field. The trend is irreversible and any distance educator or theorist will need to consider communication technology as a growing concern of the program. This phenomenon, as Bates discusses, is also true for traditional education settings.

For Bates, those that adapt the latest communication and information technologies belong to a third generation of organizations of distance education. The first one is formed by the ones that use traditional correspondence and the second one, called autonomous, by those using various combinations of media. His definition of media makes it necessary to clarify what he understands for technology. The different ways used to present ideas are called media, such as text, audio, video, or computer generated digital information. For technology Bates conceives print, radio, television, computers, and so on. It is important to realize these differences as, often times, as indicated in Tables II and III, technologies can be used for different purposes.

In exploring the reasons why technology is used, Bates proposes that, fundamentally, organizations want to extend classrooms and follow an expansionist model. In addition he argues that institutions exploit the medium according to different types of knowledge.

Bates suggests that the medium itself has a low value but that its real qualities rest on an integrated scheme where the medium has a place, thanks to the technology it actually favors. He hypothesizes that: a) There exists a need for multiple forms experience and multi-media technologies can help achieve such need; b) media are 'neutral' regarding content, but 'specific' regarding skills; c) media can be matched to
Table 2. The relationship between media, technology and distance education applications of technology

<table>
<thead>
<tr>
<th>Media</th>
<th>Technologies</th>
<th>Distance education applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text (including graphics)</td>
<td>Print</td>
<td>Course units</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplementary materials</td>
</tr>
<tr>
<td></td>
<td>Computers</td>
<td>Correspondence tutoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Databases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electronic publishing</td>
</tr>
<tr>
<td>Audio</td>
<td>Cassette, radio</td>
<td>Programs</td>
</tr>
<tr>
<td></td>
<td>Telephone</td>
<td>Telephone tutoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Audioconferencing</td>
</tr>
<tr>
<td>Television</td>
<td>Broadcasting, video-cassettes,</td>
<td>Programs</td>
</tr>
<tr>
<td></td>
<td>videodiscs</td>
<td>Lectures</td>
</tr>
<tr>
<td></td>
<td>Cable, satellite, fiber-optics,</td>
<td>Videoconferencing</td>
</tr>
<tr>
<td></td>
<td>ITFS, microwave</td>
<td></td>
</tr>
<tr>
<td>Computing</td>
<td>Computers</td>
<td>Computer-aided learning (CAL, CBT)</td>
</tr>
<tr>
<td></td>
<td>telephone, satellite, fiber-</td>
<td>E-mail, computer-conferencing,</td>
</tr>
<tr>
<td></td>
<td>optics, ISDN, CD-ROM, videodisk</td>
<td>audio-graphics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Databases, multi-media</td>
</tr>
</tbody>
</table>

Table 3. One-way and two-way technology applications in distance education

<table>
<thead>
<tr>
<th>Media</th>
<th>One-way technology applications</th>
<th>Two-way technology applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>Course units</td>
<td>Correspondence tutoring</td>
</tr>
<tr>
<td></td>
<td>Supplementary materials</td>
<td></td>
</tr>
<tr>
<td>Audio</td>
<td>Cassette programs</td>
<td>Telephone tutoring</td>
</tr>
<tr>
<td></td>
<td>Radio programs</td>
<td>Audioconferencing</td>
</tr>
<tr>
<td>Television</td>
<td>Broadcast programs</td>
<td>Interactive television (TV out; telephone in)</td>
</tr>
<tr>
<td></td>
<td>Cassette programs</td>
<td>Videoconferencing</td>
</tr>
<tr>
<td>Computing</td>
<td>CAL, CAL, CBT</td>
<td>E-mail</td>
</tr>
<tr>
<td></td>
<td>Databases, multi-media</td>
<td>Computer-conferencing</td>
</tr>
</tbody>
</table>

actually favors. He hypothesizes that: a) There exists a need for multiple forms of experience and multi-media technologies can help achieve such need; b) media are 'neutral' regarding content, but 'specific' regarding skills; c) media can be matched to appropriate conceptual models of thinking; d) learners need to interact both with the learning material and with tutors or instructors, and other students, in order to learn effectively.

A difficulty associated with media, as Bates discusses, results from the differences between management of ephemeral and permanent material. Lectures and broadcasts that are not recorded nor easily available for replay constitute ephemeral types of material, while books, tapes, and computer files are considered permanent. The latter allow for student interaction and discussion as they can be subject of further interpretation and analyses.

Finally, Bates points out that besides the fact that there is a tendency of institutions to engage in the use of technology, there is evidence to suggest that it will be of low cost, integrated, and easier to use. Nevertheless:

What will not get cheaper is the cost of producing good quality distance teaching materials. This will require people who can combine good pedagogic practice with an understanding of the strengths and weaknesses of different media and technologies. Also needed will be stronger procedures and methods for making decisions about technology use in distance education as the range of technologies and their complexity increases. (p. 232)

In advocating for substantial theoretical work, he points out the need to consider the importance of technology in the overall picture:
It will become increasingly important to develop a good theoretical basis for the applications of media and technology in distance education as the new technologies come to play a more central role in distance education. (p. 232)

2.7.11 The systems approach and distance education

The systems approach has extensively been discussed as a way to understand, reform, and operate in education by several authors, including Scileppi (1988), Banathy (1995a & 1995b), Jenlink (1995), Hansen (1994 & 1995), Duttweiler (1995), Reigeluth (1993), and Carr (1996). The roots of this approach can be found on general system theory first articulated by Bertalanffy (1968). Its expansion and proliferation as a disciplinary area of theory and action can be attributed to Checkland (1993) and Churchman (1968), among many others who consistently have addressed it in different ways.

In distance education, the first concerned with the systems outlook, although not fully explained or articulated, were Neale (1971) and Perraton (1983). Both advocated for the wholeness of the education process rather than the study of its different parts individually, sequentially, or in an isolated form.

The use of the systems outlook in education is perhaps vague among many, since it has been misused and confused by several authors (Hansen, 1994), and because few have devoted themselves to address what they really mean when referring to the systems approach (Checkland, 1993). It is, therefore, important to clarify the main statements of the approach, so that there is a clear understanding of what is presented as the theoretical background of this dissertation.
A systems view looks at the wholeness and interconnectedness of different parts of an entity or organism, as the main constructs of analysis. While traditional scientific approaches may look at different elements in a separate or sequential fashion for their study, the systems outlook proposes a view of the entire collection of studied elements in order to understand it all. Checkland (1993) explained:

Réné Descartes taught Western civilization that the thing to do with complexity was to break it up into component parts and tackle them separately. The lesson has been well learned, and the idea is deeply embodied not only in scientists, for whom the idea is central, but in anyone who has a Western-style education. Systems thinking, however, starts from noticing the unquestioned Cartesian assumption: namely, that a component part is the same when separated out as it is when part of the whole. This makes finding out about systems thinking very different from finding out about, say, Renaissance literature, the politics of the Middle East, or natural selection in the fruit fly. (p. 12)

He added:

The Cartesian legacy provides us with an unnoticed framework -- a set of intellectual pigeon-holes -- into which we place the new knowledge we acquire. Systems thinking is different because it is about the framework itself. Systems thinking does not drop into its pigeon-hole, it changes the shape and structure of the whole framework of pigeon-holes. (p. 12)

Under the systems outlook, it is widely accepted that changes in one part of the system necessarily have and effect on other. In education, a system is a complex organization of activities that are connected and interrelated in special ways. In practical terms this means that, for example, altering the manner in which students are evaluated without making the necessary changes in the form they are taught, would have a disruptive effect on the teaching and learning process as a whole. While a change of this nature is not necessarily negative for student learning, what the systems outlook says is
that the alteration of one of the system's components has an effect on other parts because of their interconnectedness. This statement, although simple for many, is the most important single idea that needs consideration if a systems view is to be used in distance education. In addition, the central considerations that are the platform of the systems approach are the concepts of structure and process (Checkland, 1993), which make system interconnectedness possible.

A systems approach has been addressed by means of the words "systemic" and "systematic" inconsistently by many authors throughout the literature. It is important to distinguish between the two because, although similar and with the same origin (Carr, 1996), they mean different things. Throughout this study, with the word "systematic" reference is made to orderly series of steps or events in a process. In education, for instance, a systematic form to evaluate means that tests are conceived first, then prepared, administered, collected, graded, and serve the purpose of learning about a particular subject both for students and teachers.

With the word "systemic" this study makes reference to the organization of all working parts of the education process and to their interconnectedness and their hierarchy. In educational evaluation, for instance, a systemic view is concerned with the effects that the system suffers as a result of changes in testing patterns, ultimately resulting in the study of all system parts and their reaction and adaptation to any performed change.

Just as a systematic approach proposes an arranged and orderly series of steps for success in education, a systemic view looks at all related aspects of the process and their equal consideration if structured education is to accomplish anything. This fundamental
difference has consistently been ignored throughout the literature of systems approaches, which in turn has provoked unnecessary confusion. The authors presented here have used both terms to mean different things, but for the purposes of this study, a systemic approach implies reference to the systems outlook, while a systematic view implies reference to order and sequence.

The reader should also see that this study deals with what Checkland (1993) calls 'human activity systems', which are social systems by definition. The organized complexity of education at a distance has been systemically addressed by some, leaving ample room for further analysis.

2.7.11.1 Cyberspace and distance education by Gary Boyd

Boyd (1993) recognized the need to articulate a theory in a systematic fashion, especially if the newest communication technologies in distance education were to be considered. He argued that in the cyberspace era, it is pertinent to clarify what is understood by networks. Although his account of networks is not as extensive, other authors (Pimienta, 1993; Silvio, 1994) have described them substantially. He warned those taking decisions about technology to be aware of simple the differences between human networks and information networks.

Boyd also stated that previous attempts to build a theory of distance education had been rather plain-looking. In his mind, they have not included the multiple aspects surrounding distance education contexts, particularly because they ignore student,
teacher, and administration networks. Educational theory models are "simplistically narrow models" and they expand to distance education as well.

He described the cyberspace culture as an illusion and explained that it "can be seen as an alternative (eventually even the main?) embodiment (of distance education) ... It will contain numerous virtual sub-worlds with more or less limited access" (p. 245). Cyberspace can be understood as the technological and social phenomena caused by the interconnections of telecommunication networks.

His view of distance education is based on viable systems theory, which suggests "that to be viable any organization must have five functional sub-systems each of which in a sense re-capitulates the whole structure" (p. 243). His model illustrates sub-systems in distance education in the following way:

1. System V: A meta-strategy system, which is concerned with the entire existence of the organization.

2. System IV: A system of alternative futures, which depicts the constant need to improve, modernize, and adapt new choices to the program.

3. System III: A steering system in charge of the management and every day practice of the program.

4. System II: A synchronizing and balancing system that filters information back and forth from System I to Systems V, IV, and III.

5. System I: A comprehensive system that covers activities related to materials production, delivery, support, marketing, and other logistical aspects of the program.
In his work advocating for a new vision of distance education based on viable systems theory, as reformed and conceived by him, there are cybernetic principles that will need to be taken into account for future distance education programs (p. 249):

- The principle of *concentration* of effort; some few product and process goals must be negotiated as paramount, must be well specified and must have the commitment of the principal actors.
- The principle of *requisite control variety*. All seriously possible sources of disturbance variety must be envisaged, and prioritized, and appropriately matched forms of counteracting control variety must be provided for each.
- The principle of *closed feedback loops*; a return message about performance although commonly called 'feedback', does not actually function as feedback control unless it is compared with a set standard, and the difference, if any, is indeed used to activate controlling actions. A looped channel, without a standard, and without triggerable control actions, is not a true 'closed' feedback loop.
- The principle of *collaborative game prescription*; when a system is too complex to understand, then prescribe! Design into machinery and/or get and agreement by those involved to play by rules which will simplify it to something understandable.
- The principle of *intermittent control*; leave subsystems alone as long as possibly appropriate to get on with their work undisturbed by 'higher' questions or orders.

Finally, he claimed that the advantages of incorporating new technologies were evident since distance education organizations would witness the benefits of artificial intelligence for recordings and other services; there would be possibilities to improve aesthetics and gain motivation; and opportunities to standardize information transmission internationally would emerge.

2.7.11.2 *A systems theory approach by Chere C. Gibson*

Gibson (1993) argued that the way distance education was understood and conceived directly affected its design, delivery, and evaluation. He defended a larger
picturing of the field since other authors have contributed to looking at "other systems on the learner and his/her learning" (p. 80) in a limited way. Perhaps, as he points out, there exists a need "to see a more transactional model in which a variety of spheres interact, such as an exploration of the impact of having a parent engaged in distance learning on family roles, responsibilities, and values" (p.81). Further effects could be the result of value changes on distance students.

Gibson was particularly concerned with the inadequacy of distance education theories to deal with student environment. He explained that the environment has a direct effect on learner behavior. In his words:

> With this relationship as given, our theories of distance education must take into consideration not only the learner, teacher, content, and the communications medium, as duly considered in a number of prevalent distance education theories, but also the content [sic] in which teaching and learning occurs. (p. 81)

Defending this broader conceptualization of distance education, he suggested that listening to learners should be the priority. For Gibson, family, work, and other general characteristics of student life should be listened to by distance teaching organizations. This is especially important because such characteristics affect student performance and good "academic experiences are translated into action at home, work or in the community" (p. 84).

Gibson draws attention to ecological systems theory, which "focuses on the multiple contexts in which human development occurs" (p. 85), as the basis for his arguments. An example is illustrated:
Consider, for example, a learner's self-confidence changing over time as a result of the interaction of a growing self awareness of his/her capabilities, acquiring excellent grades, encouragement of others, independent learning materials which instil [sic] confidence, employer rewards of more sophisticated job assignments as a result of new academic pursuits, peers' and family's new-found pride in our learner's success, etc. (p. 86)

Gibson discusses *microsystems* as those immediate issues surrounding the learner and environment, such as home, family, and the various activities in which a typical distance student engages with. *Mesosystems* constitute a more sophisticated network of issues that embraces "the interactions among the distance learning institution, the family, the work-place, the community, and perhaps a religious institution" (p. 87). *Exosystems* include "the neighborhood, the mass media, the world of work, agencies of government at all levels, communications and transportation systems, the distribution of goods and services, and informal social networks" (p. 87). Finally, the *macrosystems* are considered those that refer to the larger societal relationships as a whole and not to the individual, such as laws, customs, and traditions.

Gibson proposed that research should be opened to include all systems in the picture. Instead of looking at learners based on demographic characteristics (as recent studies do), student environment should be included as an indication of learning. The theorist recognized that this was no easy task, as context based indicators were difficult to know. Specifically, "the challenge to distance educators is to continue to identify those factors both internal and external to the learner which affect development, and to better understand the nature of the related processes" (p. 89).
2.7.11.3 A systems view by Moore and Kearsley

Under the systems approach, as presented by Moore and Kearsley (1996), the distance education program may be viewed as an integrated education process. The system is formed by smaller components that are subsystems of the system at large. What is important within this framework is to understand that, although attention can be devoted to studying and learning about a particular component of distance education, it is also important to look at the interrelationships among subsystems that make the entire mechanism work.

In reference to the quality of distance education, the theorists state that:

... good quality requires that the development and operation of each component be controlled in such a way that it is fully integrated with the development and operation of all other components, making each supportive of the others (Moore and Kearsley, 1996, p. 6)

The complexity of systems is high in large organizations because of the numbers of people involved in making the system work. Thus:

... a distance education system only becomes cost effective when it can take advantage of economies of scale. This means that the larger the number of users of the system, the lower the cost for each person. This concept so familiar in other walks of life, comes about as a result of another common practice that the systems approach makes possible - "the division of labor" (Moore and Kearsley, 1996, p. 7)

The notion of the division of labor has been extensively explored by Peters in his theory of the industrialization of teaching and learning. For the systems model, the division of labor is a requisite. Work is done in teams of specialized individuals.
Contrary to traditional teaching, in a distance education system, teaching is only a part of the process and is executed by several individuals, such as artists, instructional designers, evaluators, technical experts, content experts, discussion leaders, and others. The components of the system are illustrated in figure 1.

The illustration shows how, for example, designing a course cannot be done exclusively based on student's needs. The history and theory, as well as the philosophy of the institution, all play an important part. Selecting a medium for delivery depends on sources but considers also what's available in the learning environment. Designing
contemplates all possible issues (here referred to as subsystems) to make the and to foster their solid interrelationships to come up with a good education process. This is especially significant in large distance education programs where, according to these theorists, only a systems approach makes it possible to produce quality distance education.

2.8 Summary

This chapter has presented a literature review of distance education in efforts to provide a short overview of the field. History as well as major theoretical postulates illustrate that distance education is the product of years of experimentation and scholarship. Correspondence education developed rapidly thanks to sophisticated distribution mechanisms associated with the industrial era. The emergence of newer communication technologies gave birth to a solidified field of inquiry now called distance education.

The review has also shown that new developments in communication and information technologies have repeatedly put theoretical postulates into question. Because distance education is a new field of inquiry popularized only in the 1970s, it is reasonable to state that much theoretical work is yet to be developed.

Distance education theory, produced primarily by scholars in industrialized nations, needs to be looked at in different contexts. This is especially true when talking about the developing world, where variables are likely to put models in question. For example, the theory of distance education as an industrialized form of teaching and learning is only possible to comprehend if, and only if, most of its components can be
compared to the context under analysis. Because of the complex set of principles that the theory assumes about distance education, the modality may not be accurate to understand in the Third World. Besides the difficulties associated in understanding the industrial contexts of developing nations, historical accounts play an important role. At the time industrialization was rapidly expanding in the West, many developing countries were still agrarian colonies or had just achieved independence. Industrialization patterns were part of developing models of the Third World much after they were used in the West. Today, the same seems to be happening with the postindustrial society.

Concerning telecommunication technology, some developing countries have entered into a rapid phase of international network connectivity. However, this does not mean that the volume is the same for them as it is for industrialized nations. Furthermore, several developing countries, particularly in Africa, are still left out of the latest telecommunication revolution. Therefore, the service sector of postindustrial societies is still far away for many agrarian contexts. With this in mind, a theory of industrial or postindustrial teaching and learning is not realistic as a fundamental empirical approach to distance education in developing countries.

Telecommunication technology is now the driving force of distance education. This can be compared to the textbook industry that lead correspondence education to grow in early days. Third World theorists should be especially aware of this, as it is in developing countries that shocking technological changes happen unexpectedly. These, added to current problems of education access, drop-outs, finances, and others, should not be ignored in empirical work.
The reintegration of the teaching acts approach assumes that the set of activities, which are to be reintegrated in distance education, are proper for the learning process. Vertecchi (1993) explained this problem exemplifying it with the loneliness of traditional students:

Educational innovation, both with regard to distance education and other sectors of didactic renewal, often encounters criticism that should more suitably be addressed to traditional education. An objection that is often raised about distance education is the isolation of distance students and the impossibility for them of building a positive interaction with their teachers. One would be led to think that traditional education organization was distinguished by the constant attention it offers to students and the intensity of the interaction it establishes between them and their teachers. (p. 158)

He expands his argument, opening the way to consider if a reintegration of teaching is actually what seems appropriate to do in distance education:

Anyone who is familiar with university teaching knows well that that is the exception rather than the rule. On the contrary, it often happens that students are completely neglected as individuals. In fact the examinations are often their only personal contact with their lecturers. Each student's loneliness is not minimized by being co-present in a physical space thronged by other students: the solitude we are talking about is defined by the circumstances in which study takes place and not by a general need of personal interaction that can probably be better satisfied in other contexts. (p. 158)

Reintegration of the teaching acts should then filter, cautiously, what is to be reintegrated, as teaching is not just talking, writing, and other mechanical duties, but a set of interactions.

Moore's (1983) independent study theory opens more opportunities for research in the Third World. His theory recognizes that there are different learning styles, that learning is experiential, and that individuals ought to engage in life-long education.
Learner autonomy, though, is worth discussing so long the context of education is flexible.

The systems approach in distance education, as proposed by Moore and Kearsley (1996) is the latest model used to studying the field. A systemic outlook is inclusive and offers the possibility to consider different contextual aspects that other approaches do not consider. Because of the solid theoretical structure of systems theory, the model is looked at to understand the practice of distance education in a particular program in Mexico. In turn, the model will, possibly, offer new insights about bringing distance education theory better into practice.

Chapter three presents the design of this study and introduces the reader to the context in which it was conducted.
CHAPTER 3
THE METHOD

3.1 Introduction

Chapter 2 presented a literature review touching on the history of distance education and major theoretical approaches used to address distance education systems. This chapter presents the method used to conduct this study at the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) and discusses issues related to data collection, methodological assumptions, data analysis, instrumentation, selection of subjects, and the operational definitions under which this study works. In addition, a throughout description of the Virtual University is offered so that the context of the study is known better.

3.2 The Virtual University at ITESM

The Virtual University is a distance learning unit operating within a conventional style college founded in 1943 by a group of industrialists in Northern Mexico. Today, ITESM is a private university consortium extended throughout the country in 25 cities. As of August, 1995, faculty members added up to about 4800 (López & Esquivel, 1995) and students to 68,947 (Integratec, 1996).

ITESM was the first institution to be recognized as a member of the United States Southern Association of Colleges and Schools (SACS) outside US territory. With this, ITESM was able to credit international student class work in Mexico, as well as facilitate
its faculty members' enrollments in graduate programs in the US. In 1987, the institution studied its own operations, faculty, students, and facilities in order to comply with demands imposed by SACS for renewed membership. The result of this study showed that ITESM's faculty needed to significantly increase their education level by obtaining a minimum number of graduate degrees.

At the same time, during the mid 1980s, ITESM had changed its leading administration, which united the institution as the system known today. Pushing for full accreditation, the administration engaged in the 1987 institutional study that demanded faculty training efforts. In detail and under this demand, ITESM committed to have its faculty holding master's and doctoral degrees by 1995 and 2000 respectively. Because of such determination, SACS renewed the institution's membership for the third time (López & Esquivel, 1995).

In 1988 ITESM was faced with three alternatives:

First, to allow and help its faculty to pursue graduate degrees in and out of Mexico; second, to hire an all new teaching force; and third, to offer the graduate degrees needed. The first option was not feasible since the institution could not afford to have most of its faculty leave to pursue graduate degrees in foreign countries, where most people would want to go. The second one was not possible either since Mexico does not have, possibly even today, the professionals needed to replace those already teaching at ITESM. The alternative was to undertake the training task and have faculty development programs, including graduate education. (Galarza, Xotlanihua, & Galarza, 1995).

Given ITESM's involvement in telecommunication technology since the mid 1980s, the institution saw the opportunity to create the Interactive Education Satellite System (SEIS), which used satellite Morelos I launched in June 1985. With this program,
ITESM pioneered satellite graduate education in Mexico, even though distance education in the country can be traced back to the 1940s.

Formal operations of SEIS, renamed the Virtual University in 1996, began in 1989 (Palacios Corral, 1995). The system experienced unprecedented growth as a television unit production now using satellite Solidaridad I. From July to December 1995, for example, the number of hours transmitted in different educational programs jumped from 170 to 248. The most dramatic change experience in the same period was felt at the master's level, which almost doubled in graduate class hours transmitted. In addition, an increase from 17,617 to 20,584 students was seen. And by the end of 1995, ITESM was already receiving and transmitting classes from and to other universities, including the American School of International Management (Thunderbird), the Carnegie Mellon University, the University of Houston, the University of the Andes in Colombia, and the Venezuelan Simón Bolívar University, among others (R. Contreras Jara, personal communication, January 22, 1996).

In March 1996, upon the evident operation of SEIS as a distance learning unit more than as a program, ITESM decided to reorganize it as the Virtual University. In the January - May 1996 period, there were over 70 instructors teaching courses at the high school, undergraduate, and graduate levels, as well as continuing education seminars. Almost 26 thousand students were served during the same period by the distance learning unit (Integratec, 1996) and over 300 students had graduated since ITESM’s distance education programs began.

The 26 campuses that ITESM coordinates have satellite reception facilities for the two transmission sites located in Monterrey City and the state of Mexico campuses.
Reception centers are classrooms equipped with at least 32 inch monitors and/or projection screens, as well as computers directly connected to the Remote Interaction System (SIR) based on the TCP/IP protocol, the Internet's technical soul.

Students are all given Internet access throughout the system and, if necessary, they use fax or telephone during and outside of class to communicate with their instructors. The Virtual University has invested considerably on its facilities for transmission, such as new video link lounges and a mobil transmission unit used for occasional experimental broadcasts.

Faculty prepare classes in teams, normally composed of television production experts and a general assistant. In addition, several classes have teaching assistants across Mexico who, normally, are experts on the different subject they assist. Class notes are sent to students before the term periods and, as a general rule, they are followed carefully throughout the course of study dedicated to the class. The format of classes can be best described as extended classrooms, which practically present a distributed class format to 25 different sites throughout Mexico. Some teaching teams make use of graphical tools to enhance course materials and content, while others are only lectures given by television from a desk.

Students may ask questions while on the air. If not by telephone, students use the SIR to send comments or questions to transmission headquarters. There, class coordinators filter what a professor sees posted in a desk computer monitor. A professor then decides if time allows for an answer and responds to multiple student comments. This class format is followed since only two transmission centers are currently operating. Professors receive prior training to their classes and are constantly consulted by design
experts to better produce their courses on time and in accordance with coordination exercised by different Virtual University divisions: academic, operations, communications, and others.

The Virtual University extends classroom opportunities at a distance for several graduate programs, mainly at the master's level. A doctoral degree at a distance is now on its planning stage for 1997. Programs include education, business administration, marketing, finance, international business, computer sciences, industrial engineering, information systems administration, and environmental engineering, as well as several high school courses for the Institution's secondary units in the nation. In addition, the Virtual University has formed partnerships with other institutions and the government
that have resulted in the offering of special seminars, continuing education courses, and
general purpose transmissions.

In the end, ITESM has been able to accomplish its faculty training goals set upon
the completion of its third institutional study. In 1994, after its first six years in
operation, enrollment in graduate programs at the Virtual University (then named SEIS),
went from 693 to 2,167. Master degree holders increased from 1,136 in 1989 to 3,433 in
1994. Courses offered by professors holding doctoral programs went from 30 to 79 per
cent in the same period (López & Esquivel, 1995).

The complexity that characterizes operations at the Virtual University shows an
interrelationship of several elements of a distance education process. For its size and
different programs, the Virtual University offers a unique opportunity to learn more about
structural interconnectedness within a distance learning unit. This dissertation is the
result of close study of the Virtual University in efforts to look at the systems approach
within a distance education organization.

3.3 The design and research approach

This study works under the following statement as a fundamental research
question: The application or use of the systems approach in distance education leads to
quality programs at a distance. An interpretation of quality was developed in terms of
student and institutional success. This was looked at based on several unstructured
interviews conducted during the spring of 1996 at the Querétaro, San Luis Potosí, and
Monterrey campuses of ITESM. With this, it is possible to hypothesize that where the
Virtual University has been successful there is evidence of a systemic approach surrounding the distance education process.

To understand the elements of the system currently used at ITESM, the following research instruments were employed for this study:

1. A short survey distributed in paper to students in four of the 26 campuses of ITESM. One in the north of Mexico at Chihuahua City, one in the South at the state of Chiapas in Tuxtla Gutiérrez City, and two in the Central part of the nation at the Querétaro City and the San Luis Potosí City campuses. Seventy surveys were given to each site coordinator at the four campuses. They in turn distributed them to students arriving at the Virtual University's facilities. No preference was determined as to the education level of those surveyed, so site coordinators surveyed students that arrived to their facilities first and that were willing to answer. When surveys were completed, they were returned back to the researcher. The coordinators from sites in Chiapas and Chihuahua returned their surveys by mail, while those in Central Mexico returned them personally during visits to those campuses. A copy of this survey is included in Appendix A.

2. A short survey for 26 site coordinators sent via electronic mail in April 1996 from the researcher's personal Internet account at the University of Massachusetts. After two weeks, a reminder was sent via electronic mail to those site coordinators that had not responded. A copy of this survey is included in Appendix B.

3. A short survey for 72 professors sent via electronic mail in April 1996 from the researcher's personal Internet account at the University of Massachusetts. When available, a copy of the survey was sent to the class electronic address that is
reviewed, in most cases, by the course assistant at transmission headquarters. After two weeks, a reminder was sent via electronic mail to those professors that had not responded. The reminder was also sent to the class electronic address. A translated copy of this survey is included in Appendix C.

4. Observation sessions conducted by the researcher during January 1996 in Monterrey City at Virtual University headquarters, as well as at the Querétaro and San Luis Potosí campuses in three different occasions during March 1994, June 1995, and January 1996. Numerous previous unstructured visits to ITESM gave the researcher the opportunity to tailor specific observation sessions to better describe the system in accordance to its operations.

5. Literature made available to the researcher by staff at the Virtual University including system-wide student evaluations, history of the program, characteristics of production, course packets, new programs, and other printed statements and brochures. In addition, electronic materials available on-line via the Internet through its World Wide Web protocol. System-wide student evaluations of their courses are done by a survey nationally. A translated copy is included in Appendix D.

6. Unstructured interviews conducted by the researcher with management staff at Monterrey transmission headquarters and the Querétaro campus in Central Mexico. Informal and unstructured interviews were also conducted by the researcher with students during June 1995 and January 1996. The guiding questions of both groups are included in Appendix E.
3.4 Operational definitions

To arrive to an adequate analysis of the systems approach in distance education at the Virtual University, the primary need to define terms and statements is evident. Systemic practices, or as stated here, the use of the systems approach needs definition in detail. Likewise, quality distance education needs explicit description in accordance with statements used throughout this dissertation. Experience in the study of the Virtual University as a case provided insights to formulate the statement 'where the institution has been successful there is evidence of systemic practices in the process of distance education'. With this, a third operational statement is presented, which explicitly has to do with being successful at the Virtual University. For the purposes of this study the characteristics of such statements are examined in detail.

As stated in Chapter II, the systems approach is concerned with the interconnectedness of the different parts of the whole. It is, therefore, imperative to state that such outlook suggests the study of the multiple distance education elements as a group. At the Virtual University, the whole as a structure dedicated to the process of distance education, several parts are studied within the organization.

The elements of distance education at the Virtual University that comprise the group under study are: interaction, attractiveness of classes, readiness of professors, clarity of instructions, adequate technology access, the statement of clear objectives, inclusiveness of evaluation methods, readiness of site coordinators, inputs and resources in the system, design and reception of classes, contexts of students, logistical function, and student satisfaction.
The study assumes that these elements are all part of equal importance in the provision of distance education. They interrelate by virtue of their interconnectedness as a process. It is, for instance, impossible to provide instructions in clear way if there isn't a clear statement of objectives. Surveys utilized, as well as the results of observations and interviews, address these issues globally and in an integrated form. With this in mind, further definitions are considered.

Several aspects are meant by interaction at the Virtual University:

- Student and faculty use of the SIR in a frequent fashion in and outside of class.
- Student and faculty use of telephone and fax on the air and outside of class.
- The exchange of electronic mail among students throughout the country and with their professors at transmission headquarters.
- The reading of assignments by students as well as their reporting conclusions in written forms.
- The reception of instructions sent by professors in all forms.
- The possibility of professors seeing their students all across Mexico simultaneously.

Given the lecture format that prevails for most classes at the Virtual University, more attractive sessions are possible if: Sessions are shorter, professors avoid remaining seated throughout class, productions are more similar to commercial television, voice and sounds are of better quality, students are more motivated, sessions have better rhythm and are more dynamic, and in general, if sessions are different than traditional face to face classes.
The clarity of instructions refers here to the reception of themes and areas of study and their justification, as well as their general framework of reference. Because students in distance education are asked to assume many aspects of course content based on their high motivation, clarity does not mean to receive precise instructions in the study. Instead, it is associated with how much students can assume based on some clues that are especially given to them as designed by the teaching team.

The concept of readiness is here based on whether professors have been properly trained to engage in distance teaching. In addition, experience with the modality either as student or as instructor is also looked at. For this study, readiness of a professor means that he or she holds a doctoral degree, has received proper orientation from the Virtual University, and has experience teaching at a distance for at least one semester.

For the purposes of this study, adequate access for students is defined on the basis of student consideration or perception about it. Therefore, the notion of adequacy of access means that students have it. In addition, it is assumed that if instructors state they have access to a team of design experts, they will therefore have adequate technology availability, since such team normally includes technical experts that work on course technology related matters.

At the Virtual University, the statement of clear objectives is the affirmative perception of students on this subject. In addition, the definition includes consideration of student needs by teaching faculty at the time of designing their course.

Contrary to traditional education, where scheduled exams are often the only source of evaluation of student work, in this study the following are also evaluation
instruments: Written reports (both electronic and paper), phone calls, attendance, interest in class, interaction with teaching assistants, and group work and discussions.

The concept of readiness of site coordinators is here based on whether they have experienced their job for at least a semester. In addition, it is measured in terms of at least a master's degree and in terms of prior experience with distance education as students or program administrators.

Inputs and resources are defined here as knowing student needs by professors. Also, their knowledge of the philosophy of the Virtual University, as well as knowledge of distance education principles are considered as resources in the study. The availability of a team of experts, as well as proper faculty training are also considered definition ideas of inputs.

To understand the systems approach as an outlook for design, the role of instructors is considered to be that of a participant in a group, where content experts and designers participate. Systemic design, then, is that activity which considers the experience of instructors, the needs and characteristics of students, the results of evaluation activities, the opinion of site coordinators across ITESM's Virtual University facilities, the current events in the country that are related to the subject of instruction, as well as new available materials in direct relationship to the course content. In addition, a sound knowledge of the different contexts in which students are located and the conditions of class reception in several sites throughout the system.

With logistical functions the study emphasizes those activities related to sending and receiving classes and materials, including class notes, text books, taping of sessions for asynchronous watching, availability of video cassette recorders for student use, proper
functioning of equipment, readiness of satellite link, organization and advertising of remote satellite classrooms, dissemination of administrative information (change of schedules, exam dates, and others) to students, and the return of materials (answered exams, notes, etc.) to transmission headquarters when requested.

By referring to contexts the study alludes to the fact that different conditions surround students in 25 cities in the country where Virtual University signals are received. Therefore, the understanding, awareness, and knowledge of contexts directly affects other parts of the system. Design, for instance, depends on student needs, which may vary in the North and south of Mexico. For this study, this notion is limited to whether professors think student needs and various contexts at reception sites affect their design practices.

Student satisfaction is measured by whether students think their class effort is fair in relation to class evaluation. In addition, system wide evaluations produced by the Virtual University were consulted to determine satisfaction. In a Likert type scale ranging from total agreement (number 1) to total disagreement (number 7), as presented by such institutional evaluations, the issues under discussion are considered for satisfaction, or satisfactory, if responses to items are number 3 or less.

Two sources of information are used to determine quality for this study. First, general impressions of students and their learning as expressed to the researcher while conducting informal and unstructured interviews. Second, system-wide evaluations conducted by the Virtual University in a survey format. The first of such evaluations in the history of ITESM's distance education programs was produced at the end of the spring, 1995, semester. Here, the report produced at the beginning of 1996 evaluating fall
1995 classes is used. Quality there is based on detailed student evaluation of: professors and their knowledge of the subject matter, course assistants and their availability and help offered, teaching assistants and their knowledge at remote reception sites, interaction as defined by Virtual University officials, mainly the proper functioning of technologies for interaction, administrative coordination, general conditions of classrooms, and self evaluation and opinion of classes in general.

The notion of successful distance education here is directly linked to quality as defined and treated throughout the study. In student evaluations conducted system-wide by the Virtual University, where Likert scales are utilized, success is represented by values of three or less. In addition, student self assessment of his or her academic development as perceived formally and informally is used. For this aspect, the study looks at whether students would want to engage in distance education classes again based on their experience. Additionally, student consideration of their learning in relation to traditional classes is observed. Site coordinators' perception of quality and systemic practices as defined in this study are also measures of success.

Finally, it is appropriate to state that as of the time this dissertation was written, figures of completion rates, desertion, and other quantitative indicators were not available. Under the reorganization and constitution of the Virtual University an administrative division, working closely with its academic leadership, is expected to take charge of compiling such information.
3.5 Sampling for the study

Two different groups of people were sampled for the objectives of this study. One group was sampled randomly and one based on availability of subjects. For the groups of professors and site coordinators, the survey was distributed to their entire populations.

In the spring, 1996 all 72 professors instructing at a distance at the Virtual University were surveyed. They received a survey sent via electronic mail directly to their Internet addresses at the Monterrey and State of Mexico campuses, since these were the only two transmission sites for the ITESM system.

Two hundred and eighty paper surveys were distributed equally in four different campuses totaling 70 each. Because of different economic and perceived social aspects that can be found in the country, it was decided to survey students in the North, South, Center, and North-Central Plains. This arbitrary selection speaks to the distribution of ITESM campuses in the nation. Traditionally, Central, Southern, and Northern Mexico are thought to have differences in many social and cultural respects. This arbitrariness in selecting campuses for student surveys is also a reflection of such tradition.

Site coordinators in the four locations were contacted by the researcher before they were sent packets with 70 student surveys each. They were given two weeks to complete the task of surveying students in no particular order as they arrived to Virtual University facilities starting Monday, April 15, 1996. Site coordinators in the South and North returned paper student surveys by mail to Massachusetts since the researcher did not visit those campuses. The two site coordinators in Querétaro City and San Luis
Potosí City returned them personally after the surveying period and upon the researcher's visit.

The 26 site coordinators of the Virtual University were surveyed by means of an electronic mail message sent in the spring 1996 and returned after two weeks. Surveys were sent to Internet addresses of site coordinators at 26 different locations in Mexico.

Management staff interviewed at Monterrey transmission headquarters totaled nine. They were selected based on their availability in May 1996 and in relationship to four process areas: logistical functions, design, evaluation, and administration. Although informal consultation has been continued with these officials over electronic mail, the study is based on interviews conducted in May 1996 only.

3.6 Data collection and sources of error

The Statistical Package for the Social Sciences was used for data analysis of survey results. Observation and interview outcomes were documented accordingly and are included where appropriate. While conducting this study several sources of possible error have been detected in the collection of information. They are addressed here based on the instruments employed.

Paper surveys sent to four different campuses were to be distributed randomly based on when a student would appear at Virtual University facilities. While it was expected and indicated that the procedure needed impartiality on the part of site coordinators, there was no way to corroborate this. For the most part, and according to conversations held with some of them, site coordinators dedicate all of their time to heavy
administrative functions. It is possible that, perhaps, they opted for a practical and fast way to complete surveys in order to comply with the deadline imposed by the researcher. Although such deadline was extended for all campuses, this possible source of error in random sampling remains as a concern.

Surveys to site coordinators were sent upon approval by the academic directorship of the Virtual University, which had informed them about the study that the researcher was conducting. During the Spring 1996, because of the administrative reform of the organization and the constitution of the Virtual University, some site coordinators were asked to take different functions. For some cases surveys arrived while people were in transition and, therefore, it was difficult to report back to the researcher. It is unknown if some missing cases are represented by those individuals.

Visits to the Central campuses of Querétaro and San Luis Potosí were easier to conduct because of reduced expenses incurred by the researcher. Besides what could be corroborated by electronic mail contacts with site coordinators and other management officials, it will never be possible to know if visits to the Northern and Southern campuses would have had an effect on the statements made here.

When available, class Internet addresses were used to send copies of electronic surveys to professors. Such correspondence is normally received by course assistants, who in turn forward it to professors. Several class addresses might have helped to reinforce the immediate need to respond, but it is unknown if all class correspondence actually arrived to the hands of professors. So, for those who did not answer, it is hard to tell whether class Internet reminders or copies would have made a difference.
Management staff interviewed was not under the control of the researcher since they were selected on the basis of availability and their function at the Virtual University. While this might be a general concern of those researching education organizations, it is admitted here that more visiting time would have helped in communication with other officials as well.

3.7 **Summary**

This chapter has presented the methods used to conduct this dissertation study. Additionally, it offered a thorough description of the distance education process as conducted at the Virtual University, as well as some of its constitutional history. The chapter has also introduced issues regarding data collection, data analysis, instrumentation, selection of subjects, and operational definitions under which the study works. Chapter 4 presents the results, discussion, and conclusion of the study.
CHAPTER 4
RESULTS AND DISCUSSION

4.1 Introduction

Chapter three introduced the method used to conduct this study at the Virtual University. In addition, it discussed issues related to data collection, methodological assumptions, instrumentation, and selection of subjects. This chapter presents the results of the study based on data analysis done in two forms: Quantitatively by means of the Statistical Package for the Social Sciences and qualitatively by interpreting and structuring ideas from interviews and observation sessions conducted at the institution under study.

Information is presented here divided into several categories, primarily those stated in Chapter three as describing a systemic approach to the distance education process. Results are given based on the characteristics of interaction, class format, technology access, evaluation methods, student satisfaction, and class design, among others. Additionally, demographic attributes of each group are introduced as well. In the process of offering results, tangential outcomes suggest new avenues for further consideration and, perhaps, future research efforts.

4.2 Characteristics of students surveyed

Two hundred and eighty students were given surveys by site coordinators in the four campuses selected for the study. One hundred and ninety-seven responded. Of
those respondents, 56 per cent were males; the rest were females. Figure 3 illustrates age
distribution of the student group.

![Figure 3. Age distribution of students surveyed.]

As figure 2 shows, the majority of students surveyed (over 77 per cent) were
between the ages of 20 and 29 years. This is in correspondence with the education level
that they were seeking at the time this study was conducted. Over 94 per cent were
enrolled at the undergraduate and graduate levels, while only 8 students were at the high
school level or participating in continuing education seminars.

The largest geographical concentration was the Querétaro campus of ITESM,
where the 70 persons responded, representing 35 per cent of the sample. The San Luis
Potosí and the Chihuahua campuses had a participation of 19.2 per cent each, and the
remaining 26.6 per cent was of students from the southern Chiapas campus.

A third of students surveyed said their area of concentration was business
administration, 10 per cent were in computer science, and the rest were distributed in all
the academic disciplines offered by the Virtual University. Only five students said they
were repeating a course and only five percent said they had had previous experience as students of an open or distance education system.

Considering that several Virtual University students are faculty members of the ITESM system, it is reasonable to assume that many have teaching experience at the college level.

4.3 Characteristics of professors surveyed

Professors at the Virtual University comprise a group of professionals in several fields. All registered professors were surveyed by electronic mail according to the institution’s listings for the January - May 1996 period, totaling 72 persons. Two thirds were male and a third female. Only 28 responded even after a reminder was sent two weeks following the initial contact. This may reflect that electronic mail is not a work tool for them, that they are saturated with other commitments, or that they simply did not have an interest in responding. Over half (53.6 per cent) hold doctoral degrees and 42 per cent hold a master’s degree. Of the 28 respondents, 19 teach at the master’s level, while 25 do it at the undergraduate.

In cross tabulating demographic variables, it can be observed that only one woman holds a doctoral degree and that the majority hold master’s degrees, suggesting that men have more opportunities for pursuing terminal degrees. Sixty-eight percent of the teaching at the Virtual University is done by males and the only person in the sample who taught at the high school level was a woman. Males who teach are four times more likely to have graduated from any program in the ITESM system. This is perhaps the
result of availability of professionals in several engineering and business administration programs offered by the Virtual University. It follows that more females are associated with the area of education as compared to programs in technology management, engineering and environmental pollution control systems, industrial engineering, quality systems, management, finance, and marketing.

Sixty percent of professors have graduated from programs offered by ITESM, either at the undergraduate or graduate level. Of those who teach at the master's level, two thirds hold doctoral degrees and undergraduate teaching is done by people holding master's and doctoral degrees almost in equal numbers.

4.4 Characteristics of site coordinators

There were 26 site coordinators surveyed at the Virtual University in the spring 1996; 20 responded back through electronic mail. Most coordinators (85 per cent) are young professionals under 36 years of age. The same amount said to have never experienced distance education before arriving to their posts either as students, site coordinators, or professors. Their use of electronic mail and general knowledge of Internet tools are expected by the Virtual University's administrative coordination. Numerous contacts with several of them over the course of two years, but especially during the spring 1996, gave the researcher the opportunity to sense how much they used such technology for their work. Most answered soon after initial contact and were knowledgeable of technical issues as presented by the researcher.
Two thirds of the sample have been working in their positions for one year or more and two thirds are graduates of programs offered by the Virtual University. Half of these people are currently enrolled in one of the graduate programs of the distance education unit. This corroborates that several coordinators, although they already hold graduate degrees, continue to study because of the financial opportunity offered by ITESM’s compensation packages.

For two thirds of the site coordinators, their positions at the Virtual University were the first direct contact they had with distance education. In cross tabulating results, it was found that the more time site coordinators spend at their jobs, the more likely they are to enroll in programs offered by the Virtual University. This is perhaps the result of their mastery of administrative functions, which in turn frees up their time to engage in further study.

Site coordinators are participants of the education process lead by the Virtual University. They are technically in charge of troubleshooting equipment, as well as of making sure students have materials on time, including text books, class notes, video cassettes, and other supplies. In giving the reader a better idea of the multiple functions that these professionals have, it is important to mention that not all site coordinators have the same work conditions across the system in Mexico. Some enjoy having the help of administrative assistants and technicians, as well as full administrative support from their campus directors. Others are deemed to engage in multiple tasks while complying with their administrative work. This is perhaps the result of different budgets that campuses enjoy and of the number of students that take classes offered by the Virtual University per campus. For example, the Querétaro campus is better staffed than others because
ITESM's central zone headquarters are located there, and because there is strong support for distance education by the campus directorship.

4.5 Interaction at the Virtual University

This study assumes, from a systemic perspective, that there is not one single form of interaction in which students engage by means of several communication opportunities. In particular, interest is given to all forms of exchange, written or spoken, among students and between professors and students. From the systems outlook, the several communication possibilities are all interconnected and occur, or should occur, simultaneously or quasi simultaneously.

Three quarters of students think of interaction as being the frequent use of the Interaction Remote System (SIR) during class time. Only 42 per cent think of it in terms of their ability to talk to their professors on the phone and more than half do not consider written reports to represent a form of interaction. The exchange of electronic mail with other students in the country is seen as interaction only by 54 per cent and with professors by 60 per cent. Students do not consider that professors seeing them simultaneously during class is a form of interaction. In addition, more than two thirds do not think that receiving precise written instructions from their professors represents a way to interact.

More than half of the students think that electronic mail and the use of the SIR on-line are forms of interaction, but do not consider other opportunities within their definition. This is congruent with opinions of students who stated that communication among their peers nationally, as well as reading and writing reports, were not interaction
per se. Thus, interaction is perceived by students in a traditional form, conceived only as one which occurs between professors and students and which can happen only by means of communication mechanisms between the two groups. This is perhaps the result of their education experience that, for the most part, has been traditional. Most students had not experienced distance education before entering their program of study at the Virtual University.

Within the sample of professors, it was observed that almost 90 per cent think that use of the SIR on-line means interaction. Almost two thirds reinforced the idea that they interact when they communicate by telephone with students. Only 40 per cent think of it in terms of student reading and reports, but three quarters think that interaction means student communication among themselves nationally. A large number of professors (85 per cent) said that their exchange of electronic mail with students was interacting, which coincides with student perceptions of interaction in traditional ways. Since only one professor had taught at a distance before arriving to ITESM, it is safe to assume that interaction is conceived, experienced, and promoted, only in a traditional fashion. This could be the result of their experience in face to face education. Additionally, 44 per cent of professors disagree in that students communicate with them electronically, while they do consider such form of communication to be interaction. Thus, interaction is not systemically exercised, even though there is some indication that both groups, professors and students alike, sometimes think of different interaction forms as possible but not equally important in their definition.
4.6 Attractiveness of classes and readiness of professors

Two thirds of people disagree in that shorter sessions would make classes more attractive. The issue was observed in several three hour classes that turned out to be interesting and entertaining for students while in class observation sessions. For example, some business administration classes where business games are played throughout the country, turned out to be very attractive. Almost 80 per cent of students thought that professors did not need to walk during class to make it attractive. Two thirds stated that productions did not need to be similar to those in commercial television to be grab their attention. However, half of the student sample thought that voices and sounds should be more appealing to be engaging. Sixty per cent thought their classes would be better if they did not look so much as their traditional face to face school experiences. Two thirds thought they needed motivation from their professors and stated that more
dynamic and rhythmic sessions would help. This can be reinforced with student opinions in informal interviews, which pointed at the steadiness of Virtual University courses. For the most part, sessions are still characterized by a professor seating in a room with little visual and sound alteration of any kind. Although some make use of sophisticated techniques to introduce visual aides, this is not a generalizable rule.

In the site coordinator group it was found that 45 per cent thought courses were not perceived as entertaining and motivating and 70 per cent said courses were boring. A quarter was found to think both that they were not motivating and that they were boring at the same time.

It then becomes necessary to establish that distance education sessions are not always attractive at the Virtual University and that not all indicators of attractiveness stated in Chapter 3 are necessary to change such perception. This is to say that there is a need to produce sessions in a different way, but not necessarily requiring them to be similar to commercial productions or shorter. On the contrary, attractive sessions depend on other issues, primarily associated with a unique production style of its own, the distance education style perhaps.

4.7 Readiness of professors

Academic preparation of professors fulfills the operational definition stated for readiness in Chapter 3. Two thirds teaching at the master’s level hold doctoral degrees and there is evidence that more are in the way to obtain such degrees. Almost 80 per cent of the teaching force has either finished a terminal degree or is in the process of finishing
up while writing dissertations and teaching. Almost all professors in the sample except for one had experience as distance educators beyond one semester and 72 per cent said they had received proper orientation from the Virtual University.

Readiness of professors is also a state that is difficult to measure from a systems perspective, since it implies that they are in charge of the teaching process as a whole. This is not the case in distance education, where teaching is done by a team of professionals in different areas. However, here readiness refers to academic preparation and experience as the main indicators. It is difficult to assume that such idea of readiness is the most accurate to consider, but here it is only part of a more holistic view of the distance education process. Thus, readiness of professors is fulfilled as a characteristic of the systemic model defined in this dissertation. But with it, student evaluations of their professors cannot be excluded. Figure 5 illustrates 13 indicators that students used to evaluate their professors in the fall 1995 period by means of a Likert scale from one to seven. The lower the number the more they agreed with the statement on the Y axis of the graph. As stated in Chapter 3, values of three or less are acceptable when Likert type scales are used in this dissertation. The figure presents averages of all programs and transmission sites.

Professors are perceived as competent professionals throughout Mexico, but many times their professionalism is overshadowed by negative opinions that arise from other elements within the system, namely design and evaluation. These issues are treated more in depth in a different section of this chapter.
Figure 5. Indicators used to evaluate professors by students at the Virtual University during the fall 1995.

4.8 Clarity of instructions

The operational definition of this division suggests that students are asked to assume many aspects of their classes in distance education. For this reason, to learn at the Virtual University and under the definitions presented in this dissertation, students need a general framework of reference and the areas they are expected to study rather than precise instructions from their professors. This statement agrees with a systemic outlook since it is through open interpretation that students are able to consider all the system's elements. Precise instructions and little assumption lead to learning in a narrow fashion. Additionally, the reader should keep in mind that the notion of clarity is only one of the elements here looked at as part of a greater vision of distance education at the Virtual University.
In the student sample, 60 per cent thought it was necessary to receive precise instructions to learn. At the same time, 86 per cent disagreed that it was possible to learn by assuming much information and receiving few instructions. This was also noticed at student interviews by the researcher, where students complained that there was little attention paid to detailed directions by Virtual University professors. The student sample in the survey stated that only the justification of themes to learn would be insufficient to learn. Over two thirds of the sample said it was necessary to have personal motivation to achieve learning. In cross tabulating the indicators of clarity by sex of the student, it was found that men are a third more likely to expect precise instructions than women.

The figures presented here illustrate that learning is expected to happen in a traditional form, the way students are used to through the formal schooling process. But learning at a distance requires assuming most information and the ability to study independently. Of the site coordinators sample, 70 per cent considered that courses took into account issues related to independent learning. The same percentage of students considered that ITESM offered them adequate mechanisms to learn on their own.

Observing class sessions provided an opportunity to see that students are expecting more elements of traditional face to face instruction while taking class. Often they would complain because there were not enough details explained while the professor was on the air. This suggests that designers probably need to consider that the Virtual University’s audience is not ready to engage in activities requiring much intuition yet. This does not suggest, however, that staff are not offering appropriate resources for independent learning. Perhaps this is a reflection of the pace of transition that is the result of changes in study habits, normally acquired and developed in formal schooling.
4.9 Access to technology

Considering that adequate access to communication technology is essential for the success of distance education, it is important to look at what students perceive as good access and functionality. Then, a look at what professors see in this regard is appropriate.

In general, 68.5 per cent of the student sample said they consider to have adequate access to computer equipment needed for their classes at the Virtual University. Figure 4 illustrates student evaluation of functionality and access by type of technology. As with other Likert style scales in this study, a number 3 value or less is considered adequate, or an adequate measure of success. The Remote Interaction System (SIR) on line refers to the use of such Internet based tool while in class. SIR off line refers to its use outside of class time. Discussion lists are electronic groups based on the use/net protocol of the Internet. By weekly, the statements on the Y axis refer to frequency of use during a normal week. The figure presents averages of all programs and transmission sites.

Figure 6 illustrates that the most adequate and functional technology is the use/net protocol of the Internet through its news groups, which at the Virtual University are considered class discussion groups, nicknamed “netnews”. This is so because the institution has promoted its use due to its low cost and working network technology already in place. It follows that electronic mail is also adequate and functional and that the use of telephone and fax is considered not as accessible for interaction purposes.

Adequate technology access for professors not only means that they are able to use different computer tools at their offices or at production facilities. It is also understood that they would have it by working with a teaching team that includes
Figure 6. Student evaluation of access and functionality of different technologies used at the Virtual University.

technical experts who work on matters related to the course. Of the sample surveyed, 21 per cent said they do not have access to a team of experts to produce their courses. Perhaps this may be due to lack of knowledge by professors, to problems of access, or to the fact that not all are willing to accept input from the young professionals that normally form the group of technicians in production teams.

Almost 70 per cent of faculty said they do not design their courses with the help of by a team of designers, pedagogical experts, and technicians. Although this may seem as lack of access, the reality is that faculty are contacted by Virtual University staff with enough anticipation to ensure proper production and design. The figure can then be associated with design and teaching practices, which are discussed in a different section of this chapter. However, in cross tabulating design indicators against availability of technical personnel, it was found that those who have adequate access to technology also
have a team of technical experts available. This is to say that, perhaps, access to technology is not really an issue of the process, but rather a tendency to continue habits associated with formal teaching, from where practically all professors of the Virtual University have emerged.

Access to technology is also assessed by site coordinators. The sample reported that students have adequate access to technology (80 per cent), particularly to Internet related tools. The same group said that over 75 per cent know how to use them.

Technology access is an important part of the systemic analysis conducted at the Virtual University. It is so because it is through technical means, primarily by television and computer networks, that classes are transmitted. They are designed based on such technologies and a number of activities are planned based on their functionality. Although it is not suggested here that technology is the most important subsystem, it is clearly one that affects every consideration of other parts. This is, essentially, the interconnectedness that distance education as a systemic process offers designers, professors, students, administrators, and others.

4.10 The establishment of objectives at the Virtual University

The establishment of objectives is part of this analysis because it is a consideration related to how students are evaluated, interact, perceive classes as attractive, and ultimately, learn. In addition, it is a necessary step in design practices. In the student sample only 19.3 per cent stated that studying at the Virtual University did not have clear objectives. Almost half of the student sample agrees that studying at the
Virtual University has clear objectives and that, to learn, it is necessary to receive precise instructions. This ratifies the idea that the schemes of learning held by students are those associated with formal schooling.

4.11 Readiness of site coordinators

Academic preparation of site coordinators fulfills the operational definition stated for readiness in Chapter 3. Of the 20 people representing the sample, 15 have at least a master’s degree and one person holds a doctorate. The remaining 4 have a bachelor’s degree and are working towards earning their first graduate degree. As explained in the demographic characteristics of this sample, site coordinators are a team of young professionals, half of which are currently enrolled in one of the Virtual University’s graduate programs.

Sixty-five per cent of site coordinators have been in their posts for at least a year and only three persons had experienced distance education as students, site coordinators, or professors before taking their current jobs. A third of the sample are graduates of one of the graduate programs offered by the Virtual University. This group, although knowledgeable about students throughout the system, is not considered for designing courses for the unit and only one person thought could not offer insights for such purposes.

Readiness of site coordinators is an important subsystem that needs consideration in this systemic analysis. It is not interrelated sufficiently with other key factors of the
process. Therefore, academic and practical experiences fulfill the operational definition, although the overall organization does not include this group in the process.

4.12 Evaluation methods used at the Virtual University

Evaluation of student performance at the Virtual University is done following the traditional exam format used in formal schooling. Like regular classes at ITESM, professors at the Virtual University give assignments to students throughout Mexico and reports are expected back in paper or electronically, depending on the preference of each instructor. There are exam periods when students can take tests and, when finished, site coordinators send completed exams back to transmission headquarters. Like regular courses at the institution, there are partial and final tests at the Virtual University.

From a systemic viewpoint, evaluation of students is more than just traditional exams. It is taking into account other indicators of student work that reflect their efforts and performance. These may include attendance, electronic messages, interest, interaction, team work, written reports, and even phone calls. Because distance education students work on their own and make progress as their time and ability permit, evaluating systemically means taking into account their preferences and availability according to their schedules in different contexts. Systemic evaluation is not conducted in one way and at the same time. It is evaluation that considers alternatives, opened to the preference of students and that happens because students are able to make it happen.

Evaluation is an important part of the systems model in its overall picture. At the Virtual University, this study looks at it with what students and professors think it should
be. Evaluation at the unit is not systemic, strictly speaking, but the study sought ideas held of those affected by the evaluation activity.

In stating differences between traditional schooling and distance education, it is important to stress that evaluation cannot be done the same way in the two environments. Since distance education requires special design considerations, primarily derived from different forms of instruction, evaluation needs to be adapted to proper designs. Two thirds of the student sample stated that their exams were the same as those they have had in traditional face to face classes. However, 75 per cent said they thought the breakdown of their grades was fair. That such feeling of fairness exists does not mean student evaluation is necessarily appropriate. Figure 7 illustrates what students think should be considered as part of their grades. The figure shows percentages of the student sample surveyed.

![Figure 7. What students think their grades should measure in their courses at the Virtual University.](image-url)
The figure illustrates that the majority of people give preference to evaluation instruments traditionally used in formal schooling. The lower values were given to phone calls, electronic messages, and their interaction with teaching assistants. At the same time and as stated in section 4.9 of this chapter, it is interesting that over two thirds of students considered to have adequate technology access. Because a number of exercises and much information is transmitted electronically, students are expected to make heavy use of electronic mail and interact with assistants at the local campus. That telephone is not as used as electronic mail may explain why students think their calls should not be as important for performance evaluation.

The opinion of site coordinators and professors about student use of electronic mail may help explain why alternative evaluation forms were not popular measures in figure 6. Over half of professors (52 per cent) said students do not always know how to communicate electronically with them. Additionally, 43 per cent thought students do not establish frequent electronic communication with them.

Site coordinators reinforced the above opinions of professors at the Virtual University. Seventy per cent disagreed with the statement that students communicated frequently with their instructors by electronic mail. In addition, 80 per cent thought students do not exchange any kind of information with other students across Mexico.

These findings may reflect the need for training both students and professors to use electronic technologies adequately, so that they can be incorporated into the curriculum of instruction. Evaluation is here interconnected with another part of the
overall system to which the Virtual University apparently has paid little attention: technology training throughout the institution.

4.13 Inputs and resources at the Virtual University

As a systemic practice, distance education is concerned with multiple inputs and resources. Some of them are student needs and expectations, instructors, administrative staff, tutors, technologies, institutional organization, and philosophy and theory; all driving the overall system. Here there were specific references made to some inputs and resources that are available to professors at the Virtual University. Site coordinators and professors were asked whether the latter were aware of some of them. Figure 8 illustrates comparatively the opinion of both groups towards four sources, or inputs, that are defined here as part of the system.

Figure 8. Comparative opinions of site coordinators and professors to whether instructors know distance education principles, the philosophy of the Virtual University, and student needs, and whether they have received proper training from the organization.
The figure illustrates that a high percentage of faculty say they know student needs, as well as the principles of distance education. In contrast with the opinion of site coordinators, professors were not too confident that they had received proper training (over 25 per cent) from the Virtual University. Even though both groups hold positive opinions about the indicators asked, they are not at the same level. Asked about whether they have a team of experts to produce their classes, 21 per cent of professors said they do not. It follows, then, that it is hard to establish if these inputs and resources are taken into account in a systemic fashion.

Inputs of the system as well as its resources, here referred to as subsystems, take different shapes according to the experiences of each professor. At personal communications with administrative staff, it was found that not all professors practice what they are trained to do. The Virtual University has a dedicated division for training purposes that is in charge of making sure faculty consider all possible inputs and resources available to them in their design, evaluation, and general educational practice at a distance. The fact that most faculty still teach based on their own experience without concentrating in different sources of the system, is one of the most difficult problems that exists at the organization. In the opinion of an administrator, limited time and workloads in other classes make it impossible for professors to take a look at other areas that feed the system; namely, distance education principles, students needs, philosophy of the Virtual University, and the like.

Finally, it is fair to state that a number of issues that are important as inputs of the system are fundamental parts to understand design processes, logistical functions, and the contexts in which students learn. A separate division for each follows.
4.13.1 Design practices at the Virtual University

Systemic design assumes that instructors do not design courses completely by themselves. On the contrary, they belong to a group of experts that take into account multiple inputs and resources that the organization provides. Some other issues concerning student characteristics, results of course evaluations, experience and knowledge of professors, current events related to the subject happening in the country, new available materials, are also taken into account. This holistic approach to designing messages is studied in this dissertation at the Virtual University.

Almost 40 per cent of professors said they design the course completely by themselves. Of this figure, over 80 per cent said they knew the principles of distance education and 72 per cent said they had a team of experts available for design purposes. This may indicate that professors simply do not have time to engage in group processes to design courses.

Of the total sample of professors, 75 per cent stated they did not design their courses with the help of colleagues or co-instructors. Additionally, almost 70 per cent stated that their courses were not designed with the help of a team of designers, pedagogical experts, artists, technicians, and other team members. Only 28 per cent of professors said that they knew distance education principles and that they design their courses aided by other members of a team. Furthermore, only a quarter practiced shared design and thought they had received adequate distance education training from the Virtual University.
Since systemic design of distance education courses implies that a group of experts is involved in the process, it is therefore unlikely to have classes be the same as in traditional schooling. Over 90 per cent of professors said their classes are not copies of others they teach face to face. Figure 9 illustrates what professors said are the factors on which course design depends. Figures are percentages for comparison purposes.

Figure 9. Variables of design according to professors at the Virtual University.

In the figure, the three most popular variables of design have been separated to emphasize the ones that account for much of the process. As it is shown, important systemic elements, such as student results on exams or general course evaluations, for example, are not as considered as others. This is congruent with the finding that, not only teaching follows traditional schooling patterns at the Virtual University, but design and evaluation as well. To stress this discerning, it is pertinent to note that 56 per cent of the
sample said that materials sent to students nationally come out of personal notes that instructors prepare for themselves.

Asked about different aspects that were necessary for class success, professors said they needed assistant teachers at remote sites (75 per cent), even though only 6.2 per cent consider their experience when designing their courses. In terms of participation of site coordinators, who are responsible for the overall administration of procedures at remote locations, only 53 per cent of professors thought their opinions were necessary. Looking, however, at how much support administration is considered for designing purposes, only 10.6 per cent of professors said to be concerned with it.

Seventy percent of site coordinators, on their part, considered that are not consulted for designing courses and 95 per cent said they could offer important insights for designing teams at transmission headquarters. The majority in the same group (85 per cent) thought that the courses received in their remote locations incorporated the experience of professors too much. Sixty per cent thought they did not incorporate the experience of remote teaching assistants. The majority (80 per cent) also thought that courses were supported by their administrative work at remote locations.

As it can be observed, course design at the Virtual University does not follow a certain pattern, nor does it incorporate multiple systemic aspects in the process. As a subsystem of a larger unit of distance education, the design activity is little interrelated with other entities as currently practiced at the unit. Course design is a professional exercise that follows traditional habits normally encountered within formal face to face education. With this in mind, reevaluation of design practices may need prioritization at the Virtual University.
4.13.2 The logistics and contexts of distance education at the Virtual University

The logistics of the system as a whole represents a crucial part of the distance education process. Here there is not intention to evaluate the degree of proper functioning. Instead, the study looked at the logistical aspects that prevail at the unit and their relationship to other parts in the system, such as design, evaluation, and interaction. Only five campuses were under study and only three were visited by the researcher. To understand the different logistical aspects surrounding the system as a whole would require knowledge of all physical, administrative, and staffing conditions at all 26 campuses. This idea is reduced here, as stated, to an analysis of survey results obtained from the three samples studied.

Professors were asked to rank indicators of class success according to how much they were needed. Bars in figure 10 represent the percentages of those who said indicators were needed and needed very much.

![Figure 10. Indicators of class success as reported by professors at the Virtual University.](image)
As illustrated, professors regarded highly the work of remote site coordinators and teaching assistants, yet they also said they did not consider their opinion in designing their courses. Additionally, the opinion of site coordinators was not ranked as necessary in relation to other indicators, such as transmission quality for example.

Concerning how important knowing student context for success is, professors regarded them at a very low level. Additionally, only about 22 per cent said it was important to know remote facilities. This is directly in contradiction with a systemic approach to the distance education process, since a major component of the approach calls for an understanding of different conditions, physical and ideological, that may affect how students perceive class content, how they learn, and how they react, among others. Therefore, it is proposed here that contexts represent a subsystem which is not taken into consideration at the Virtual University.

Figure 10 shows also an emphasis on traditional indicators of class design normally met at formal settings. Here it is important to note that, even though the graph shows an accentuation on course evaluations, only one third of the sample said they consider them for designing purposes. This may indicate that, although willing to consider more issues in their teaching, there is little opportunity to do so. As stated before, workload may be a reason why professors adopt more traditional ways to perform at a distance. But this analysis also opens up the opportunity to think whether professors are likely to leave traditional teaching schemes and become team players in the system.

Logistical aspects are also assessed from the point of view of site coordinators. Only two thirds agree that materials are always received on time. All but one in the sample said the quality of transmission is always good, but two thirds in the group
disagreed in that sessions are always available to students on tape. Emphasizing the idea that courses are designed with formal schooling schemes in mind, 80 per cent in the group said the materials they receive are identical to those presented as visual aids by professors in class.

Eighty per cent of site coordinators said they agreed that students also receive support materials electronically, but only two thirds said there were enough textbooks available to students at their locations. As for direct administration of individual courses, only two thirds agreed that they were easy to administer in all of their aspects. The same number said course exams did not present any problems when they were applied.

Logistical functions were also observed at three campuses by the researcher. It is safe to establish that this an area of much concern to the image of the system as a whole, but well-taken care of. Those who experience logistical problems at remote locations generally are sites that are under staffed or locations where the lowest level of experience can be found. As for other areas that are directly related to logistics, such as design for example, it is difficult to state that they work in coordination. Therefore, a systemic pattern cannot be established in this practice.

4.14 Student satisfaction

Satisfaction levels are measured in this study by looking at whether students think their efforts are fairly evaluated. As indicated in section 4.12 of this chapter, 75 per cent thought the breakdown of their grades was fair. Concerning overall satisfaction, system-wide evaluations were used to study the idea of satisfaction. This was measured
with global opinion of their experience and of self evaluation. Results of institutional evaluation are used to illustrate such indicators in figure 11. The issues under discussion are considered satisfactory if responses to items are three or less.

![Diagram](image)

**Figure 11.** Global opinion and self evaluation indicators of students at the Virtual University.

As the figure illustrates, all but one indicator of satisfaction fall below the accepted standard of acceptance. It is important to notice that the lowest refers to student willingness to take another distance education course, which may reflect a high level of satisfaction. At the same time, student learning is evaluated as unsatisfactory in comparison to the one acquired at traditional courses. This may indicate two things: first, that courses are perceived easier than formal or traditional classes and, therefore, attractive for future study; and second, that students are unaware of the fact there is no evidence to suggest that they learn less than those at regular face to face classes. The latter may be emphasized by some faculty and administrators at the different campuses,
who have not credited fully the efforts and achievements of the Virtual University during its first eight years of existence.

4.15 Quality as an indicator of success at the Virtual University

This study is concerned with determining if a systemic approach to distance education has been the driving force of successful practices at the Virtual University. To accomplish this goal, the study has looked at the components of the system described as a case study. There has been no indication that they are interrelated at the distance education unit, nor that they hold different hierarchical relationships, based on the opinions of students, professors, site coordinators, and on interviews and observation sessions conducted by the researcher.

What follows is now the presentation of findings regarding successful areas of the system. To arrive to a determination of the areas that have represent accomplishments, the study looks at some indicators of quality. Two sources of information are used to judge quality. First, impressions of students and their learning as expressed to the researcher while conducting informal interviews. The driving questions of these interviews appear in Appendix B. Second, system-wide evaluations conducted by the Virtual University in a survey format. As indicated before, the first of such evaluation efforts was only done in the spring 1995 semester. The results of the fall 1995 period are used here.

Indicators of efficiency in education, such as completion rates and desertion, for example, were not available to the researcher as of August 1996. Contact persons
consulted at Monterrey transmission headquarters expressed that quantitative indicators were being collected as part of a newly created division of the Virtual University.

System-wide evaluations present summarized results of end-of-term surveys distributed to the 26 campuses of the system. A translated version is included in Appendix C. They are arranged in eleven categories, stemming from two geographical divisions of transmission locations at the Monterrey City and the State of Mexico campuses. The State of Mexico campus participates in transmission of classes at the undergraduate and high school levels. At the master’s level, its participation is in the business administration and the computer science programs.

In general terms, the Monterrey transmission site was better evaluated by students, particularly at the high school level. Since the Monterrey City campus was the first campus in the ITESM system, it has traditionally had the best equipped technological infrastructure and reputation. Such campus alone accounts for 24 per cent of total enrollment of the system nationally. Although the rest of the campuses have gained an important participation in student distribution, they have not paralleled the resources allocated to the Monterrey City campus. This may explain why, perhaps, resources allow for better quality of programs than those of the State of Mexico campus.

Of the graduate programs, the one with values closer to number 1 in the Likert type scale used is education, transmitted out of Monterrey City. The one with highest values corresponds to the business administration program out of the State of Mexico campus. In figure 12, average system-wide evaluations are illustrated by level of education: high school, college, and master’s.
Overall evaluations fall under number 3 in a one to seven scale. This was the limit set in this dissertation as an acceptable quantitative indication of success and quality. As illustrated, the highest numbers in the seven areas considered here, are those corresponding to the high school level and the lowest to the graduate. This suggests that the older students are, the more tolerant they are to the format used in the Virtual University. In fact, this is a trend that is observed in much of the literature dealing with instructional design for distance education.

Informally, the researcher interviewed students in the Querétaro, San Luis Potosí, and Monterrey campuses. Except for one student at the Querétaro campus, all expressed that they were satisfied with their professors. In particular, reference was made to the academic preparation and work experiences they have as being adequate. One student

Figure 12. Average system-wide evaluations by level of education at the Virtual University.
said "I like that I can have some of the best professors in the country teach the classes I need". For the most part, the Virtual University tries to follow this parameter, integrating specialists anywhere they are in Mexico by means of their satellite channels. This is to say that, for instance, if one the best physicists is in Mexico City, he or she would be invited to the State of Mexico or the Monterrey transmission headquarters to be part of a class. In cases where entire classes are taught by a person who does not live in the cities that transmit their specific programs, they are flown weekly to transmission studios as needed. This was the case of a mathematics professor in the master’s of education program during the spring 1996 semester for example.

Teaching assistants were perceived at informal interviews as young professionals who are just beginning their careers. This, however, was not derogative or diminished their roles in any way. It is widely accepted that teaching assistants "are concerned and are the ears of professors", as a student in the San Luis Potosí campus put it. They are the front liners in classes and receive most correspondence. They also are the first contact by students in the nation and in countries where classes are received. Teaching assistants monitor class Internet addresses and pass on important information to professors in courses. While on the air, they monitor and filter questions and comments arriving by way of the Remote Interaction System (SIR) before professors see them in their computer monitors. Although in early days of graduate distance education at ITESM, teaching assistants were not always specialists in the subjects they assisted for, this is changing as the Virtual University hires and organizes its human resources according to academic needs.
At the San Luis Potosí campus, a student expressed that one of the difficulties she saw in a certain class, was that her local professor (referred to as remote teaching assistant in figure 10) turned the television set off when he disagreed with the opinions being expressed by the one at transmission headquarters. Even though this represented "a problem for the system", she conveyed that she did not dislike or thought less of the discussions her local teaching assistant had after shutting the set off. She said "I only wish I could have both viewpoints", referring to the two instructors she had to follow during her semester of study.

Didactic materials were criticized by students hardly. In the Querétaro campus, a student expressed that the local library not always had the textbooks available. The site coordinator for that campus, however, indicated to the researcher that textbooks are always offered first to students to buy, and then, a library copy is processed. Regarding printed guides, students were generally pleased. One concern arose across the students interviews related to the content of materials. They thought there was no justification to have the same slides that they saw on television reduced in black and white in their class folders.

Perhaps the most criticized issue regarding quality of visual aids used in classes, was that many were not so clear. This is because they are normally designed and tested using state of the art equipment. Not all campuses have the same technical infrastructure and, therefore, the original design quality is lost. The researcher audited several class sessions and about a third showed visual aids of poor quality, primarily because they were not legible. This trend to design and produce materials with high end equipment, as well as to expect prompt communication from all sites, is very much in the minds of
producers and of those at the Monterrey transmission headquarters. Several students said that, often times, the technologies they need are just not there or "they are too slow to spend much time waiting for responses". An example of this was a compact disc produced for a class on the Macintosh format. While the Macintosh platform is widely available at the Monterrey campus, as an administrator put it, "the rest of the system in Mexico is IBM compatible". At the Querétaro campus, the researcher observed the delivery of such material when there was no proper machine available to use it. This type of apparent coordination problems were noticeable, but nevertheless, were not enough to decrease student appreciation and satisfaction with the administrative work. A student at the San Luis Potosí campus said "I can tolerate these issues because even though they happen I know the institution is giving me the best education it can".

The general student impression about technology access was favorable. This was corroborated by the researcher with visits to public computer laboratories in three campuses. Sophisticated equipment is generally accessible at a variety of hours and Internet connections are open to students anytime. One complaint found was, as a student said in the Querétaro campus, that "we still cannot connect from home". Although the Querétaro campus does not have outside dial-up access, other campuses do and the institution is working towards offering remote access in the future.

Finally, students expressed satisfaction for the general physical condition of classrooms across those interviewed. Reception rooms are all adequately equipped with large television monitors, computer access, and large working tables. Acoustics and illumination were regarded as acceptable and "good privacy" was mentioned as an excellent condition at the Querétaro campus.
Although some logistical details fail to run smoothly on a consistent basis, it is fair to state that the quality of class delivery is acceptable and that students are satisfied with their experiences. There exist concern towards how much students learn by themselves, primarily because they compare their traditional schooling methods routinely. This is not regarded as low quality here, since this does not mean that they do not learn nor that they dislike their classes. What is questionable is: 1) whether the Virtual University produces classes different enough from those traditionally taught face to face, so that students have less opportunity to compare them; 2) whether students learn the same even though they think they do not; and 3) whether more training in the modality is needed so that students feel more pleased and satisfied with their overall learning.

4.16 Summary

This chapter has presented the results of the study based on the findings obtained through the following research instruments: surveys distributed to three samples, informal interviews, observation sessions, and literature made available to the researcher by administrators at the Virtual University.

The study looked at the components of distance education with the systems approach in mind. It was stated that the organizational whole of the Virtual University comprised several subsystems, including interaction, attractiveness of classes, objectives, evaluation, readiness of professors and site coordinators, reception, contexts of students, logistics, student satisfaction, and design. These were investigated to determine if they
operated systemically or not. They were then paralleled to the larger systemic whole of the distance education unit to exercise the same analysis. Based on the findings, it is here suggested that the different subsystems at the Virtual University do not follow a systemic pattern. Some operate independently, observed in class design practices for instance, paying little or no attention to their interrelationships with other parts of the whole. Therefore, it is concluded that there is no evidence of systemic practices in the distance education process under analysis.

The study was also concerned with successful areas of the Virtual University and with the quality of its products as a whole. System-wide student evaluations, as well as direct opinions from informal interviews, served to look at this question. Overall, it was determined that, although the system presented some logistical problems, there was evidence to suggest that the practice of distance education was successful at the institution according to the parameters set forth in the operational definitions of this work. Unsuccessful aspects were related to issues of design, which ultimately had a negative impact on student evaluations towards the academic administration of the program as a whole. The most successful area, here referred to as subsystem, of the unit was found to be the teaching force. Professors, co-instructors, and teaching assistants at remote and transmission sites, were evaluated positively according to this dissertation’s parameters.

The first part of this chapter presented demographic characteristics of three sample groups used: students, professors, and site coordinators. Then, a discussion of each systemic element was conducted while presenting what each sampled group thought to be its main properties. The interrelationship of each subsystem to the system at large
was presented in each division. Finally, a discussion about quality indicators of success was presented according to system-wide student formal evaluations and interviews done by the researcher.

Chapter 5 presents the conclusion of this study, offers recommendations for the institution and presents possible research avenues for the future.
CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Chapter 4 presented the findings of the study based on the information collected by use of the research instruments. Some discussion to those findings was introduced in an effort to address the statements of the driving hypothesis of this study: that the use of the systems approach in distance education leads to quality distance education programs.

This chapter looks at the findings expressed in chapter 4 and follows up on discussion in order to conclude the study. Additionally, it offers recommendations for the institution and suggests possible research paths for future exploration of distance education elements in similar contexts of the developing world.

5.2 Examining the systems approach

Proponents of the systems approach suggest that its use in distance education leads to good distance education. This suggestion, along several other viewpoints developed by theorists in industrialized countries, forms part of one of the groups of theoretical statements that are commonly adopted and discussed in developing nations. This transportation of ideas, with a few exceptions, is usual in many fields but especially in distance education, whose theory has been written in industrialized countries for the most part.

Given that the systems approach is the latest theoretical proposition as a basis of analysis and practice for distance education, this dissertation was devoted to look at such
theoretical outlook in a Mexican institution. With this, the study not only contributes to seeing the model against a case study, but to making a statement about the adoption of ideas by developing countries.

Consistently, developing countries and their education systems are analyzed, deconstructed, and understood with foreign structural ideas in mind. This practice is particularly true in the economics of development. Recommendations and important decisions about developing countries and about their systems of education are made based on principles that evolve in societies other than those adopting such recommendations. While many aspects of education are adaptable all over the world, given the similarities of different education systems internationally, distance education models receive little attention. The systems outlook, for instance, implies a number of characteristics that are questionable in the contexts of developing nations.

In an effort to understand the systemic model, this study examined specific areas of a distance education unit in Mexico. It was also an effort to look at the model in a Latin American university. The study placed an important theoretical proposal in the context of a developing country. After careful analysis, this dissertation suggests that the systems approach may not be necessary to produce good distance education.

5.3 The approach at the Virtual University

It is fair to suggest that there is no specific approach followed at the Virtual University in the delivery of distance education programs. As stated in chapter 4, it is not
unusual to see a mix of practices that have little coordination with one another in the system. I present a few here.

Interaction at the Virtual University is conceptualized in a narrow fashion both by its administrators and by its students. This is perhaps the result of the traditional schooling experience that most of them have gone through. This could be observed in the institution’s system-wide evaluations where interaction is meant to be understood as "technologies of interaction" rather than "interaction" per se. Neither professors nor students think of interacting substantially by means of written information other than electronic mail messages. The use of the Remote Interactive System (SIR) seems to be equivalent to interacting. It was found that national exchange of information among students, reading, and writing reports were neither techniques nor forms of interaction at the Virtual University. Additionally, it was also found that professors tended to value electronic techniques more than students, but neither them or their students conceived interaction as an exchange made possible by the extensive use of the technologies for interaction.

Interaction, therefore, is not exercised systemically at the Virtual University. It takes a prescribed form, preferred by the institution and by professors, which can be associated with formal schooling practices. This is to say that, at the Virtual University, interaction in distance education "looks like" face to face interaction and its players would want it to be that way. In many respects, this is a trend in distance education in general. Video conferencing, video links, and two way satellite video systems are technologies that help reproduce interaction patterns of formal education at a distance. Therefore, alternative or systemic habits of interaction are not fostered.
Judging whether classes at the Virtual University were attractive or not, it was found that students would prefer different aesthetic elements, like better voices and rhythm. Nevertheless, it was clear that a change in production needs not be like commercial style television. The steadiness of classes is clearly a reflection of design problems. This is to say that two subsystems of the whole unit are directly related: design and attractiveness of class productions. If designers ignore contextual elements, such as student characteristics or availability of technology nationally, course presentations would be less attractive to the audience. Such practice, which according to the findings is common at the Virtual University, is not systemic. Interconnectedness between design and other system elements is not evident. It follows that design is decided on a few parameters, normally associated with decisions of professors. Almost 40 per cent of them said they design their courses completely by themselves.

Systemic design is a practice that assumes consideration of system elements. A one person design cannot possibly be as open and inclusive as a team design. Although more than 70 per cent of professors said they have access to a team of design experts, it was found that a good number continue to design in traditional ways. This praxis has a systemic effect on other parts of the unit. While how attractive a class may be is one of them, there are other which require attention.

Student evaluation at the Virtual University is directly linked to design style. The systems approach proposes that if a change in design is to be adopted, a necessary change in student evaluation would be needed. At present, traditionally designed courses lead to traditionally evaluated students. In fact, the most important indicators of performance that students thought should be measured were written papers, partial, and final exams.
Phone calls, electronic mail messages, their class interest, and attendance were not cited as indicators of their performance by themselves. This is because their courses are primarily designed to emphasize exams and written reports. If, for example, interaction were to be evaluated, students would understand the importance of their interactivity through all means, making technologies of interaction irrelevant. Interaction as an avenue to learn could be re-conceived.

The re-conception of interaction would make its medium a true vehicle, the way computers are in standardized testing or papers (and their format) in evaluating student ideas. At the Virtual University, programs follow face to face schooling patterns. They are the result of traditional design and traditional teaching. Education has been transported into the distance format without changing many of its elements and without considering many of the elements it affects. This lack of systems thinking is common among distance education programs. The literature suggests that attractive classes are the result of different educational designs. Findings of this study reinforce this statement.

The approach followed at the Virtual University is not systemic, nor can it be determined or framed under one of the theoretical postulates presented in this dissertation. Perhaps, as in other distance education units and organizations, the Virtual University is undergoing its first stages of development and an approach to distance education will be the result of more experiential years. As of now, it is fair to suggest that it follows traditional face to face parameters. The unit has introduced education into the realm of distance education technologies, but it has neither adapted or changed practices that can attest to a particular form to operate in the modality in Mexico.
5.4 Good distance education

Defining successful areas of the Virtual University was done based on measurable quality indicators that were obtained from the Institution’s system-wide evaluations and from student interviews conducted by the researcher. Because quantitative indicators of education efficiency were unavailable, I opted to define the notion of success based on several aspects that the Virtual University already had measured, including satisfaction with professors, teaching assistants, remote professors, site coordinator administration, technologies of interaction, and room physical conditions. I called these quality indicators in the study. In addition, I used student opinions that related to such indicators.

All quality indicators were evaluated as successful considering that, in the Likert type scale, the number selected here to imply a positive result was 3. Values of three or less represented adequate indications of quality. With this in mind, it is important to establish that I only used average values for each category and by level of education sought. It was observed that on all indicators illustrated in chapter 4, high school students tended to offer the more unfavorable evaluations. Additionally, of all indicators it was found that technologies of interaction were the best evaluated. Overall, quantitatively speaking, distance education quality indicators suggest that the institution is successful at delivering its programs.

Rather than focusing only on quantitative results summarized for the fall 1995 semester, I included statements made by students in different interviews. This qualitative approach helped in examining the results obtained in institutional evaluation surveys. This was done not with the purpose of scrutinizing such results, but with the purpose of
establishing whether indicators worked as measures of good practice in distance education.

Students expressed acceptance of professors, co-instructors, and teaching assistants regarding them as highly prepared individuals and, in most cases, as the best specialists in the country. Materials used as didactic resources were not perceived to be of the best quality. Although materials as such were not defined as an indicator of quality in the operational definitions section of this study, they are mentioned here because they were one of the few issues of concern that students expressed in several interviews.

Administrative issues were frequently cited as being problematic by students in informal interviews. This concurs with quantitative evaluations of the administrative coordination. This obtained the less favorable opinions by high school and undergraduate level students. The quality of visual aides was another example of not so favorable opinions for some classes. As indicated before, this is perhaps the result of not knowing the conditions under which classes are seen nationally by the design team.

While administrative coordination and visual aides were identified as problem areas, it was found that positive student opinions of the overall distance education experience at ITESM overshadowed them. This was the case for other concerns as well.

Qualitative evaluations of students were more favorable as the level of education sought was higher. This coincides with quantitative results illustrating that the lower the education level, the more unfavorable opinions students have. Graduate student qualitative opinions typically expressed concerns with not having materials on time. Other quality indicators were favorable.
It is, therefore, fair to assume that although some negative opinions arouse in questioning students about indicators, the general practice of distance education at the unit is favorable. I propose that, although quality is a difficult concept to measure anywhere, distance education at the Virtual University is successful based on the parameters established in this dissertation. Nevertheless, there exist areas for improvement that were identified in conducting this study.

5.5 The systems outlook and the Virtual University of ITESM

This dissertation sought evidence of systems approach use in successful practices at the Virtual University. Likewise, it also concentrated on finding whether there was evidence of not following the said approach in unsuccessful areas. With these tasks, I proposed the following statement as the main hypothesis of the study: that the use of the systems outlook results in good distance education.

As evidenced here, the Virtual University does not follow systemic patterns of action in the design, production, and delivery of its programs. Additionally, satisfactory attitudes towards the experience at large were commonly found. It follows that the main hypothesis is not supported based on the measurable parameters established in this dissertation.

Evident success areas of the Virtual University can be associated with its teaching staff and with its technological infrastructure. However, their positive evaluations are not necessarily the result of systemic considerations in distance education. In fact, it was observed that the teaching force differed substantially in their opinion about their own
training, their student technology access, their design practices, and their general understanding of distance education principles. Furthermore, it was concluded that the general pattern at the Virtual University obeyed the formal education paradigm, perhaps as a result of people’s experience with face to face education. Therefore, there is no evidence of the use of the systems approach in successful areas at the Virtual University.

Following the secondary statements made to examine the main hypothesis, it was observed that problem areas were related to administrative coordination and design. Although positive student opinions eclipsed them, I suggest that consideration of student learning conditions and attention to differences in technological infrastructure would improve problem areas substantially. These suggestions were defined here as subsystems of the overall system of distance education. Even though I state here that in unsuccessful areas there is not evidence of systemic thinking, I can not establish that the systems outlook would be necessary to improve some problem areas. Systems thinking looks at all levels of interconnection and hierarchy in the whole, which are not easily identifiable at the Virtual University’s success areas. It is, therefore, impossible to establish that the use of the approach leads to quality distance education based on this dissertation’s operational definitions.

The fact that this study’s hypothesis is not supported does not mean that the systems approach is not necessary. It only establishes that, in a distance education unit of a Mexican higher education institution, there is no evidence that the use of systemic thinking leads to good distance education. As stated before, this study places the systems approach postulates in the context of a Latin American university only. The Virtual University is, then, only a case for study.
5.6 Research avenues for distance education at the Virtual University

Student satisfaction was found in this dissertation to be a common area for many at the Virtual University. Given that systemic thinking could not be established as the cause of good distance education, it is important to question if positive perception is culturally determined at the Virtual University. In particular, it would be appropriate to know if:

- the Mexican student of the Virtual University perceives the distance education process different than his counterparts in other parts of the world.
- technology use patterns are different and why.
- different populations and needs determine specific patterns of design, production, and delivery of distance education programs.
- different contexts within the same country are similar and if they need consideration separately to better design distance education.

In an effort to understand culturally determined principles of distance education, I suggest that models are submitted to continuous tests. In this way, it will be easier to propose locally developed models to distance education. Theoretical work in the modality can be done with the experience that Mexico and other countries already have. Persisting to import ideas that are not locally developed should be carefully analyzed. This is not because it is imperative to scrutinize them, but because basic conceptual arguments which support the practice of distance education can and should be developed from within. This approach is needed in distance education and will prove to be appropriate for future theoretical work.
5.7 Recommendations for the Virtual University

Problem areas found in this study suggest that improvements in design could benefit the perception that students have about their distance education experience. The involvement of professors in designing classes at the Virtual University should be somewhat limited. They should be considered experts but not teachers of expertise. Designing should consider that students at a distance are capable of discerning class content if classes are attractive and their materials demand them to think critically. Didactic materials should not be a copy of those visual aides shown on television. While this is slowly changing at the unit, it needs close attention to keep students in the process.

Designing should include the opinion of site coordinators. These are the front liners of the Virtual University and listen, better than anybody, student reactions nationally. Site coordinators as part of the design team could benefit programs rapidly due to the nature of student contact they have. The fact that most professors do not think of student contexts when designing might be a reflection of not knowing such contexts. And while it is probably unrealistic to expect professors to know all contexts nationally, site coordinators do.

For the Virtual University, as for many other institutions that work with distance education, it is imperative to promote the attitude of facilitating among its teaching force. In distance education, characterized by the division of labor, one person cannot and should not do the teaching alone. This shift in importance from the “expert” to the “team of experts” is challenging in a country that idolizes academic achievement very much.
Terminal degree holders should be molded to think in different ways about teaching when at the Virtual University. Proper training may help endure this new attitude.

Technology training should continue to be a priority for the institution as a whole. The fact that many professors and site coordinators said they thought students do not communicate enough electronically says that there is much to do in this regard. That students think they use electronic means is not equivalent to their using them. The institution should take advantage of the perception that students have towards technology and increase training.

Finally, it is appropriate to suggest that research at the institution be devoted in part to finding a distinctive form of operation, an approach. This is important because lacking its own course of action supported by research could lead to importing models that are inappropriate and vague. Research efforts should be oriented to determining if large investments in technology should be accompanied by other efforts. This in turn would evolve in a peculiar form to operate. The benefits of self theoretical determination could unfold effortlessly thereafter.
APPENDIX A

TRANSLATED COPY OF STUDENT SURVEY
USED AT THE VIRTUAL UNIVERSITY

This small survey is part of an independent study I am conducting at the Interactive Satellite Education System (SEIS)/Virtual University. Data obtained will be used as supporting material in my doctoral dissertation at the University of Massachusetts at Amherst. The information offered by you will be strictly confidential during the length of my research. Please, DO NOT WRITE YOUR NAME IN THIS SHEET. If you would like further information about this study, you may write to me directly (lgalarza@comm.umass.edu) and I will answer your questions in the best possible way. Your participation is voluntary. Thanks for your cooperation.

Luis Galarza P., Center for International Education, University of Massachusetts at Amherst

PART I. Student characteristics.

1. Sex: female ☐ male ☐

2. Age: 15 - 19 ☐ 20 - 24 ☐ 25 - 29 ☐ 30 - 34 ☐ 35 or more ☐

3. Which of the following options describes best your student status?
   ☐ High School ☐ College level ☐ Masters
   ☐ Continuing Education ☐ Other _______________________________

4. What is your area of study? _______________________________________

5. Are you repeating a course that you failed at SEIS? Yes ☐ No ☐

6. Had you ever studied at an open or distance education system before enrolling in SEIS? Sí ☐ No ☐

PART II. This section is related to your ideas about interaction as a student at SEIS.

1. What is the meaning of interaction within SEIS for you?
   (Mark all options that you consider appropriate)
   a. Frequent use of the Remote Interaction System (SIR) ☐
   b. To be able to talk with professors by phone and be listened to on the air ☐
   c. To read my assignments and report results in a written fashion ☐
   d. To exchange electronic mail with other students around the country ☐
   e. To receive detailed instructions from my professors ☐
   f. To exchange electronic mail with my professors ☐
   g. That my professors be able to see me simultaneously as I do see them on TV ☐
   h. Other __________________________________________

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PART III. This section is related to your perception of quality programming at SEIS.

1. In order to capt your attention better, which of the following options do you think would make our classes more attractive at SEIS *(Mark all options that you consider appropriate)*
   
   a. Shorter sessions □
   b. Having professors walk during class time □
   c. Having productions similar to those found in commercial television □
   d. More attractive sound and voices □
   e. Sessions different from face to face traditional classes □
   f. Motivation by my professors □
   g. Sessions with more rhythm, more dynamic □
   h. Other ____________________________________________

2. Do you feel that professors focus more their attention to students at transmission headquarters?  
   Yes □ No □

3. Do you consider that professors at SEIS function more as facilitators than instructors of knowledge, the latter as in traditional face to face classes?  
   Yes □ No □

PART IV. This section is related to your learning style and its mechanisms.

1. To be able to learn at SEIS, it is necessary:  
   *(Mark all options that you consider appropriate)*

   a. To receive precise instructions from professors □
   b. To receive some instructions and to assume some aspects of the course □
   c. To assume many aspects of the course and to receive few instructions □
   d. To receive only the justification of themes to be learned and the general framework of reference □
   e. To have a lot of personal independent motivation □
   f. Other ____________________________________________

2. Do you consider that you have adequate access to computing facilities necessary for your classes at SEIS?  
   Yes □ No □

3. Do you consider that SEIS offers you the mechanisms needed to learn on your own adequatelly  
   Yes □ No □

4. Do yo consider that studying at SEIS has clear objectives?  
   Yes □ No □
PART V. This section is related to your considerations about evaluation of your performance.

1. Which of the following do you think should be considered as part of your grade? (Mark all options that you consider appropriate)

   a. Final and partial (mid term) exams
   b. Written reports
   c. Phone calls that I make to talk to my professor
   d. Attendance
   e. Electronic mail messages
   f. My interest in class
   g. My interaction with teaching assistants/site moderators
   h. Discussions and group activities/work that are taken in my reception campus
   i. Other

2. Do you consider that the weigh given to your work efforts is fair at SEIS?
   
   Yes ☐   No ☐

3. Do you consider that your exams are equal to those administered in your face to face traditional classes?
   
   Yes ☐   No ☐

Thanks for your collaboration
APPENDIX B

TRANSLATED COPY OF SITE COORDINATORS SURVEY
USED AT THE VIRTUAL UNIVERSITY

This small survey is part of an independent study that I am conducting at the Virtual University of the ITESM System (formerly SEIS). During the last 12 months I have studied the distance education program at ITESM and the data obtained here will be used as supporting material in my doctoral dissertation at the University of Massachusetts • Amherst. Your name will not be used nor will it be identified at any moment. The information collected will be strictly confidential and your participation is voluntary. By answering this survey you agree that the information you provide will be usable for my dissertation. You may request to see the material discussed before the actual defense date. If you would like further information about this study, you may contact me directly (lgalarza@comm.umass.edu) and I will try to answer your questions to the best of my abilities. Thanks for collaborating
Luis Galarza P., Center for International Education, University of Massachusetts at Amherst.

PART I. Characteristics of site coordinators.

1. Age:  20 - 25 □   26 - 30 □   31 - 35 □  36 -40 □  40 or more □

2. Maximum level of studies:  bachelors □  masters □  doctoral □  post-doctoral □

3. What is your area of specialty/studies/preparation? ________________________________

4. Which of the following best describes your experience with distance education?
   (Mark all that apply)
   a. I have been a site coordinator for the Virtual University in my campus for more than a year □
   b. I have been a site coordinator for the Virtual University in my campus for a year or less □
   c. I graduated from one of the graduate programs at the Virtual University □
   d. My first experience with distance education was coordinating the Virtual University (formerly SEIS) in my campus □
   e. I currently study in one of the Virtual University's graduate programs □
   f. I had experience as a student or coordinator in another distance education system before coming to ITESM □
PART II. This section is related to the inputs and sources that are found at the Virtual University of ITESM.

1. Answer the following questions according to your opinion:

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<th>a. Professors are aware of student needs</th>
<th>Totally Agree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Totally Disagree</th>
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<td>b. Professors know the organizational philosophy of the VU/SEIS</td>
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<td>c. Professors are aware of distance education principles</td>
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<td>d. Professors obtain adequate training to teach at a distance</td>
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<td>e. I believe professors are aware of our campus context</td>
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<td>f. Specialists in the different subjects of VU are located in the Monterrey and State of Mexico Campuses</td>
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<td>g. Students have adequate access to electronic mail</td>
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<td>---</td>
</tr>
<tr>
<td>h. Students know how to use electronic mail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
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<td>---</td>
</tr>
<tr>
<td>i. Students are people with other full time jobs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
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<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>j. Students feel assisted and happy with their professors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PART III. This section is related to interaction at the Virtual University.

1. In general, students of the Virtual University at my campus:

<table>
<thead>
<tr>
<th>a. interact frequently with their professors via e-mail</th>
<th>Totally Agree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Totally Disagree</th>
<th>4</th>
</tr>
</thead>
</table>

160
b. get advice from teaching assistants at local classrooms  □ □ □ □ □

c. exchange information with other students around the country  □ □ □ □ □

d. request my help and my assistant's if they need it  □ □ □ □ □

e. if necessary use the phone to communicate with their professors  □ □ □ □ □

f. report homework and conclusions in writing to their professors  □ □ □ □ □

g. receive precise information from their professors  □ □ □ □ □

h. exchange e-mail with their professors  □ □ □ □ □

i. would like to be seen simultaneously by their professors as they see them  □ □ □ □ □

PART IV.  This section is related to course design at the Virtual University/SEIS.

1. In general, Virtual University courses that are received in my campus:

<table>
<thead>
<tr>
<th>Totally Agree</th>
<th>Totally Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>
   a. are perceived as entertaining and motivating  □ □ □ □ □
   b. are perceived as boring with lack of motivation  □ □ □ □ □
   c. are easy to administer in all of their aspects  □ □ □ □ □
   d. give us problems when applying exams  □ □ □ □ □
   e. consider student's independent study abilities  □ □ □ □ □
f. incorporate professor's experience very much

   □ □ □ □

g. incorporate my campus teaching assistant's experience

   □ □ □ □

h. rest on our administrative support capacity

   □ □ □ □

i. are very demanding administratively speaking

   □ □ □ □

j. incorporate evaluation results in order to improve

   □ □ □ □

k. are very similar to face to face traditional classes

   □ □ □ □

l. seem to be designed by a team of experts

   □ □ □ □

PART V. This section is related to the way Virtual University courses are received at your campus.

1. In your opinion:

<p>| | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   a. course materials are always received on time

      □ □ □ □

   b. transmission is always of good quality and on time

      □ □ □ □

   c. students may be absent from class as they always have the alternative of watching their sessions taped

      □ □ □ □

   d. printed materials are indetical to visual aides that professors use in class

      □ □ □ □

   e. students receive support materials electronically

      □ □ □ □

   f. we have enough text books for all students

      □ □ □ □

   g. site coordinators could offer much helpful information for Virtual University course designers

      □ □ □ □
APPENDIX C

TRANSLATED COPY OF PROFESSORS SURVEY
USED AT THE VIRTUAL UNIVERSITY

This small survey is part of an independent study that I am conducting at the Virtual University of the ITESM System (formerly SEIS). During the last 12 months I have studied the distance education program at ITESM and the data obtained here will be used as supporting material in my doctoral dissertation at the University of Massachusetts • Amherst. Your name will not be used nor will it be identified at any moment. The information collected will be strictly confidential and your participation is voluntary. By answering this survey you agree that the information you provide will be usable for my dissertation. You may request to see the material discussed before the actual defense date. If you would like further information about this study, you may contact me directly (lgalarza@comm.umass.edu) and I will try to answer your questions to the best of my abilities. Thanks for collaborating.

Luis Galarza P., Center for International Education, University of Massachusetts at Amherst.

PART I. Characteristics of professors surveyed.

1. Sex: female □ male □

2. Maximum level of studies:
   bachelors □ masters □ doctoral □ post-doctoral □

3. In which of the following levels do you teach at the Virtual University?
   □ High School □ College □ Masters
   □ Continuing education □ Other ________________________________

4. What is your area of specialty? ________________________________

5. Which of the following describes best your experience in distance education?
   a. I have been a distant teacher for more than a year at ITESM □
   b. I have been teaching at a distance for one year at ITESM □
   c. This is the first time I teach at a distance □
   d. I had taught at a distance before coming to ITESM □
   e. I personally studied in a distance education program □

PART II. This section is related to the input and sources that are found at the Virtual University of ITESM.

1. I am aware of the needs of my students
   [Totally Agree ___ ___ ___ ___ Totally Disagree]

2. I am aware of the organizational philosophy of the Virtual University
   [Totally Agree ___ ___ ___ ___ Totally Disagree]
3. I am aware of theoretical principles in distance education
   [Totally Agree ___ ___ ___ Totally Disagree]

4. I have received training in order to be able to teach at a distance
   [Totally Agree ___ ___ ___ Totally Disagree]

PART III. This section is related to program design.

1. Which of the following options describes best your role in designing the course(s) that you teach at a distance?
   a. I design the course completely, including materials, homework, etc. □
   b. I design the course with the help of a colleague instructor □
   c. I design the course with the help of designers, educators, technicians, etc. □
   d. The course had been already designed before I took it □
   e. The course is a copy of another one I teach face to face, I just add visuals □
   f. I only teach the material, the course design is done by others □
   g. Other ________________________________

2. There is a team of experts available to me to produce my classes.
   [Totally Agree ___ ___ ___ Totally Disagree]

3. My course design depends on: (Mark all that apply)
   a. new materials available in the course subject (texts, theories, etc.) □
   b. student characteristics □
   c. what can be taught on television □
   d. my experience □
   e. the experience of teaching assistants at remote classrooms □
   f. the administrative support mechanisms that I get from UV □
   g. results of exams □
   h. course evaluation □
   i. I do not design the course □
   j. Others ________________________________

PART IV. This section is related to the way your course is delivered and received in different parts of the country.

1. For my course, the ideal medium is satellite television
   [Totally Agree ___ ___ ___ Totally Disagree]

2. It is absolutely necessary that my students have access and communicate via e-mail in my course
   [Totally Agree ___ ___ ___ Totally Disagree]

3. Generally, printed materials that are sent out to students are taken out of the guides that I have for me
   [Totally Agree ___ ___ ___ Totally Disagree]
4. My students know how to communicate with me electronically  
   [Totally Agree ___ ___ ___ Totally Disagree]  

PART V. This section is related to your ideas about interaction at UV.

1. For you, what is the meaning of interaction within an educational program at the Virtual University? (Mark all that apply)

   a. Frequent use of the Remote Interaction System (SIR)  
   b. To be able to talk to my students by phone and be listened to on the air  
   c. That my students read assignments and report their conclusions in writing  
   d. That students exchange electronic mail among themselves across the country  
   e. That my students receive precise directions from me  
   f. To exchange e-mail with my students  
   g. To be able to see my students simultaneously as they see me  
   h. Other ____________________________

PARTE V. This section relates to your general ideas about your class and the VU.

1. How useful do you find the following for the success of your class?

<table>
<thead>
<tr>
<th></th>
<th>Very useful</th>
<th>Not useful</th>
<th>Not used</th>
<th>Have Not Applic.</th>
</tr>
</thead>
<tbody>
<tr>
<td>text books</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td></td>
</tr>
<tr>
<td>support materials sent to students</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td></td>
</tr>
<tr>
<td>electronic mail</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td></td>
</tr>
<tr>
<td>phone</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td></td>
</tr>
<tr>
<td>fax</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td></td>
</tr>
<tr>
<td>teaching assistants</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td></td>
</tr>
<tr>
<td>knowing where your students work</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>knowing the learning centers across the ITESM System</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>knowing the needs of my students</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>my training as a distant teacher</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>administrative support from the VU</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>course evaluations</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐  ☐  ☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
the quality of class transmission
that there are students all across the country
good coordination at reception sites
satisfied students

Thanks for collaborating
APPENDIX D

TRANSLATED COPY OF SYSTEM-WIDE INSTITUTIONAL EVALUATIONS DISTRIBUTED TO VIRTUAL UNIVERSITY STUDENTS AT END OF TERM

SURVEY TO BE ANSWERED BY VIRTUAL UNIVERSITY STUDENTS

Course name ____________________________________________
Campus or Remote Location __________________________________
Your course of study ______________________________________
Sex __________________ Age ____________________________
Nationality ____________________________________________

I. YOUR PROFESSOR:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Totally Agree</th>
<th>Totally Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has command of the subject matter</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>2. Explains his/her ideas in a structured fashion</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>3. Exposes material clearly</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>4. Speaks in a way that facilitates comprehension</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>5. Enriches course content adequately using the resources available to him/her on television</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>6. Design adequate academic activities in order to achieve course objectives</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>7. Fulfills the syllabus and course objectives</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>8. Answers the questions that are posted</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>9. Fosters interaction during class</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>10. Fosters interaction outside of class</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>11. Gives advice outside class</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>12. Evaluates learning adequately</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>13. Fulfills your expectations satisfactorily</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
</tbody>
</table>

II. YOUR CO-PROFESSOR: (To be answered by students on courses transmitted from the State of Mexico campus)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Totally Agree</th>
<th>Totally Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has command of the subject matter</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>2. Explains his/her ideas in a structured fashion</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>3. Exposes material clearly</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>4. Speaks in a way that facilitates comprehension</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
<tr>
<td>5. Enriches course content adequately using the resources available to him/her on television</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td></td>
</tr>
</tbody>
</table>
6. Design adequate academic activities in order to achieve course objectives
7. Fulfills the syllabus and course objectives
8. Answers the questions that are posted
9. Fosters interaction during class
10. Fosters interaction outside of class
11. Gives advice outside class
12. Evaluates learning adequately
13. Fulfills your expectations satisfactorily

III. YOUR TEACHING ASSISTANT:

<table>
<thead>
<tr>
<th></th>
<th>Totally Agree</th>
<th>Totally Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shows availability to resolve your doubts</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>2. Answers to your questions</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>3. Fosters your participation or interest</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
</tbody>
</table>

IV. YOUR REMOTE PROFESSOR: *(This section is to be answered only by undergraduate students)*

<table>
<thead>
<tr>
<th></th>
<th>Totally Agree</th>
<th>Totally Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has command of the subject matter</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>2. Explains his/her ideas in a structured fashion</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>3. Exposes material clearly</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>4. Is enthusiastic when teaching the class</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>5. Contributes to the class that your professor at transmission headquarters teaches</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>6. Design adequate academic activities in order to achieve course objectives</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>7. Fulfills the syllabus and course objectives</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>8. Gives advice outside class</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>9. Fosters interaction during class</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>10. Fosters interaction outside of class</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>11. Attends class and is punctual</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>12. Evaluates learning adequately</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>13. Fosters your confidence and credibility on distance education</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
</tbody>
</table>

V. DIDACTIC MATERIAL.

<table>
<thead>
<tr>
<th></th>
<th>Totally Agree</th>
<th>Totally Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quality of printed materials is adequate</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
</tbody>
</table>
2. Materials content is adequate
3. Visual aides on screen help facilitate content comprehension
4. Visual aides on screen are legible and structured

VI. INTERACTION.

1. The functioning of interaction media is:
   a. Remote Interaction System (SIR) on-line
   b. Remote Interaction System (SIR) off-line
   c. Telephone and fax

2. Weekly use of SIR on-line
3. Weekly use of SIR off-line
   a. Discussion lists
   b. Electronic mail
4. Weekly use of telephone and fax

VII. ADMINISTRATIVE COORDINATION.

1. Assists you pertinently in your request for course support
2. Informs you pertinently of support materials for your courses
3. Gives adequate academic support (sending and receiving materials, surveys, etc.)

VIII. CONDITIONS OF YOUR CLASSROOM.

1. Classroom size is:
2. Screen size is:
3. Furniture is:
4. Lighting is:
5. Acoustics is:
6. There are not distracting factors (noise)
IX. YOUR OVERALL OPINION.

1. The work done by my professor was generally:
   - Excellent
   - Awful

2. The work done by the co-professors (if any) was generally:
   - Excellent
   - Awful

3. The work done by the teaching assistant was generally:
   - Excellent
   - Awful

4. The work done by the remote professor (if any) was:
   - Excellent
   - Awful

5. The work done by the administrative coordination was generally:
   - Excellent
   - Awful

6. In general, the course was:
   - Excellent
   - Awful

X. SELF EVALUATION.

1. How would you evaluate your performance in the course?
   - Excellent
   - Awful

2. Do you think you participated in class?
   - Totally Agree
   - Totally Disagree

3. If you could take another satellite course, would you take it?
   - Yes
   - No

4. How do you consider your learning in a satellite course with respect to a traditional one (face to face)?
   - Greater
   - Lesser
APPENDIX E

DRIVING QUESTIONS THAT HELPED
IN STUDENT INFORMAL INTERVIEWS

1. Do you think your professors at the Virtual University are adequately prepared to teach your class?
2. What do you like about your instructors at the Virtual University the most?
3. What do you dislike the most about your instructors at the Virtual University?
4. Do you feel that your professor cares about you in your classes at the Virtual University?
5. Are you comfortable with the way you are evaluated in your classes at the Virtual University?
6. Are you able to communicate with your professors at the Virtual University outside of class and how?
7. Do you consider yourself attended or well helped by the teaching assistants of your classes at the Virtual University?
8. Do you think that your professors at the Virtual University match or make a good team with your local professors in charge of the class?
9. Do you think you interact with professors, students, and administrators at the Virtual University?
10. What is your assessment of didactic materials you get for your courses at the Virtual University?
11. Do you have adequate access and make use of technologies that are needed for classes at the Virtual University?
12. Do people in your local administration team at the Virtual University are prompt and overall helpful to you?

13. What is your assessment of the facilities at the Virtual University, including electronic equipment, classrooms, etc.?

14. Do you see yourself learning in classes that you take at the Virtual University?

15. Why do you think you learn more/less in classes that you take at the Virtual University than in regular classes that you have taken before?

16. Are you satisfied with your experience as a student at a distance?

17. What is the most difficult thing about being a distance student?

18. Are classes designed to be taken at a regular phase?

19. Can you always read what is presented to you on the television screen?

20. Can you understand clearly what your professors are saying on television?

21. If questions remain after class, what do you usually do to follow up?
APPENDIX F

DRIVING QUESTIONS THAT HELPED IN INFORMAL INTERVIEWS WITH ADMINISTRATORS

1. What is your role in the organization?

2. How do you influence the design of courses at the Virtual University?

3. What is the most difficult aspect about training professors to teach at a distance?

4. How do you train professors to teach at the Virtual University?

5. How many hours do professors need to prepare classes at the Virtual University?

6. Do professors work with other people in designing classes?

7. Do you hire professors to teach exclusively at the Virtual University?

8. What incentives do professors at the traditional system have to teach at a distance?

9. How many teaching assistants are assigned to each professor and how?

10. Does the Virtual University makes information about other campuses available to professors who teach here?

11. Do you introduce students and professors in any way before the start of the semester?

12. What are the areas of the Virtual University that you think you have less problems and why?

13. What are the areas of the Virtual University that you think you have more problems and why?

14. How do you assess if you are doing a good job with site coordinators?

15. How do you assess if you are doing a good job with students nationally?

16. How do you assess if you are doing a good job with your teaching force?
17. What are the statistics of growth that are kept of the Virtual University?

18. How do you evaluate classes? Have you used focus groups?

19. What is the process for ordering textbooks for students nationally?

20. What is the nature of your communication with site coordinators throughout the system?

21. How are materials sent to the 26 different campuses?

22. How early do you plan in order to offer a certain course on a given semester and what is involved in such planning?

23. Do you provide technology access to professors and their assistants constantly?

24. How do you make sure the same reception conditions exist nationally?

25. What does interaction mean to you? To the organization?


27. Who designs your electronic materials?

28. Why was the *usenet* protocol selected as the means to provide access to class discussion electronically?

29. What does ITESM electronic network look like?

30. Do all students access the Internet similarly throughout the 26 system campus?

31. Do you see the Virtual University becoming a two way video system in the future?
BIBLIOGRAPHY


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