CHAPTER - I

INTRODUCTION

1.0 Introduction

We live in a rapidly changing world. Within a relatively short span of time, we have moved from the "industrial-age" to the "information-age". In future years, our way of life and our expectations are likely to be tremendously affected by new technologies. "In the 21st century, the way we do business, communicate and learn have changed dramatically". The knowledge we use today will be largely obsolete tomorrow! So will be many of the tools. Therefore, we have to realize that the effective teaching methods of the past cannot ensure the future success of students. Also, the use of future educational technologies can only help students grasp the impact that technology has on human life (Wright, 1994).

Today the educational institutions face many challenges. The rapid changes in our societies require that all educational institutions reconsider 'how', 'where' and 'when' education must be delivered to individuals. There is obviously no one best way to ensure education. Not all individuals learn the same way, have the same needs, or preferences. It then becomes essential that educational institutions be given the means to ensure a high diversity in education to reach all individuals. Further the ratio of teacher and taught is growing. How, can then the aim of education for "All" be realized?

It is being increasingly realized that the formal system of education which has been prevailing for long is not sufficient enough to meet the demands of the present century. The real problem of the nation is the paucity of specialized manpower needed to educate large masses of people making almost impossible for the experts to be accessible to the learners to reach the experts.

The formal system of education, especially higher education in India is one of the biggest man making enterprises in the world. Today we have 248 Universities, both Statutory and Deemed and 9,700 colleges of all sizes and shapes and about 6.5 million students enrolled in higher education (University Handbook, AIU, 28th Edn. Jan. 2000). In spite of phenomenal rise in educational sector since independence, both in Government and Private sectors, only a small percentage of the working and non-working population of the country has access to the facilities of higher education under the formal system. Besides, the tremendous quantitative expansion of the formal system, higher education has been accompanied by qualitative deterioration. Facilities in the institutions of higher education have been limited and standards have declined enormously. In short, the traditional formal system of education has proved to be inefficient in

- ensuring the educational opportunities to various groups of aspirants,
- sustaining and enhancing the quality of education, and
- minimizing the cost of expansion of educational services.

Further, the system has failed in providing life long continuing education and extending the benefits of education to the employed and handicapped persons, housewives and persons from weaker sections who are either unable to attend educational institutions or have missed the opportunity of securing knowledge under the traditional system of education (*Ansari*, 1988,p.132).

Limited place for enrollment, the rigid timings, compulsory attendance, set curricula and syllabi are the constraints that do not encourage people of different age groups and occupations to avail themselves of the opportunities in the conventional system; nor are the opportunities adequate to their needs.

Frank (1988), indicates that the tele-teaching – the education with multiplier effects aided by machines – may provide a possible solution to this problem. It is also because of the fact that in today's world of rapid technological progress, knowledge once gained becomes obsolete in a short time. There is always more and more new and important pieces of information generated and one has to learn continually to keep pace with it *(Gyozo,* 1988). At the same time, we are aware of the fact that knowledge gained never becomes obsolete in such a short time as we find today. However, *Tilley* (1972) finds that the growing interest in developing a technology for training reflects awareness of the need to improve the effectiveness and efficiency of instruction.

1.1 Concept of Distance Education

Distance education is considered as a supportive mechanism to the formal system and most of the countries are increasingly resorting to this novel method of teaching which denotes the application of multi media approach during the entire learning process, which is fast becoming an integral part of the educational system. Through such a system, learning of a subject and operation of the machineries wherein more powerful communication tools such as graphics and illustrations can be used will be much quicker in time. It would also help in reducing long distance travel of the subject experts to reach out to the students. This is the way in which the modern teaching – learning methods and forms can actually become an integral part of innovation (*Grosz and Forgacs,* 1988).

For a nation like India with its population nearing 100,000 million distributed over nearly 3.2 million square kilometers of scattered geographical area (Manorama Year Book, 2002), special effort is required to reach all of them with a development package including education. In the 21st century, when we

analyze the achievements in educating the masses in the recent past and look at the task ahead, we do realize that the situation is changing very fast and distance education is one of the possible answers to meet the requirement of those staying far away from the centres of education, especially, quality education or standard education.

Similarly, evolution of the new professionalism and restructuring of general education into technical education and managerial skills-development-programmes require extensive training and continuous update of knowledge. But the challenge remains that of reaching out in the vast geographical area and to the increasing number of people requiring education. *Misra* (1987), points out that constraints in terms of manpower and money to build educational institutions, appoint teachers, provide other infrastructure, and the distance of the student from the schools / colleges led to the search of a via-media which could be alternatively used to expand education and fulfil educational needs of all. Instead of bringing students to the schools/colleges, it was proposed to take schools to the students and hence this concept of distance education came into existence.

1.2 Major Objectives of Distance Education in India

The system of distance education has the potential to fulfil the enormous responsibility of universalisation and democratisation of education, as it holds the promise of checking the falling standards, at reasonable costs, making the optimum use of media and technology and providing education relevant to the needs of the country. Thus, the major objectives of distance education in India are:

i) To provide an alternative cost-effective, non-formal channel for higher education.

ii) To supplement the conventional university system and to reduce the pressure on it.

iii) To provide a second chance at education for those who have had to discontinue their formal education or could not join regular colleges/ universities owing to pecuniary or other circumstances.

iv) To democratise higher education by providing access to large segments of the population, in particular the disadvantaged groups. It could include those living in remote and rural areas, working people, women and other adults who wish to acquire and upgrade their knowledge and / or skills through studies in various fields.

v) To strengthen and diversify the degree, certificate and diploma, courses related to the needs of employment and necessary for building the economy of the country on the basis of its natural and human resources.

vi) To provide a means for continuing and life-long education for enriching the lives of the people.

vii) To provide an innovative system of university education which is both flexible and open. This is in terms of methods and pace of learning, combination of courses, eligibility for enrolment, age of entry, conduct of examination and operation of the programmes with a view of promoting learning and encouraging excellence in new fields of knowledge. [UGC Annual Report, 1981-82; APOU Act, 1982; IGNOU Act, 1985; IGNOU Project Report, 1985; KOU Act, 1987].

1.3 Profile of Distance Learners

The primary role of the learners / students is to learn under the best of circumstances. This challenging task requires motivation, planning and the ability

to analyze and apply the information being taught. In a distance education setting, the process of student learning is more complex for several reasons (*Schuemer*, 1993):

- Many distance education students are older, have jobs and families. They must coordinate the different areas of their lives which influence each other; their families, jobs, spare time and studies.
- Distant students have a variety of reasons for taking courses while some are interested in obtaining a degree to qualify for a better job, many others take courses to broaden their education and are not really interested in completing a degree.
- In distance education, the learner is usually isolated. The motivational factors arising from the contact or competition with other students are absent. The student also lacks the immediate support of a teacher who is present and able to motivate and, if necessary, give attention to the actual needs and difficulties that crop up during study.
- Distant students and their teachers often have little in common in terms of background and day-to-day experiences and therefore, it takes longer for student-teacher rapport to develop. Without face-to-face contact, distant students may feel ill at ease with their teacher as an "individual" and uncomfortable with their learning situation.
- In distance education settings, technology is typically the conduit through which information and communication flows. Until the teacher and students become comfortable with the technical delivery system, communication will be inhibited.

Thus, keeping in mind the profile of distance learners, interaction becomes an important component for smooth running of distance education.

1.4 Need for Interaction

One of the most challenging tasks ahead for distance education institutions is to create a congenial learning environment by bridging the physical and psychological distances between the experts / teachers and the learners. The notion that interaction plays a vital role in the process of learning is shared by many distance educators today, though some early views considered interaction among learners to be "literal noise in the instructional system" (*Cazden,* 1986, p. 432). The significance of interaction is now an important reason for exploring new ways to facilitate the interaction. The opportunities provided by interaction to share views enable the creation and interpretation of communication which in turn lays the foundation of learning. Moreover, a distance learner desires to feel connected and share his/her feelings with the teacher and other learners with similar interest (*Graham*, 1984).

Traditionally, distance education has been characterized as an individual form of learning, lacking opportunities for socially shared learning (*Holmberg*, 1986). The emphasis on individual students studying alone at their own pace creates unique challenges to educators attempting to assist learners in their cognitive development, especially that associated with social cognition. *Keegan* (1996), argues that non-interactive distance education must attempt to compensate for the following characteristics:

- No heard language.
- Absence of non-language communication.
- Absence of student-to-teacher feedback processes.

- Absence of teacher-to-student feedback processes.
- Delayed reinforcement.
- Absence of student-to-student communication.
- Change in role of non-cognitive learning processes (pp. 121-122).

According to *Keegan*, lack of compensation in any of these areas results in a tendency for students to drop out, difficulty in achieving quality of learning, and a loss of status of learning. Efforts have been made to compensate these by providing a variety of additional student support services (*Amundsen* and *Bernard*, 1989), specialized writing styles (*Holmberg*, 1989), and feedback mechanisms (*Howard*, 1987).

The application of audio/video communications technology to distance education provides the opportunity to alter *Keegan's* seven defining characteristics significantly. The defining characteristic of teleconferencing is that it substantially increases human interaction in distance education. This increase has the potential to markedly change the nature, practice and context of the distance education experience.

Acknowledging the need for connectedness, *Moore* (1989), succinctly divides such desire into three types of interactions, namely, 'learner-content interaction', 'learner-instructor interaction' and 'learner-learner interaction'. Although the three kinds of interaction identified by *Moore* are interdependent, it can be argued that the self-instructional learning materials or specially designed text books for distance learning provide sufficient opportunity for learner-content interaction. However, technological support is indispensable for the other two types of interaction; that is, learner-instructor and learner-learner interaction.

The postal system, radio and television have played important roles in the early growth of distant education worldwide. In order to achieve effective levels of interaction, the managers and planners of distance education have embraced various communication technologies such as radio, television, telephone and now innovations such as teleconferencing and computer conferencing. The limitations of radio and television in terms of providing quick and frequent interaction have led distance educators to reach out to newer technologies which promise better interaction.

Examining the available communication technologies in terms of achieving *Moore's* three types of interaction, one finds that teleconferencing may have an edge, over other technologies in making it possible to have all the three kinds of interaction and on "many to many" basis. It is not inappropriate to suggest that teleconferencing is a synthesis of the telephone and television, with the additional advantage that the event occurs in real time. Recent developments in the field of teleconferencing provide affordable ways to augment a pedagogically productive interaction between the teacher and the students and amongst the learners themselves. Teleconferencing is seen as a major democratising force for higher education in that it enables students in remote rural communities to receive educational choice similar to those offered in more urban areas. Students who may have travelled several miles to attend a class can now do so at one convenient location saving considerable amount of money and travel time (*Ehrhard and Schroeder*, 1997).

1.5 Distance Education and Communication Technologies

Schrum (1995, p.4) recommends; 'It is important to begin by accepting that distance learning is an effective and appropriate manner in which to deliver

instruction'. Similarly, *Roberts* (1996, p.813) reports that current research and practice indicate that distance education is being used in almost every country in the world. According to *Keegan* (1996), it represents a valued component of many educational systems and has proved its worth in areas where conventional schools, colleges and universities have difficulties in meeting demands of education. Distance education adds to, rather than diminishes, the importance of colleges and universities (*Cantelon*, 1995). It allows one to take classes from the most renowned experts in the field, regardless of their location (*Hansel*, 1997). It is also possible to take a course that is not offered at one's educational institution, either because of interest or need (*Hansel*, 1997). Furthermore, "Distance learning is a means of creating educational unification; connecting people who may be physically, socially, and / or culturally distant from each other, but who are unified in active learning communities by mastery of a shared body of knowledge and common educational goals and aspirations" (*Derline* and *Erazo*, 1996, p. 1-2).

In this ever-changing world therefore, technology becomes a precious asset in many fields of activity such as education and business. Indeed, previous researches focusing on the integration of technology into education show several benefits, including increase and improvements in active learning, critical thinking, motivation and co-operative learning and communication skills. Technology has also been shown to enable students to learn at their own pace, promote multi-sensory delivery, expand multicultural education, and provide support for students with special needs (*Barron* and *Orwig*, 1997; quoted in *Jankowski*, 1997, p.1). Moreover, if properly used, technology can make a significant difference in student academic achievement (*Spagnolo*: quoted in *Barker et al.*, 1995, p.1).

Communication technology supports distance education in a variety of ways; without the use of technology, distance education would not exist (*Garrison*, 1987). Modern communication technologies have given the facilities to distance education to reach a large number of people who can learn in their own place, pace and time.

Keegan (1982), describes distance education as the form of education in which the teacher and learner carry out their essential tasks at a distance from one another. He also characterized distance education as the use of media to unite the teacher and learner and with the provision of a means of two-way communication. As *Talesra* (1987) writes, the concept of correspondence education, mass media in teaching, open university, radio, television lessons have all been included in the structure of distance education. The concept, therefore, has been comprehensive covering a wide spectrum making a conceptual structure of distance education. Thus, one finds a communication technology component requiring mass media support.

Although, not much has come to notice about the utility and effects of using communication technology like satellite for supporting education, specifically distance education or improving the quality of education. In the late 1960s, the Brazilian Institute of Space Research began to investigate the possible uses of communication technologies, that is, satellites. In 1980, satellite-delivered television was made accessible to people in Canada.

Potter (1981), reports that using satellite was a rewarding and rich educational experience (in Canada) but it also created a whole multitude of problems of planning. He also points out how the satellite-based communication can be extremely impersonal. Olympus Satellite of European Space Agency was

used for education as Pan-European public service channel by setting up an European Olympus Network. Similarly, European Institute for the Media with the help of ASTRA Satellite organized a series of educational and training experiments. The same has been followed by setting up of channel 'E' in which EUTELSAT – II F Satellite is being used to transmit multilingual educational programmes to Pan-European students and trainees.

In Japan, under Konet Plan Project, Nippon Telegraph and Telephone Corporation, (NTT), carried out training for technical "skill up" of school teachers dispersed all over Japan, from around 1000 schools. According to *Shinohara* (1997), "to be able to share the same information and interact at the same time from distant places is one of the greatest merits of the videoconference". This type of videoconferencing system (two-way audio and one-way video) for distance education is expected to affect the revolution of the educational system in Japan.

A number of satellite communication projects have been conducted to reduce the cost of education and also evaluate its utility in improving the quality. *Bates* (1987), analyzes the experience of five countries namely Australia, Canada, India, South Pacific and West Indies, where satellite television has been used in higher education. Based on their experiences with the use of satellites, the key conclusion is that satellite helps in providing genuine two-way communication to improve the quality of education. This encourages the possible use of two-way communication for education through teleconferencing mode.

Olgren and Parker (1983), claim that educators were the first group to adopt and apply teleconferencing systems, primarily to extend educational opportunities to people in distant locations. This mode has been applied in

continuing professional education, college credit instruction, general adult education, in-service training and public service programmes.

Satellite links have been extensively used in other places in the world for teleteach, teleconferencing, broadcasts and telecasts. Educationists go to the extent of suggesting the need for augmenting satellite education projects in the total education system (Communication Research Trends 1988/89). Review of a large number of studies conducted in the use of telecommunication for education, *Olgren and Parker*, (1983), accept that audio teleconferencing is an effective and efficient medium. According to *White* (1985), television broadcasts augmented with an audio teleconferencing network makes two-way audio and one-way video interactive and provides immediate feedback. But *Mackenzia, Postgate, and Scuphan* (1975,p.484), have visualized some practical problems. According to them, 'the operational responsibility for the satellite is likely to rest with a Ministry of Communications or a Ministry of Information and Broadcasting. Thus, the Ministries responsible for the substantive aspects of the educational programmes, such as education, health, agriculture, etc. will have to coordinate at the national level not only among themselves but with the ministry responsible for the operation of the satellite'.

With the concept of universal education, the increasing role of education and training in all areas of development, the rapid growth of knowledge and the high rate of obsolescence of knowledge make demands on education that the conventional system is no longer able to cope up with. The Open University System, with its potential to make education reach places and people hitherto unreached was expected to meet an emerging need in the field of distance education. According to *Perry*, "The concept of the Open University evolved from

the convergence of three major post war educational trends. The first of these concerns development in the provision for adult education, the second the growth of educational broadcasting and the third the political objective of promoting the spread of egalitarianism in education" (*Perry*, 1976, p.1).

Therefore, it could be concluded that, one of the important features of the open university system is the use of modern educational and communication technology including audio-video components, computers and broadcast media.

1.6 Indira Gandhi National Open University (IGNOU): Present scenario

In the Indian context, the technological solution was thought to have more significance because of the geographical spread. By the late 60's the concept of distance education was germinating in India and the first of its kind – The Andhra Pradesh Open University (APOU) was established in 1982. In September 1985, The Indira Gandhi National Open University (IGNOU) was established with the objectives to advance and disseminate learning and knowledge, to provide opportunity for higher education to a large segment of the population, primarily to the disadvantaged groups living in remote and rural areas, working people, housewives and other adults who wish to upgrade or acquire knowledge and sharpen their skills. Also to promote the educational well being of the community generally, to encourage the open universities and distance education system in the educational patterns of the country and to coordinate and determine the standards in such systems (IGNOU : A Profile, 1991).

According to *Kulandai Swami* (1991), the Open Universities represent the first major step towards application of Science and Technology in imparting knowledge and skills and thereby increased productivity in education. Today, Indira Gandhi National Open University (IGNOU) with its 26 regional centres (5 of

which are army command centres) and 504 study centres all over the country presently offers 229 different courses to more than 6,00,000 students / learners where students can participate in the counselling sessions related to their areas of studies. There has been a long felt need of interacting with the eminent speakers, professors and guest faculty members at the time of teaching-learning process. The distance education offered by IGNOU is based on multimedia approach. There are, a few state level open universities under the perview of IGNOU which have come up in the country recently.

IGNOU plans to use the satellite communication for Extended Contact Programmes (ECP) for the students and Orientation Programmes for the Counsellors with interactive mode of teaching to be used as an additional input. The idea was that by using interactive mode of satellite communication, one can approach the Regional Director, the Counsellor and the students and counsellors at their places. The interaction and teaching can take place from a distance reducing the travel time and expenses.

The satellite based teleconferencing system provides an excellent opportunity to individuals to interact with the speakers at the teaching end and get their doubts clarified. The counsellors also get an opportunity to interact with the eminent speakers and upgrade their knowledge and sharpen their skills.

This type of education emphasized largely on making education accessible to the masses in an efficient manner. Education, however, is more than an efficient method of making information available to learners. The essence of any educational transaction, including distance education, is the communication between teacher and student. It is the nature of the communication process that will determine the effectiveness of learning process.

Effectiveness is dependent upon supporting the education transaction appropriately and is intimately related to the communication process. Support through communication provides richness and variety during the educational transaction which motivates and sustains students / learners. The strength of teleconferencing is that it goes beyond extending access to education at a distance by providing effective support of the educational transaction.

While teleconferencing has attracted considerable interest in both the educational and business communities, it is also somewhat of an enigma. In this regard, *Johnson* (1983), states that teleconferencing has been defined in many ways, some of which are contradictory. It is an entirely new concept / it is as old as television, or the telephone, or even the telegraph; it is simple / it is complex; it is inexpensive / it is very expensive; it is interactive / it doesn't have to be interactive and so on. In reality it is all these things. The reason is that there are several types of teleconferencing that can and are being used for a range of purposes. Perhaps, because it supports the most of human activities – communication – it should be expected to be inherently contradictory as even the most rationale of us often appear to be.

1.7 Concept of Teleconferencing

Teleconferencing (TC) means conferring at distance or holding a long distance conference. The conference participants are geographically separated, and they "meet" with the aid of technical media that transmit their voices and / or images. Teleconferencing allows several persons to participate in meetings without the necessity of face-to-face contact. Participants can be geographically dispersed and still "meet", using the technology as the means that brings them together.

Interactive electronic communication among three or more people in two or more locations – the generic definition of teleconferencing – encompasses a wide variety of possibilities. The number of participating sites can range from two to hundreds. The number of participants in a teleconference can range from three to thousands. All the participants can be physically separated, or as often happens, some can be grouped together at one or more sites. The teleconference thus, entails individual face-to-face interaction, local group interaction, and remote interaction as well.

Teleconferencing is an appropriate and flexible means for distance education. It facilitates two-way communication among users at different locations with the experts (central location). The users also get immediate feedback from the experts and fellow users at other location as well. Thus it is proving to be an effective learning technique (IGNOU, 1992).

Teleconferencing has been formally described as two-way electronic communication between two or more groups or three or more individuals, who are in separate locations, includes group communication via audio, audio-graphics, video and computer systems (*Olgren & Parker*, 1983).

Besides these realities there are some aims of teleconferencing specifically suited to distance education. These are

- Teleconferencing humanizes education at a distance creating an environment which focuses on the importance of individuals and thus overcomes distances by establishing rapport among them;
- Spontaneous interaction between the participants that is, two-way communication is taken care of;

- It ensures that the message gets through that is, it is properly received, understood and assimilated;
- Both the sender and the receiver get immediate feedback about the messages which are being exchanged. It helps the participants remove their misunderstanding and doubts.

Thus, teleconferencing is communicating, exchanging, managing, meeting, networking as shown schematically in figure 1.1.

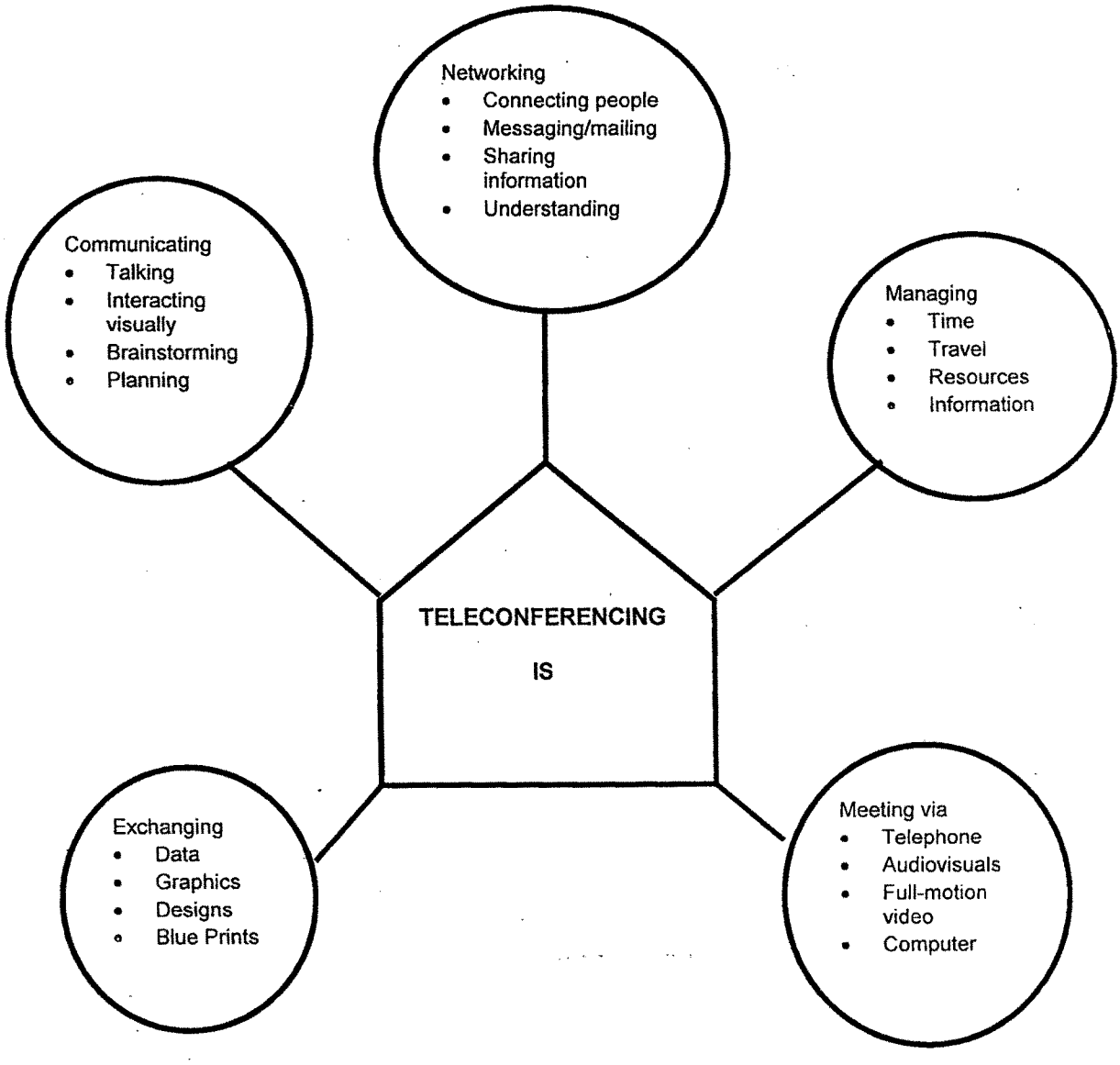


Figure 1.1: Schematic representation of aims of TC

1.8 Characteristics of Teleconferencing

The significance of teleconferencing to distance education has escaped many theoreticians. Teleconferencing has usually been lumped together with a variety of ancillary audio-visual media used as an adjunct to correspondence study. The unique characteristics of teleconferencing in supporting the educational transaction have not generally been recognized and are usually overshadowed by the primacy of print media. Teleconferencing, however, represents a paradigm shift in facilitating and supporting learning at a distance. The main reason for this is that teleconferencing is .

- A group method of learning at a distance. Of all the means used to support distance education, teleconferencing most closely simulates the transaction between teacher and students in a contiguous or conventional form of education. The exchange is conversational in nature, it may be spontaneous, and it is immediate. In these respects teleconferencing differs from all other technologies used to bridge the distance in distance education.

Before the advent of teleconferencing, distance education methods (i.e. correspondence) were considered to be an individual and therefore independent method of learning. Even today some distance educators equate individual and independent study with distance education. However, this is no longer the case nor is there any inherent reason why it should be so. In fact, dialogue and negotiation are essential whenever it is appropriate for the particular educational objective. Independence and isolation need not be regarded as inherent characteristics of distance education. On the contrary, interaction to facilitate and support the educational process, must be seen as the central feature of any

educational transaction including distance education. The richness and variety of this interaction is brought about through sustained contact with other students as well as with teachers.

- A second defining characteristic of teleconferencing is the regularity and immediacy of two-way communication. The potential of teleconferencing for the negotiation of goals and meaning with the instructor as well as the sharing of meaning through dialogue with fellow students is unprecedented in distance education. Provision for regular and immediate two-way communication means that control issues may be addressed. The manner and pattern of communication is changed with the use of teleconferencing. Regularity or frequency of communication may be increased considerably compared to correspondence study and the feedback is immediate. The regularity, immediacy and naturalness of communication by teleconferencing also make possible a full range of instructional techniques.
- A third characteristic of teleconferencing is that it is ideally suited to the design and delivery of distance education to small and widely dispersed target groups. Unlike correspondence study where economic feasibility is dependent upon large numbers of students, a teleconference course could be quickly and inexpensively developed and delivered for small group of students. This makes it of particular interest in 'dual mode' institution whose main function is not distance education. While most teleconferencing makes use of print materials they do not have to be highly structured and attractively packaged. Relatively disjoint materials

can be integrated in real time along with other media into a unified, well functioning and dynamic educational transaction.

1.9 Types of Teleconferencing

Teleconferencing is a medium device of a wide range of interactions facilitated by satellite system. The use of teleconferencing began more than two decades ago. Although it was seen to possess great potential for information sharing, training and education, the use of teleconferencing was limited to corporate meetings and conferences. This scenario has now changed with teleconferencing being increasingly used to provide the competitive edge for education and training (*Wilson*, 1997). In developed countries, teleconferencing has been popularised to a large extent in educational situations. Especially, distance learners get major benefit from such facilities. Moreover, because of popularity of satellite-based instruction, teleconferencing has been found cost effective. This system provides information in a concrete fashion. It also provides concise verbal and visual facilities as per requirement of learning situations.

In recent years, two parallel developments have taken place. First, the phenomenal growth in distance education and second the advancement in the technology of teleconferencing, both reinforcing each other's strength. To meet the growing demand of education outside conventional institutions, existing distance education institutions have consolidated their efforts, while new institutions have come into existence and many conventional universities have extended their educational opportunities to learners at a distance (*Rumble*, 1992). At the same time, rapid innovation in the technology of teleconferencing such as compressed digital video and fibre-optic cables have made teleconferencing more versatile, cost effective and adaptive to the needs of our

distance education system (*Walsh and Reese*, 1995). Teleconferencing has been described as "the interactive electronic transmission method for real-time, facilitating two-way conversation among groups of individuals in different geographical locations" (*Brock*, 1994, p.126). Teleconferencing can take place between two locations, known as point-to-point teleconferencing, or among many locations, known as multi-point teleconferencing (*Graham*, 1984). On the basis of the medium of transmission used, teleconferencing may be categorized as audio-conferencing, audio/graphic conferencing or videoconferencing. The latest addition is desktop videoconferencing.

Audio-conferencing connects people by voice alone (*Murphy*, 1988). This is the least expensive and oldest form of teleconferencing. It uses a familiar technology, the telephone, and requires less planning than other forms of teleconferencing (*Parker*, 1984; *Hatfield, Garrison and Adams*, 1986). Audio-graphic conferencing is an advance over audio conferencing. An audio graphic system supplements audio conferencing by transmitting static visual components such as charts, graphics and photographs (*Grahams*, 1984). In an audio/graphic teleconference, participants in different locations speak with each other and write to each other on a computer. Audio / graphic conferences are especially useful when instructor includes technical information such as charts and diagrams.

Videoconferencing is the most expensive and sophisticated technology of all kinds of teleconferencing. It involves full motion video and audio transmission between two (point-to-point) or several (multiple) locations, via a satellite, cable or microwave network (*Brock*, 1994). Videoconferencing falls into two categories:

a) One-way video / two-way audio, and

b) Two-way video / two-way audio.

Teleconferencing

In one-way video / two-way audio interaction system, the participants remaining in different parts of the region can interact with the presenter of TV station. Satellite based communication system facilitates easy telephone communication from learners to the presenter. In response to the learner's queries at the time of telecast of lesson, the presenter can answer the questions through TV line on the spot. While the learner's queries can be accessible to the presenter by satellite connected telephone, his/her response can be both audio and video based through TV. The viewers of TV can only listen to the queries of distance learners while they can get audio-video response of the presenter on the screen. This facility encourages interaction between the presenter of Educational Television (ETV) and the distance learners at the spot time of telecast session.

The two-way audio / video interaction is possible through two-way television network. The presenter from different TV stations can interact with each other with audio-video system. Satellite system enables distance learners viewing the ETV programmes consisting of teacher-students and student-student interaction taking place at a wide TV network. Learners sitting at home and watching audio-video teleconferencing get a feel of classroom through the TV screen. Moreover, several questions raised by a particular learner may be raised by students participating in ETV. Such system can serve both purposes i.e. expert interaction as well as popular interaction.

The two-way audio/video is closest to face-to-face meeting and is more expensive (*Parker*, 1984). It allows participants at various sites to speak and see each other at the same time. The one-way video / two-way audio conference is comparatively less expensive. In this teleconference, the participants at the transmitting end can be seen by the participants at the receiving locations but not

vice-versa. However, all the participants can interact with each other through audio connections.

Recently, innovations in videoconferencing/teleconferencing methodology have taken place. Desktop videoconferencing is the most recent development in the technology of videoconferencing. It provides a complete set of tools for conducting face-to-face interaction between two remote locations using audio, video and data transmission simultaneously through a telephone line. A student who can afford a computer terminal along with the software and hardware system can use desktop videoconferencing from the comfort of his/her home. This medium offers immense opportunities for interaction to physically disabled students who can become distant members of a class (*Fox, Loutsch and O'Brien*, 1993).

1.10 Terminology of Teleconferencing

Teleconferencing or videoconferencing have been described by several authors as 'interactive video' or 'interactive television' (Eg. *Ehrhard and Schroede*, 1997), whereas others have called it 'interactive distance learning' or 'satellite mediated interactive learning' (*Piskurich*, 1997). Some others (*Roblyer, Edwards and Havriluk*, 1997) distinguish between computer based videoconferencing / teleconferencing and television based videoconferencing / teleconferencing by pointing out that in satellite or television based teleconference, one-way video and two-way audio interaction takes place through telephone and anyone with a satellite dish to pull down the signal can receive it, whereas computer based videoconferencing is a point-to-point closed communication system connecting computers equipped with video and only participants can see the transmission. Despite these distinctions, in general the

term videoconferencing has been used as a generic term for any teleconferencing that involves a television screen (Eg. *Carl*, 1986; *Abbot, Dallat and Robinson*, 1995; *Emery and Schubert*, 1993; *Gant*, 1996). Furthermore, tele-teaching, tele-training, tele-counselling and other related activities which are carried out through the mode of teleconferencing and incorporate some level of real time two-way interaction come under the umbrella term of videoconferencing. In many instances teleconferencing and videoconferencing are used inter-changeably.

1.11 IGNOU Teleconferencing

IGNOU has established basically a system, which consists of one-way video and two-way audio teleconferencing network in order to improve and enhance the teaching-learning components. It has also been called by several names like 'talkback network', 'interactive television network' or 'interactive narrow-castings'. There are three basic components in the system. These are

i) The teaching end (studio and uplink earth station);

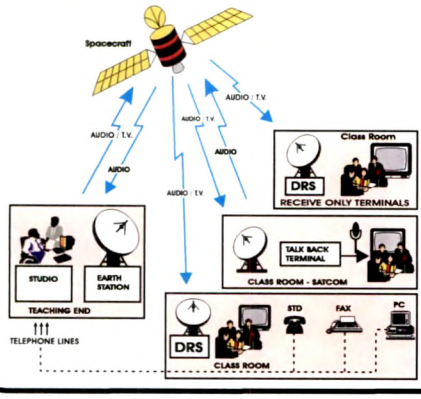
ii) The receiving end (the classroom/conference hall).

iii) The space craft.

The teaching end is basically responsible for originating the instructional materials either in the form of 'live' lectures, or recorded video programmes, or group discussions, etc. and uplinking these video signals to a geostationary communication satellite by means of uplink earth station, which is located at the teaching end. The teaching end, in addition to all the studio equipments, also have facilities like telephone lines, teaching aids and fax. The satellite receives, amplifies, retransmits these signals which are received at the receiving end

IGNOU TELECONFERENCING SYSTEM.... AT A GLANCE

NETWORK CONFIGURATION FOR IGNOU TC



The IGNOU-TDC Channel provides a one-way video and two-way audio teleconferencing network for education and interactive training.

THE STUDIO

Consits of studio floor, video console, audio console and telephone exchange.

THE STUDIO FLOOR

Is equipped with cameras (one or more) microphones caption stands, display boards, dias, chairs, monitors, lights and sound monitoring system.

Optional equipment - teletop cameras, PC, character generator, video writer and fax machine.

THE AUDIO/VIDEO CONSOLE

Video cousole consists of video mixer, VCR's, PC, character generator and monitors. Optional equipments-video writer.

Audio Console consists of audio mixer with at least 8 Channels and having pre and post fade facilities, sound monitoring system and intercom services for communication between producer and other personnel.

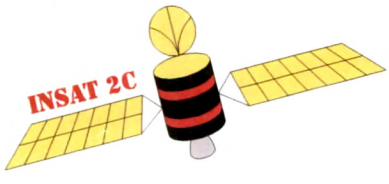
EPABX TELEPHONE EXCHANGE

Consists of at least 2 incoming telephone lines for the talk back programme.

RECEIVE END FACILITIES

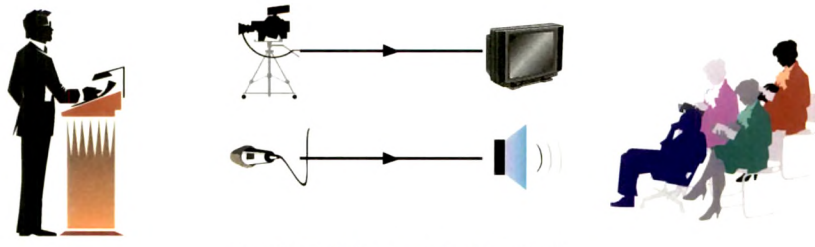
Classrooms, Direct Reception Sets and Talkback PSTN line Subsystems.
Parabolic Dish Antenna including reflector, stand and extended C-Band horn.
Extended C-Band LNBC, Low Loss Cables.
Satellite Receiver, Colour Television Receiver.

ONE EXTENDED C-Band TRANSPONDER

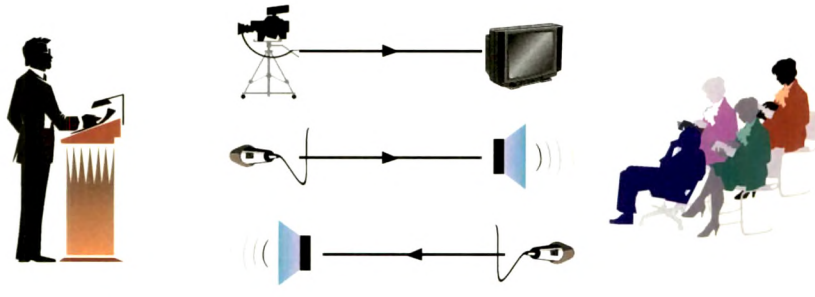


Channel C-15 of INSAT 2C Satellite

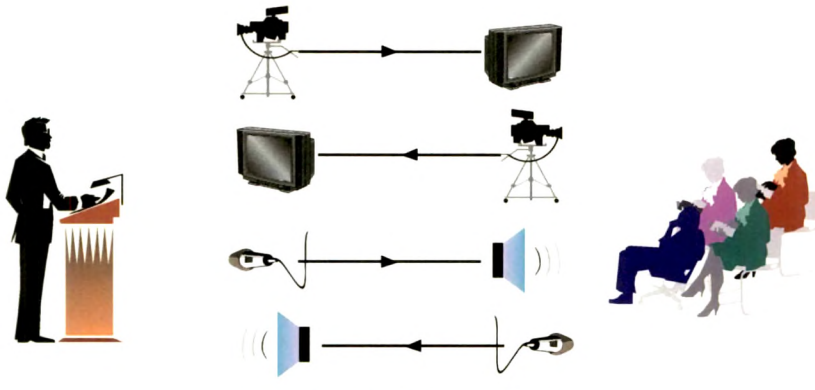
TYPES OF TELECONFERENCING



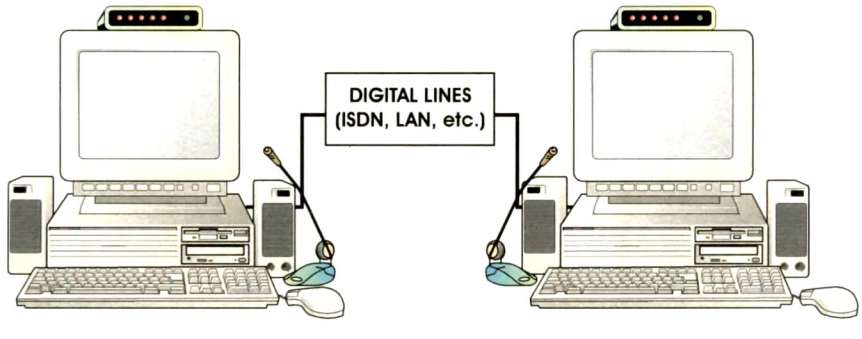
One Way Video and One Way Audio



One Way Video and Two Way Audio

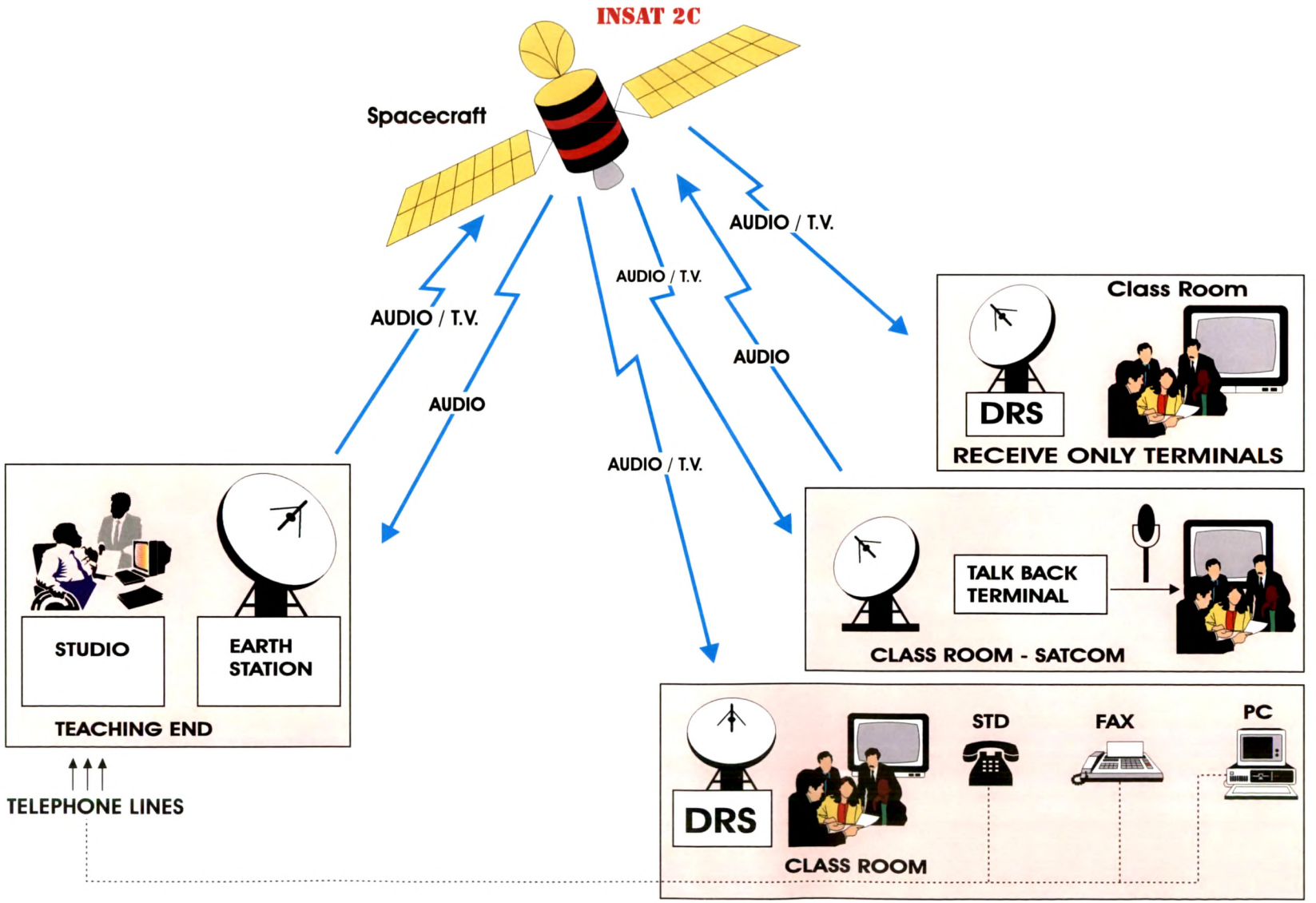


Two Way Video and Two Way Audio



Destop Videoconferencing

NETWORK CONFIGURATION FOR IGNOU TELECONFERENCING



A View of EMPC IGNOU, New Delhi

Mobile Earth Station

EMPC Studio IGNOU

EMPC Control Room, IGNOU

(classroom/conference hall) within the coverage area by means of a Direct Reception System (DRS) – a perforated dish antenna of 8 – 12 ft. in diameter, front-end electronics and an ordinary television receiver. The 'uplink' earth station has been stationed at IGNOU campus – Electronic Media Production Centre (EMPC) and is presently being operated and maintained by Indian Space Research Organization through Training and Development Communication Channel (ISRO – TDCC). The TDCC started by the ISRO is being jointly operated from the IGNOU campus at Delhi since 1993.

The receiving ends have been provided with dish and an ordinary television set. The programmes are viewed by the students, target audience and the counsellors. The receiving ends have also been provided with Subscriber Trunk Dialling (STD) facility so that interacting with the teaching-end is possible. This can also be done through a small satellite communication terminal located at the receiving end which can transmit the processed audio signals via satellite to the teaching end where these are received and processed. Facilities for reception of such satellite communication (satcom) signals are provided at the teaching end. Classrooms where such interactive facilities are provided are known as 'talk-back' locations or nodal centres. At the receiving ends, whenever calls are made to clarify doubts or to interact with the speakers these are received by a small EPABX located at the teaching end. The teaching ends are maintained by IGNOU. Some of the receiving ends have been provided with STD facilities and these are known as "talkback locations". Other receiving ends which have not been provided with STD facility are known as 'receive only locations'. These locations are not able to interact with the teaching end due to non-availability of the STD facilities. The number of 'talk back locations' in a system are limited by

the systems capacity to receive simultaneously and process questions from various 'talk-back' locations. There can be thousands of receiving ends if they have the dish antenna and television sets available. If one dish is installed, we can have a number of connections with the study centres within a radius of 15 – 20 miles.

The 'teaching-ends' is linked up with 'receiving – ends' with the help of 'uplink – earth station' in the forward direction for transmission and in the reverse direction for routed calls received from satcom talkback locations to the studio. The receiving ends telephone calls are received at the teaching end and are fed to the expert panel through an 'anchor' person. The calls are received in audio control room at the teaching end and are diverted to the anchor person who puts it to the member of the experts panel to answer or explain the point of view. Specially designed procedure for putting the telephone calls on 'hold' and feeding them sequentially to the expert panel (one at a time) has been developed. The 'anchor person' at the teaching end conducts interactive sessions. The questions are answered using audio-video mode. The visual images from the teaching end can go at the receiving end but vice-versa is not true. The visual images and audio signals generated at the teaching end are transmitted by the uplink earth station and received at the receiving ends which are equipped with dish antenna.

At the receiving end, questions, remarks, suggestions can also be communicated through fax in addition to the voice which is carried through STD lines from receiving end to teaching end. It is observed that sending the questions through fax is more systematic and convenient. This also provides an opportunity for the members of the expert panel to answer the questions received from fax in the off-line mode, that is, through mail or other means if the satellite time is not sufficient for this purpose.

Audio Mixing

Video Mixing

Learners at ....

Teaching end

Receiving end

The IGNOU teleconferencing system configuration consists of a teaching end studio at the EMPC or Sanchar Kendra at Maidan Garhi campus of IGNOU from where the audio and video signals can be uplinked to INSAT 2C satellite. The signals are down linked from the satellite to a number of Direct Reception System (DRS) located at all the 26 Regional Centres (RC) (5 of which are army centres) and around 120 Study Centres (SC, also known as 'receiving ends' or learning ends). The return communication, that is, learners from various receiving ends communicate to teaching end through (toll free telephone numbers) STD telephones and Fax lines.

The academic inputs are decided by the concerned faculty and the schedule is given to EMPC or Sanchar Kendra. The time slots are allotted by ISRO. The EMPC in liaison with ISRO finalises the schedule for teleconferencing. The teleconferencing sessions are telecast from the studio at EMPC. The teleconference programmes are conducted through panel discussions, live lectures, question-answer, audio-video presentations supplemented by computer based graphics, charts, models and a few audio aids.

IGNOU regularly uses teleconferencing for the following purposes:

a) Telecounselling to student/learner groups;

b) Training of study centre counsellors and coordinators;

c) Administrative interaction with Regional Centre functionaries; and

d) Extended Contact Programme (ECP) for students / learners.

Teleconferencing in distance is recognised as a flexible way to overcome communication problems in terms of time, distance and costs and improves the quality of services to its learners. Face-to-face instruction has the disadvantage that students from remote areas have to spend extra time and money on travel

and stay at the places where these facilities are available. On the contrary, TC provides a cost effective way to provide seminars and tutorials to distance learners (*Murphy*, 1988). In support to this, *Stahmer, Idris and Bolai* (1990), state that the main benefit of the distance education system is the substitution of telecommunication for transportation. The individual who would not otherwise be able to leave their work place can now have direct access with remote tutors, experts and faculty, because two-way telecommunication support offers learners the opportunity of 'talkback' to the teachers or experts and the learners can also improve the learning material (lecture) based on the talkback requirement.

According to *Subbayamma* (1998), teleconferencing was highly appreciated as a useful technology for distance education. It brings about human element in teaching and learning at a distance by creating an environment, which focuses on the importance of individuals establishing rapport among themselves. On the other hand she also reported that female learners show apprehensions about their participation in teleconferencing programmes as the host centres have no accommodation facility for them.

Garrison (1990), in support to the use of teleconferencing in distance education states that of the many new technologies, teleconferencing is likely to be used widely in the near future. It can be considered as a significant shift in offering education at a distance since this technology enhances the learning possibilities. At the same time, teleconferencing must be seen as acceptable from the students' perspective and it should be accessible to them at their convenience, if this technology is to be integrated in distance education system.

Further, the effective utilization of teleconferencing in education is contingent on several factors according to *Olgren and Parker* (1983). These

include a user oriented technology, implementation planning that considers user benefits and applications, a supporting infrastructure, training, advocacy and ongoing evaluation. In light of this background, it becomes important to study IGNOU teleconferencing programmes mainly from the pedagogical point of view.

1.12 Experiences of Media and Technology in Distance Education

In the following text, the various aspects of teleconferencing in Indian scenario would be discussed.

1.12.1 National Talkback Experiment on Countrywide Classroom Programme

During 1991, the University Grants Commission started an experiment on two-way audio and one-way video interaction through countrywide classroom programmes. In this project there was an arrangement for telecast of teleteaching lessons followed by a question-answer session between students viewers from different EMRCs/AVRCs and resource persons at Delhi earth station. Viewers in general got chance to observe teleteaching lessons along with talkback taking place between experts in Delhi and students asking questions from different parts of the country. It was observed that, those students who viewed talkback CWCR / teleteaching programmes fared significantly higher in achievement than the students who viewed only CWCR programmes. Students expressed favorable reaction towards talkback viewing (*Passi et al.*, 1992). *Joshi* (1991), reported that all the 12 programmes brought considerable gain among students who took part in the talkback experiment. English medium students fared better than their non-English medium counterparts.

However, several limitations were witnessed. *Vemraju and Jaiswal* (1991), reported that: exposure to talkback did not indicate significant performance among those who participated in the experiment; the control and the talkback viewing groups fared better than the talkback participating group; gain scores were witnessed in the case of all the groups who viewed CWCR lessons without talkback, who viewed CWCR lessons with talkback and who participated in the talkback experiment.

Basu (1991) revealed partial level gain of students who participated in talkback experiment. *Joshi* (1991), reported about limitations of time for question – answer session and technical problems like dialing as the major constraints. Inspite of these limitations it can be appreciated that Indian Educational Communications System can progress for a better networking of two way interaction of ETV in future.

Chaudhary and Behari (1994), examined the advantages and limitations of cable based interactive network system when used as a tool for distance teaching. It was found that female respondents preferred observing the experiment at home to going to learning end and participate in talk-back facility. Due to lack of awareness, very few respondents could attend the programme. The participants reported that the question-answer time (20 minutes) was inadequate and also opined that properly planned and effectively managed network system may be more useful for educational purposes.

Shrinivasacharyulu, Rao and Mouli (1989), evaluated the effectiveness of various facilities (audio-visual aids) provided to the distance learners. They found that, students joined the courses with an interest in learning through audio-visual aids. But the utilization of audio-visual aids was very little. This developed a

negative interest in the learners towards the course. The failure in utilizing the facilities might be due to lack of adequate electronic equipment and other physical facilities. Also, the lack of required attitude and skills of coordinators and counsellors in using the audio and video lessons effectively.

Sahoo (1994), studied the effectiveness of teleconferencing as a means of distance education. He found that the participants made positive remarks about the role of teleconferencing but also expressed that the time for talk-back (Question-Answer) session was less and reported negligence of resource persons in answering many questions and lack of reinforcement given to the participants.

Jayashinghe (1995), studied the impact of camera angles, single versus multiple monitors and incentive on instructor credibility, immediacy and interaction in a simulated (two way audio and one way video) distance learning environment. The analysis revealed that viewing the instructor on the eye level camera videotape significantly improved instructor immediacy and students' attitude towards the instructor. Moreover, the eye level camera videotape and multiple monitor condition had a positive effect on students' perception of interaction and reduced disparity with the instructor, shown by students looking at and leaning towards the monitor, smiling and being attentive. Research has shown that teacher immediacy is a powerful predictor of teaching effectiveness. It was concluded that using multiple monitors reduced the psychological distance between instructor and students and camera positioned at eye level ensured that instructor and students shared the same visual plane, resulting in favorable immediacy and credibility ratings, reducing disparity and increasing interaction with the instructor, thereby promoting teaching effectiveness.

Sinha, et al (1994), evaluated teleconferencing as an interactive communication for distance education. It was found that though teleconferencing was very useful for distance teaching, the time for question-answer session was very little. Due to this, interaction was very little. Graphs and Charts used for presentation were not legible and clear. Thus, care must be taken to use them properly so as to make lecture presentation more effective.

1.12.2 Teleconferencing and its Tele techniques

Apparently researchers in their work have focussed their attention more upon the technology than on "know-how", tele-techniques and human factor of the technology. "In most cases, technology has been the major consideration with very little attention being paid to the human aspects of sophisticated support systems, perhaps that is the reason why the success of teleconferencing is not fully attained in distance education (*Laaser*, 1987). *Boone* (1985), rightly points out that, "huge investments have been made in designing user friendly systems but the fact remains that most complicated process involved in teleconferencing is that of human communication" (p.5). Focussing on the performance aspect of a teleconference, *Parker* (1984), discusses the need to consider several communication skills or 'tele-techniques' that a moderator or teacher must learn for conducting an audio conference, such as:

(i) **Humanising**: Creating an environment of connectedness; e.g. addressing students by their names;

(ii) **Participation**: Enhancing students participation in the programme; e.g. role playing; question and answer strategy;

(iii) **Message style**: Making presentations more interesting and persuasive by using a variety of formats such as discussion;

(iv) **Feedback**: Gathering feedback regarding the clarity and relevance of information; e.g. by pausing or asking questions.

These tele-techniques are applicable in a teleconference or video-conference as well. However, a teleconference or videoconference because of its added visual component, demands more complex and additional tele techniques.

A few attempts have been made to prepare some guidelines for effective presentation techniques in conducting a teleconferencing session. A natural, relaxed, conversational style of the teacher helps to make the student more relaxed and involved in the session (*Tykwinski and Poulin*, 1991). Talking too fast will make the communication difficult to comprehend and will be construed as a sign of nervousness (*Massoumian*, 1989). Clothing should be comfortable enough for ease of movement; solid stark colors in clothing are appealing on the screen; small and busy patterns, fine checks or stripes become distracting as they shimmer on camera; etc. (*Tykwinski and Poulin*, 1991). Students and teachers alike feel that the teaching end of the conference should resemble a classroom situation with free movement of the teacher making him/herself more comfortable and natural (*Sinha*, et al. 1994).

Movement breaks the monotony and helps in engaging as well as maintaining the interest level of students. But a teacher should be careful not to overdo certain actions, because the TV camera tends to exaggerate mannerism. Some people struggle constantly with their ties or stroke their hair very frequently, and such actions can be perceived as signs of nervousness or lack of credibility (*Massoumian*, 1989; *Tykwinski and Poulin*, 1991). There is strong emphasis that a teacher should have frequent eye contact with the students by looking into the camera lens (*Abbot, Dallat & Robinson*, 1995).

It is interesting to note that the guidelines prepared are based on intuition and the personal experiences of those involved in organizing teleconferences than on some concrete research evidence. Interestingly some of the suggestions made by authors are not in line with the conclusions derived from experimental research. For instance, *Abbot et al* (1995) and *Massoumian* (1989) have emphasized that teacher's frequent eye contact with the tele learners adds to the credibility of the presenter. However, evidence from television research (*Baggaley, et al.*, 1980; *Coldevin*, 1981) suggests that too much eye contact with the students may have a negative influence on the perceptions about teacher's credibility. This could be due to the fact that looking directly into the camera is generally associated in commercial TV with the news reporters and anchor persons whereas subject matter experts are generally shown in an interview situation. The review of the evaluation research (*Sinha; Kishore and Hashmi*, 1994), observations of teleconferencing sessions in formal feedback collected from students and the student support staff involved in the programme, a qualitative study on students' perception by the ERT Unit of IGNOU, reflect the following concerns regarding the presentation:

(i) The teaching component is usually very long without any breaks and without much visual support despite the scope in the lesson.

(ii) The teachers look non-professional and do not take advantage of the medium. Their approach is dry and unfriendly, they seem tense and very formal. It seems as if they were reading through the book.

(iii) The graphics used during the teleconferencing sessions are drab, unimaginative and often lack clarity. Their flaws become noticeable as they usually stay for long time.

(iv) The background of the presenters is usually very boring and restricts movements.

It may be deduced that tele-teaching sessions of IGNOU suffer from dull and monotonous presentations which do not evoke enough interest and attention of the students.

Lehman & Dewey(1998), with their more than 30 years of teleconferencing experience in the University of Wisconsin developed a framework for working with clientele and for planning training session. The framework outlines seven critical areas that are essential to consider when planning to use teleconferencing or videoconferencing. The "7 keys to success" include:

1. Understanding the participants
2. Knowing the environment.
3. Working as a team player.
4. Developing formats and strategies.
5. Creating interaction activities.
6. Integrating support.
7. Monitoring for quality.

These keys include all the areas necessary while considering teleconferencing or videoconferencing: preplanning, development, design, management, assessment and follow up.

Hsu and Sammons (1998), in a paper, "The invisible barriers in teaching at a distance through technology", stated that many a times technologies become ineffective due to border elements such as body language. Thus instructors while delivering through teleconferencing mode should take care of this element.

Zimmer (1988), contends that, "videoconferencing is television and the medium is much of the message" (p. 87), and that people who are exposed to commercial television are used to the production techniques of commercial television. He points out that "good television is rarely boring and many of the professionals for whom our programmes are designed have the same discriminatory expectations that they have from television" (p.87). He further believes that it is quite possible to give a one-hour lecture in a face-to-face teaching situation, but the same attempt can be disastrous in a videoconference. Unfortunately, in educational institutions, videoconferencing is usually in the hands of administrators and academics who are comfortable delivering lectures and fail to explore the technological "know-how" so as to use the technology in the best possible way. *Salomon* (1979), appropriately points out that treating technologies as invariant and discrete entities ignores the number of possible ways in which technology can interact with learner and content, and limits the perception of what can be accomplished with a given technology.

Horner (1998), in 'ways to improve distance teaching using tele-conferencing' focuses on using graphics and other interruptions to break up lectures or speeches.

Wakamatsu (1998), evaluated a videoconferencing system for lifelong learning at a distance between Koriyama Women's University (Japan) and rural public halls, using a student questionnaire to rank pedagogical and human factors. Results indicated that the system was acceptable to students, content affected evaluation and a sense of unnatural compressed video was overcome by repeated experiences. Thus, teleconferencing /videoconferencing programmes should be scheduled frequently.

Parkash and Lal (1996), focused on using Satellite Technology for special orientation of Primary Teachers in Madhya Pradesh, where emphasis was on presentation aspects and production values of teleconferencing for teacher training. The sample of 164 trainee teachers undergoing special orientation program was randomly selected from different centres of Madhya Pradesh. The data was collected by administering questionnaire. Frequencies and percentages were used to analyse the data. The major findings were: 65 percent of the respondents had no problem in understanding the language of the experts / presenters. But the reasons for those who had problems were TV sound / programme. Sound not very clear, use of English and uncommon words, speaker's pronunciation not very clear; speed of speaking very fast and speedy removal of cards from the screen. The findings also indicated that pictures/graphics/written text also have a bearing on the effectiveness of presentation and production value. For further improvement of presentations and effectiveness of teleconferencing some of the suggestions given were : more video programmes/clips make programmes interesting; questions in interactive sessions should not be ignored; presentation should have spontaneity; materials shown in demonstrations should be available in the schools; experts should have a clear voice and fluency in language.

Jones (1995), conducted an in-depth analysis of presentation styles, information technology usage, questioning strategies, and teacher and student evaluation in interactive telecourses. The data were gathered by means of teacher and student surveys and two concurrent content analysis. The findings suggested that lecture as a presentation style worked well for certain courses. For others, it was less successful. Courses whose teachers used more interactive

questioning and technology strategies were generally better received. Teachers used the technology in very individualistic ways. For students, interaction seemed more related to how technology was used rather than what was used. Interaction appeared more adequately defined as a teacher's timely and consistent response to students rather than as specific activities done in the classroom. Surveys suggested that course judgement for students as a group varied most closely with student motivation, the teacher interaction that students thought occurred with regard to the class, and the amount of empathy students felt from the teacher.

Reinhart and Schneider (1998), examined the relationship between student's perception of the two-way audio/video classroom and their anxiety, as well as their satisfaction with their distance learning experience. Students (n=22) in 12 two-way audio/video distance classes at two major mid-western universities and 2 mid-western community colleges completed inventories that measured their anxiety in the distance situation, satisfaction with learning in the distance environment and perception of key elements in the two-way audio/video learning environment. Environmental variables were subdivided into perceptions of the physical environment. The data collected for each measure were correlated and step-wise regression analysis were done. The findings indicated that there is a positive relationship between students' anxiety in the distance situation, their satisfaction with learning in the distance environment and their perception of key elements in the two-way audio/video learning environment. Thus, the findings suggest that physical environment including infrastructure inside viewing room is an important factor for successful teleconferencing.

Patricia, Carusetta, Maher (1998), did the comparison of a nursing course delivered by videoconferencing (n=21), administration course via audiographics (n=23) and education course via audioconferencing (n=31) and showed that, regardless of the technology, learners were most influenced by instructors teaching style. In the context of teleteaching or teleconferencing, one needs to understand and investigate the conditions under which learners' attitudes towards the presenters' integrity, subject mastery and poise are enhanced (*McNabb*, 1994). The effects of such situations on the reactions and attitudes of learners is an area of critical significance in a mediated environment since students / learners are in touch with the subject experts through the interface of a TV screen. It is also important to realise that a subject expert / teacher, however good, needs to be transformed into a live TV instructor for an effective learning outcome to take place.

1.12.3 Bringing Schools to the Learners' Doorstep

The general tendency in a teleclass is to use a talking head approach or lecture based instructions is an expensive misuse of the technology (*Moore*, 1989). Educational TV research which compares one version of a program (e.g. lecture based) with another version (e.g. lecture supported by relevant audio-visual aids) indicates that a more dynamic presentation helps to ensure retention of content, and also encourages student discussion. For instance, *Morris* (1984), used two different versions of a TV programme with the same content. The first version was a simple talking head delivering the lecture, whereas the second version had the same talking head interspersed with several audio-visual effects like video animation, dramatisation, split screens, super imposed graphics and freeze frames replacing the chalkboard. *Morris*' results showed that the

experimental group with the audio-visual-effect version performed better than the control group on conceptual questions involving both immediate and delayed recall.

Latchem and Rapley (1992), claim that videoconferencing is simply an extension of good classroom practice. However, as *Emery and Schubert* (1993), have rightly argued that, videoconferencing failed to bring learners together with one another or with a teacher; thus it presented a new kind of challenge, and should aim at overcoming barriers to communication by improving the quantity and quality of interaction. The makers of teleteaching should set the stage for a comfortable and conducive learning environment. The fact that in a teleclass the learners are missing the teacher's human presence, and are only sensing this presence through a TV screen, demands that the screen should aim at grabbing the learners' attention.

There can be no doubt that good attention is a prerequisite for interaction. In fact gaining and maintaining learners' attention is crucial to a learning situation irrespective of the medium used for instruction. In *Gagne's* "event of instruction" (*Gagne and Briggs*, 1987), each event is expected to evoke a specific response in the learner; the cumulative effect of all these events leads to the ultimate learning. In most teaching situations, all the events of instruction are crucial for learning to take place, but some events have added significance in a teaching situation involving video conferencing.

Gagne's first event of instruction (gaining and maintaining learner's attention) is probably the most vital in videoconferencing. It has been observed, in the educational TV situation, that once the novelty of the medium has worn off,

it becomes increasingly difficult to keep the viewers constantly alert and attentive (*Karnik and Chander*, 1976).

Mitchell (1978), indicates that in situations where students do not have the opportunity to review the material, attention-eliciting techniques must be employed. If the TV monitor used in a teleconferences cannot attract and maintain its viewers' attention through a lively presentation of the content, one can assume that the experience might not lead to a deep understanding of the content. *Mitchell* (1978), indicates that "attention may be controlled not only by instructional messages but also by the manner of presentation" (p.2).

The claim that everything that one can do in the classroom can be done via teleteaching is largely true, but teleteaching requires different strategies and practice wherein live TV medium is involved. *Baggaley* (1973), argued that "the strategies of TV presentation equip a producer with aids to educational effectiveness that are never available in the conventional teaching situation" (p.19); and it is hoped that when such strategies are applied in teleteaching a 'hybrid TV form' will emerge, utilizing:

a) the audio visual techniques of television to bring the student a rich array of visual materials otherwise unavailable in the classroom; &

b) the potential of teleconferencing to capture the dynamic, spontaneous interchange between student and teacher, and student and student.

Abbot, Dallat, Livingston and Robinson (1994), observe that "the principle of face-to-face contact highlights the fact that the use of videoconferencing is a means to an end in terms of effective teaching and learning and that it does command a delivery of its own" (p. 91). This style of delivery has more in common with TV presentation and live presentation. A teleclass provides better

opportunities than classroom teaching to enrich the content by exploiting various sources of information. This does not mean that it can replace classroom teaching.

Bates (1980), indicates that television, by virtue of the amount and kind of symbol systems available to it, can be utilized for educational purposes as can no other medium. Teleteaching is not classroom instruction in its true sense. For instance, fixation upon a video monitor can be more stressful for participants and facilitators than looking at a live presenter (*Emery and Schubert*, 1993). This suggests that one may need to break the monotonous teleteaching presentation by designing more activities than a live classroom session would usually contain.

As *Abbot, et al* (1994), argue : "When videoconferencing is judged by the standards of classroom teaching and learning, it can approximate to the standards of a 'real life' classroom, but it does not equal them, and can never be 'quite as good'; however, when judged by the standards of open and distance learning, it has a potential, and a challenge of its own" (p.90).

It appears that the yardstick for measuring effectiveness is always a face-to-face classroom setting. Unfortunately, face-to-face classroom teaching is no longer an ideal form of education. In these changing times, teachers are facing challenges which never existed before. They are dealing with increased class sizes, limited funds and new communication technologies. The latter are enabling us to plan virtual classrooms, virtual conferencing, virtual laboratories and virtual fieldwork. We have already entered into what is being called 'the third phase of non-formal education': that is networked education (*Jandial*, 1996). The important question now is whether or not, with the latest interactive technologies at our disposal, we should be emulating classroom teaching in distance education.

It is clear that the teleconferencing has become an integral part of student support system in many distance teaching institutions. The paradox, however at the conceptual level is that, on one hand, distance education claims to overcome the need for a classroom environment including interaction of learners with area experts; and on the other, teaching through teleconferencing is regarded as an extension of classroom teaching. Thus, all efforts are directed towards emulating a classroom instruction situation with the least concern for the various aspect and phases of teleconferencing like preparation, presentation, interaction, production and feedback. There has been a total indifference to the views and reactions of makers and recipients of these two-way interactive instructional programmes.

Therefore, there is a need for systematic inquiry, both at teaching as well as learning ends keeping in mind the various aspects and phases of teleconferencing.

1.13 The Contribution of teleconferencing to Distance Education

Various forms of teleconferencing have become an integral part of distance education systems in developed countries. In North America, audio and video teleconferencing have been used both at high school and higher education levels. In USA, the student groups in sparsely populated states such as Montana, Minnesota, Alaska, the Dakotas and Arizona interact with each other through videoconferencing (*Massoumian*, 1989). The University of Wisconsin has the world's largest and the most sophisticated audio conferencing system (*Murphy*, 1988). In Australia higher education system, where several universities and colleges merged to form large multi-campus institutions to reduce duplication of services, teleconferencing plays a central role (*Baker and Hansford*, 1990).

Several Canadian universities have been using audio conferencing for seminars and tutorials (*Jeffery*, 1980, *Buchanan and Macintosh*, 1997). In the province of Alberta, as in many other Canadian provinces, access to higher institutes of learning can at times become problematic for remotely based and geographically dispersed aboriginal populations. In 1995, the University of Alberta, Fairview College and Kayas Cultural Colleges started a distance education project in partnership by offering Faculty of Arts course to communities in remote sites of North-Western Alberta using multi-point videoconferencing as their primary mode of delivery *(Keast*, 1997). The British Open University uses audio and audio/graphic conferencing called Cyclops for its tutorials (*Murphy,*1988). Interestingly many developing countries have also taken a lead in using teleconferencing.

The IGNOU, India, and the University Sans Malaysia in Malaysia, are using teleconferencing in a major way to provide tutorial support to their distant learners (*Idrus*, 1993).

According to *Khan* (1998), IGNOU caters to the needs of 4,00,000 students spread over the length and breadth of the country, and has adopted teleconferencing as an important component of its delivery system. The University conducted 246 hours of teleconferencing in 1995, 483 hours in 1996, 495 hours in 1997 and approximately 530 hours in 1998. IGNOU plans to cover 40% or even more of IGNOU's face to face counselling sessions, to be conducted through teleconferencing for some of its courses like Management Studies (*Khan*, 1999). Such decisions would definitely offer economies of scale as a single resource person at the teaching end can communicate and interact with a large number of participants present at their respective learning ends.

Various other Indian agencies such as the National Open School (NOS), The National Council of Educational Research and Training (NCERT) and The Indian Institute of Technology (IIT) have made use of IGNOU's teleconferencing facility and receiving centres in conducting their courses and counselling approximately 300 hours in 1996, 234 hours in 1997 (*Rao and Khan*, 1998) and 213 hours in 1998.

Rapid innovations in the technology of teleconferencing (e.g. compressed digital video, fibre-optic cables, etc.) have made teleconferencing more versatile, cost-effective and adaptive to the needs of the distance education system (*Walsh and Reese*, 1995). Teleconferencing as a cost effective alternative to face-to-face meetings has been extensively used for staff training and information sharing in the commercial business world (*Gant*, 1996). Organizational training is one area where teleconferencing has been extensively used in public and private sectors alike. The US Defence Intelligence Agency's Joint Military Intelligence Training Center (JMITC) started distance learning/video teletraining (DL/VTT) programmes in 1992 using two-way audio/video system with multimedia capabilities (*Gant*, 1996). Similarly, the Florida Training Project (FTP) aimed at training military personnel based at centres in Florida, Alabama, and Rhode Island is an extensive project which involves the development, delivery and evaluation of five military courses (*Bramble and Martin*, 1995). Technological developments in teleconferencing systems such as Integrated Services Digital Network (ISDN) promising maximal interaction, are being exploited by distance educators (*Fox, Loutsch and O'Brien*, 1993). By an ISDN system, all devices, such as, telephone, fax, computer, modem and cable television can be

connected through a single network, thus providing great economies of scale; for the user does not need to acquire a separate telephone line for each application.

In certain situations, teleconferencing remains the only viable means to reach the target audiences. For a one-day training course concerning the health services, 9,000 teachers and administrators were to participate in Dallas, Texas. However, organizers could not find a single place to accommodate all the participants and there were not enough resource persons to go to all sites. Teleconferencing is a solution to such problems (*Fox, Loutsch and O'Brien*, 1993). Colleges and schools which are thousands of miles apart are working together on subjects with the aid of teleconferencing facilities (*Verrecchia*, 1995). In India, NCERT's programme, "Orientation of Elementary Teacher Educators through Interactive Video Technology" held in October 1997 was attended by seven hundred teachers distributed across 20 locations in Madhya Pradesh. Teleconferencing was the only viable option since it was not administratively possible to bring all the participating teachers at one location for want of space and equipment (*Phalachander*, 1997). Schools are opting for teletraining in the face of dwindling resources, declining budgets and the lack of specialized laboratory equipments. It is evident from the literature, that teleconferencing in its various forms is contributing significantly to an unprecedented growth of distance education (*Verrecchia*, 1995).

Donna (1990), studied the effective differences between host-site and remote-site distance learners participating in two-way interactive television classrooms. The study used a comparative design to measure the intensity of affective reactions towards the ITV experience. An attitude agreement scale had students react to extremely favorable or unfavorable statements about the two-

way interactive television classroom experience. The statements were related to five research questions, which sought to find general affective differences and those affective differences related to personal contact with the teacher, feedback from the teacher, teacher control and discipline and perceived cognitive achievement. Results of the study showed that there were some general affective differences between host-site and remote-site students, and that there were some statistically significant affective differences between groups of students related to personal contact with the teacher, teacher feedback and perceived cognitive achievement related to the amount of time the teacher spent with the students. There were no statistically significant group differences attributable to teacher control and discipline.

Dexter (1995), examined the differences between academic performance outcomes and satisfaction levels of distant learners of one-way video and two-way audio mode as compared to that of students enrolled in campus based instruction taught at the same time by the same instructor. The sample included 286 campus-based students who were in attendance in the classroom and 132 distance learners who were viewing the interactive courses. The findings showed that more female (59%) than males (41%) students enrolled in distance education courses and in the age group of 17 to 30 years (80%). It showed no significant difference between the campus based students and distance learners in terms of final course grade. It was also found that most of the distance learners felt included as a member of the class and they learned just as much as they would have in a regular on-campus course.

Ritchie (1990), studied the effects of three types of interaction mode on participation, attitude, achievement and anxiety during two-way audio and one-

way video instructional programmes. The data indicated that the instructor-facilitated treatment resulted in a significantly higher level of student interaction. Using the attitude scale, attitudes towards instruction did not differ significantly among subject groups or treatments. Subjects were more reluctant to use microphone to communicate during the student – initiated interaction mode than during the instructor – facilitated interaction mode. Achievement did not differ significantly among subject groups or treatments. Anxiety increased with the number of exposures to televised instruction. Subjects perceived two-way televised instruction as impersonal (43 %) and discussion was an important part of instruction (66 %). One half (51 %) of the subject reported that they benefited from class discussion by listening rather than by participating during two-way televised programme.

From the above it could be concluded that since interaction did not increase achievement or attitudes towards instruction, the interaction levels would not justify the expensive technological hardware and transmission cost. Here for a more thorough statistical study of interaction during two-way televised instruction, methods of increasing subjects' participation need to be developed.

Briton (1992), examined the perceptions of students towards the course content, satisfaction with the instructional delivery method (two-way audio, one-way video) and students outcome in an interactive distance learning programme. Graduate engineering students were the sample. The students at the remote site and urban site were able to draw the attention of the instructor if they were confused or needed additional explanation on a topic by using one-touch system. Attitude scale was used towards course content and satisfaction with instructional delivery method. Results of data analysis indicated no difference in perceptions

of course content or instructional delivery methods. Based on the delivery site of the students, there were no differences in student outcomes as measured by the weighted interim exam grades, final exam raw scores and total points in the class. The students in the programme were primarily male and under 40 years age.

Crowe (1990), analyzed the perceptions of parents and students under 'Providing Academics Cost Effectively (PACE) projects' two-way interactive instructional programme centered in rural locations. The results of the data analysis disclosed that parents and students did not differ in their opinions towards the use of two-way interactive television in distance education . While both groups were positive towards the use of two-way interactive television, parents' opinion appeared more favorable than those of students who indicated higher levels of reservation with this system. Parents were not in the classroom and did not experience first hand, the technical problems that seemed to be the focus of complaints by students in their subject comments located in the end of the survey.

Worley (1991), compared the two delivery modes (two-way audio/video and one-way video and two-way audio modes) using quasi-experimental design to study the students' achievement and attitudes and instructors' attitude. Pre and post tests and course's final examination were used to measure student achievement. Student's attitude was measured using student attitude survey while interviews were conducted for instructors' attitude. Findings revealed that compressed digital video was a highly effective instructional delivery mode based on pre / post test comparison and final examination scores of both treatment

groups. Instructors preferred two-way video / two-way audio significantly more than one-way video / two-way audio. No significant difference was revealed in students' attitude between treatment groups. After experiencing compressed digital video instructional delivery, both groups rated course instructor instruction, course content and course delivery medium highly. Additionally both groups rated time and distance as important factors in choosing to attend future courses via instructional television.

Sclater (1990), did an investigation of national and international approaches to teleconferencing in continuing and distance education. The main objective was to establish an informational and inter-disciplinary body of knowledge in the field of teleconferencing that would facilitate the undertaking of research leading to the development of models of organizational and programmatic design appropriate to the medium. A survey of teleconferencing in the United States, Canada, Australia, New Zealand and Fiji in institutional categories of (a) elementary and high school education, (b) community college education (c) higher education (engineering; bio-medical; general) (d) Commerce and industry. The findings reveal that there is a continuing high level of use for the teleconferencing and also the amount of use of multiple teleconferencing technologies by the various institution. Investigation also shows that a very high level of enthusiasm for the teleconferencing as expressed by the respondents.

Daugherty(1989), using a quasi-experimental design of the non-equivalent control group type, assessed the effect of pre-videoconference training under distance education courses for on-site seminar learners on samples from two population (on-site learners and participants attending the videoconference)

looking at the seminar learners' and participants' attitudes towards videoconferencing and participants' knowledge gain concerning home-based business. The findings indicate that having an on-site seminar, learners who had received instruction by workshop did not affect attitudes towards videoconferencing or knowledge gain about home-based business. Further, it indicates that the seminar with videoconference was successful in imparting to participants' knowledge about home-based business.

Dash (1996), studied the reactions of primary school teachers of Gwalior district, Madhya Pradesh towards training through interactive television. 26 teachers from 4 blocks of Gwalior District participated in the experiment. The training program namely Special Orientation Program for Primary School Teachers (SOPT) was conducted by the National Council of Educational Research and Training (NCERT) using interactive television technology from August 2 – 8, 1996. To measure the reactions of the participants towards training through interactive television, a questionnaire was developed. The major component were contents and their presentations, interaction between the experts and the participants, technology related matters and activities at the training centre. Data collected from the participants were analyzed by Chi-square technique. It was concluded that primary school teachers expressed favourable reactions towards training through interactive television. These findings were supported by *Maheshwari and Raina* (1996), who reported that there was an overall favourable response towards the various components of interactive video technology such as the panel discussions, TV programmes and their presentation.

Ciferentes, Murphy, and Davis (1998), did case study which focussed on the effects of collaboration activities between two teachers and their students. The authors explored the effectiveness of distance learning for students in promoting self-esteem, achievement and multicultural understanding. This project demonstrated that, in networked classrooms, students can connect with distant others to learn about their perspectives and increase their multi-cultural understandings. From overarching themes emerged the data – growth, empowerment, comfort with technology and mentorship. In addition distance technologies can foster team teaching across cultures and geographical distances. The main technology used was teleconferencing.

Foster (1993), studied the effects of interactive teleconferencing as an instructional medium on the learning environment for students. Subjects were all persons enrolled in a required graduate course offered by the school of social work at University of North Carolina – Chapel Hill and Asheville. Single case design was used to compare classroom processes as teaching strategies of face-to-face instruction and interactive teleconferencing which alternated weekly. All classes were videotaped and analyzed for themes and patterns in interactions. Direct observations of classroom behaviour, focussed group interviews and the relationship of selected learner characteristics of student participation and satisfaction were considered. Specific relationships explored included, the effectiveness of the medium for student with differing learning and personality style preferences, the influence of the medium on group dynamics, teacher – student interactions and other classroom behaviour. Data analysis used a within-case comparison of classroom behaviour by instructional method. Differences in response to instructional methodology by learner characteristics were analyzed.

Comparisons between telecast and on-site instruction revealed that faculty teaching methods, student-faculty interactions and peer interactions differed by method. Faculty used more monologue, reading and visual cues to focus discussion and students more often guided topic-shifts during telecast. Students identified by learning style or personality type preference varied in their responses to the medium, but definite patterns could not be established.

Videoconferencing or teleconferencing is an effective technology that may be used in distance education settings (*Willis*, 1996). But, as with other technologies, their usefulness is directly related to the professor's understanding of its benefits, limitations, and utilization strategies (*Willis*, 1996). Video / teleconferencing is foremost an information technology issued from the fusion of telecommunications and computer sciences. It is a powerful communication technology allowing one or many groups, in one city or region, to communicate live with one or many other groups anywhere in the world, using a combination of audio and video equipment (*Emery & Schubert*, 1993). Its essence is interactivity (*Mathews and Reiss*, 1995). In brief, videoconferencing or teleconferencing allows us to simulate electronically the face-to-face interaction of conventional education.

'The distance education literature today is reporting growing acceptance of video/teleconferencing for education and training purposes' (*Bramble and Martin*, 1995; quoted in *Keegan*, 1995, p. 22). According to *Portway and Lane* (1994), as far as education and business are concerned, it represents the fastest growing segment of the electronic telecommunications market in the United States. When correctly designed, video/teleconferencing systems are an excellent way to teach

(*Keegan*, 1995). Indeed, the universities of Karlstad in Sweden, Southampton in England and Ulster in Northern Ireland are both nationally and internationally renowned since they began offering videoconferencing and teleconferencing to their students (*Marot and Darnige*, 1996).

Thus, to determine the impact of video / teleconferencing on distance education that is both accurate and realistic, an inventory of various studies throughout the world in a continuum covering 1984 to 1996 was developed by *Fillion, Limayem and Bouchard* (1999). The table below contains a summary of this inventory. The left-hand side of table gives a summary of the findings of each of the studies. Each finding is followed (in brackets) by the corresponding number(s) of the authors and locations at the right-hand side of the table. The literature on the subject also yields numerous other benefits and some limitations of videoconferencing and teleconferencing. As shown in the table, the benefits clearly outweigh the limitations and more so for the students, specially distant students. Also, these various benefits are generally more present for students at remote sites rather than for onsite students. Moreover, these benefits further concern a course typology including method, media, mode and content for active student participation.

Table 1.1: Past studies on the impact of videoconferencing and teleconferencing in distance education

Findings	Authors and Locations
▪ Increased opportunity for continuing education (1)	1. Carl, 1984 (Nova Scotia)
▪ Increased educational perspectives (4)	2. Branch et al., 1987 (Alabama)
▪ Equity in the curriculum (16,17)	3. Catchpole, 1988 (Norway)
▪ Enhanced educational effectiveness when remote groups are small (11)	4. Halcrow, 1989 (Minnesota)
▪ Improved student performance (1,12,25)	5. Hobbs and Osburn, 1989 (Dakota and Missouri)
▪ Increased pedagogical effectiveness (2)	6. Wilson, 1990 (Oklahoma)
▪ Improved student learning (3,13,20,25)	7. Heinzen and Alberico, 1990 (New York)
▪ Increased student creativity (7)	8. Riddle, 1990 (Colorado)
▪ Positive changes in student attitude (7,12,13)	9. Baker and Hansford, 1990 (Australia)
	10. Kabat and Friedel, 1990 (Iowa)
	11. Bland et al., 1992 (Tennessee)
	12. Ellis, 1992 (Ohio).

- Improved student academic and social integration (18)
- Increased student appreciation of the course's progress (3,4,8,9,10,17,19,23,24)
- Increased student motivation (6,7,13,20,23)
- Increased student/student and student/professor interaction (3,6,11,13,19,20,21,23,25)
- Increases student autonomy (2,6,7,13,18,20,23)
- Increased student support and collaboration (3,13,18,20,23)
- Increased student satisfaction (2,3,5,6,9,18,23,24)
- Development of student receptiveness and spontaneity (1)
- Increased access to technologies (22)
- Redefinition of teaching (22)
- Increased student anxiety (14)
- Increased dropout rate caused by a strong student dependency on the professor (16)
- Resistance to change (15)

13. Dallat et al., 1992a, 1992b, 1992c (Ireland)
14. Jegede and Kirkwood, 1992 (Australia)
15. Schrum, 1992 (Oregon)
16. Ismail, 1992 (Asia)
17. Barker and Hall, 1993 (32 American States)
18. Towles et al., 1993 (Lynchburg)
19. Miller et al., 1993 (Georgia)
20. Abbott et al., 1994 (Hawaii)
21. Zhang and Fulford, 1994 (Hawaii)
22. Miller and Husmann, 1994 (Nebraska)
23. Bramble and Martin, 1995 (Florida)
24. Sorensen, 1996 (Iowa)
25. Whetzel et al., 1996 (United States)

Thus, there's a need to investigate from the point of view of content method, media and mode used in teleconferencing for IGNOU courses.

1.14 Evaluation Studies on Teleteaching

Feedback studies on UGC INSAT – CWCR programmes during the initial year (1984-85) revealed the following results (*Swaminathan*, 1986), that (i) the programmes could be made more meaningful, if they were produced, keeping in mind the syllabus and the subject preferences; (ii) efforts are to be made in order to improve the presentation and rectify some of the technical flaws; (iii) more structured programmes are needed. UGC INSAT Cells analysis of feedback reports from students, teachers and general public (*Mishra*, 1988-1989) indicated the usefulness of country-wide classroom programmes in many respects. During 1988 and 1989 out of total feedback letters received it was found that the respondents structure was as follows: students – 42 percent; general public – 47 percent; and academics – 13 percent. It reveals the awareness as well as

popularity of countrywide classroom programmes among different groups of interested viewers of teleteaching.

Another study conducted by UGC INSAT project (*Mishra*, 1990) revealed that in the Himachal Pradesh, almost half of the viewers (49 percent) found the language of the telecast difficult to comprehend because of speed of delivery and the pronunciation of the presenter.

Mohanty and Sahoo (1991), did content analysis of around 25 teleteaching programmes telecast during Aug. 12-20, 1991. They observed the following in these programmes: (i) knowledge objective was given higher emphasis in 88 percent of the programmes, (ii) formats in most of the programmes included lectures, discussion and interviews, (iii) interviews with experts, documentary films and lecture with demonstration were found most attractive, (iv) most of the programme were adequate with regard to content, visuals and voice. The visuals were attractive and voice was quite distinct and normal.

Niemi, Owens and Ehrhard (1977), focused on evaluation research aiming to supply summative data as the basis for planning future video-teleconference distance education (VTDE) classes. The sample comprised of students of graduate level and instructors. The data was collected through written records of class activities with special attention to problems directly related to VTDE. Responses of students and instructors were also collected using Likert scale and narrative responses. Mean and standard deviation were used to analyze the data.

The outcome of summative evaluation in terms of students and instructors responses revealed that on-site staff was helpful. The teleconference effectively made up for the absence of the instructor. It was also observed that there could

have been more interaction among students when the instructor was present and when technical problems are dealt immediately. The interaction between sites could be enhanced if each participating person submits a brief, written, autobiographical sketch at the beginning of the course. The instructor's teaching style is important to facilitate learning in VTDE. Conducive environment including good lighting, temperature etc. are important factors for effective VTDE. It was found that VTDE provides a platform for intera and inter communication through dialogue, visual contact or the joint colloquium.

1.15 Effectiveness of Teleteaching Programmes with and without Talkback Facilities

In India, *Sahoo* (1991), conducted an experiment on effectiveness of countrywide classroom (CWCR) programmes with and without talkback facilities. Besides the criteria of learners' achievement, critical analysis was made about the content and presentation of the programmes. The findings regarding content and presentation of teleteaching programmes or CWCR programmes revealed positive elements like – clarity of sound and visuals; appropriateness of colour choice; optimum co-ordination between the sound and the visuals; well sequenced visual presentation; adequacy of teaching points within given framework of timing of programmes; suitability of speed of presentation; adequate discussion on individual teaching points; suitability of language at grade level; comprehension level of programmes. On the whole, the programmes analysed were found well designed and produced. Out of ten programmes selected for experiment, significant achievement gain was witnessed in the case of pre-telecast and post-telecast of eight programmes. In case of two ineffective programmes it was found that the programmes were just solo talk; did not

incorporate any visual, and the speed of delivery was relatively fast. There was no significant difference between the mean achievement scores of Hindi and English medium students of eight out of ten programmes. In the case of rest two programmes, English medium students fared better than their Hindi medium counter parts. Only in the case of thirty percent programmes talkback input contributed towards significant increase of achievement scores of students over that of the non – talkback input learners. In the case of rest of the programmes no significant difference was witnessed between achievement scores of students exposed to talkback inputs and students not exposed to talkback input. Majority of the students exposed to teleteaching learning programmes expressed high position reactions about different aspects of the programmes like : audio-video presentation; compactness; teaching points; language comprehension; music; demonstration; reflective level and questions raised in the programmes.

Singh (1991) conducted a study of effectiveness of countrywide classroom programmes on Models of Teaching with and without talkback and through interactive mode in simulated exposure situations. The study was conducted on the sample of B.Ed. teacher trainees. The study revealed following results: the post-test achievement mean score was significantly higher than the pre-test mean achievement score in case of all the five programmes on models of teaching; there was no significant difference between achievement scores of Hindi and English medium students even though the programmes were telecast through English language; there were additional gains through talkback inputs in the case of two models of teaching viz. concept attainment model (selection strategy) and advances organizer model; whereas talkback inputs were not effective in achieving gains of learners in the case of concept attainment model

(Reception Strategy), synectics and inquiry training model; the mean achievement of learners with interaction inputs in between video play of programmes was significantly higher than the mean achievement of learners without such input in the case of two programmes viz. synectics and concept attainment model (selection strategy).

Biswal et al. (1997), analytically studied teleconferencing for training teachers of National Open School (NOS), which was conducted by Human Resource Development Department of NOS from December 17-19, 1996. The sample comprised of 36 tutors using purposive sampling techniques from two study centres. The data was collected through opinionnaire and informal inteviews. Analysis was done using percentage and frequency. The major findings of the study revealed that : talkback facility helped in classifying the doubts instantly; majority (94.4%) expressed dissatisfaction due to audio-video disturbance during the teleconferencing which was due to lack of technical expertise at receiving centers; English language was a barrier during question–answer session as large number of trainees were from Gujarati medium and could not comprehend properly.

Spillane (1993), conducted a case study of first time use of the trans Texas Video Conference Network (TTVN), by the faculty at Texas A & M University. It was found that initial users exhibited a relatively low resistance to using the technology for instructional delivery to distance learners but had a higher resistance in changing instructional style. Instructor satisfaction was related to the amount of modification required in delivery. Instructors using lecture style were the happiest with the TTVN, because the communication pattern between sites was controlled with a minimal amount of two-way interaction.

Fyock (1994), evaluated the effectiveness of two-way interactive television as a distance education mode. Forty six students enrolled in the programme participated in the study. Data was collected from classroom observations, interviews and open-ended questionnaire. Data was analyzed using statistical package for social services (SPSS). The findings showed that distance education using two – way ITV meets the expectation of the students by offering the courses that would not be practical or possible through traditional educational modes of delivery. Findings also showed that some technical problems were found which should be improved while using the technology.

Thus, it is noted that as feedback and evaluation are important components to check on the efficiency of any technology, it becomes a matter of concern to place emphasis on feedback aspect of IGNOU teleconferencing programmes. Thus, the feedback from the receiving ends/study centres regarding the ongoing teleconferencing programmes would help in modifying and making the technology more acceptable for distance education in Indian situations.

1.16 Teleconferencing: Potential for Instruction

Audioconferencing, teleconferencing, videoconferencing and computer conferencing have made it possible to achieve better interaction among instructors and learners. Among the stated types of conferencing, it is teleconferencing/ videoconferencing which succeeds the most in simulating the ordinary classroom environment. Both audioconferencing and computer conferencing prevent the participants from being visible to each other and thereby lack the important information conveyed by body language and eye contact. *Boverie, Murrell, Lowe, Zittle and Gunawardena* (1997), argued that the capacity for almost immediate interaction through live video was one of the key

reasons that made satellite based courses as effective as face-to-face instruction, and that this immediacy had an appreciable impact on student satisfaction; learning was achieved through the 'social presence' of the teacher. The social presence element had been described as:

"The degree to which the on-screen instructor is seen as a real person, with a genuine interest in the distance learners' progress. This characteristic is described in the literature as a function of the on-screen personality's 'immediacy' or closeness in space/time and emotional 'closeness' (Boverie et al, 1997, p.2).

Watching a teacher / expert during a teleconference helps the learner to develop a rapport with the on-screen teacher which ultimately contributes to the richness of the learning environment in case of videoconferencing and two-way audio and one-way video teleconferencing.

Education is more than just the transfer of information, and so an efficient and effective interaction between the instructor and learner becomes an integral part of educational process (*Gaskell and Mills*, 1989). *Baath* (1979), considered two-way communication to be a basic requirement for an effective distance learning environment and *Homberg* (1988) stressed the use of "guided didactic conversation" in distance instruction design. In addition to providing a platform for lively interaction, videoconferencing and two-way audio and one-way video teleconferencing allows the visual presentation of objects and artifacts (*Gay and Lentini*, 1994). It is not inappropriate to suggest that teleconferencing and videoconferencing are the synthesis of the telephone and television, with the additional advantage that the event occurs in real time.

Teleconferencing has made it possible to achieve higher and effective levels of interaction in the following ways:

1. **Face-to-face:** The instructor, resource persons, experts and learners interact with each other with the help of a television screen (phone or fax). The knowledge that they are visible on the TV screen encourages the learners to become active rather than passive learners (*Gaskell and Mills*, 1989). *Idrus* (1993), found evidence that the levels of interaction provided by audio/graphic teletutorials helped "overcome the secretive habits of the Malaysian students, who for some reason prefer to perform alone" (*Idrus*, 1993). With the help of live visual input in teleconferencing and videoconferencing, one can assume that such habits will undergo dynamic change.

2. **Instant:** Since the teleconferencing event occurs in real time, no time is wasted by delayed responses to questions (*Gay and Lentini*, 1994). The immediate clarification and doubts and dense subject matter keeps learners' interest in the lesson alive and renewed. Such a spontaneous question-answer process may be assumed to enhance the retention of subject matter.

3. **Increased feedback:** Teleconferencing /videoconferencing is a very close simulation of the real classroom situation (*Murphy*, 1988). The instructor or expert receives feedback to his/her instructions not only in the form of verbal questions but also from body language and other physical cues (in case of two way audio-video configuration). Further, *Rao* (1990), found that listeners' comprehension would be higher when using communication (like two-way audio and one-way video) in which it is easier to provide feedback. Teleconferencing allows an instructor to restructure or repeat the subject matter for the purpose of clarification.

4. **Additional audio visual aids presentation:** A variety of audio-visual aids are at the disposal of teleconferencing / videoconferencing even with the most basic type of infrastructure. The use of graphics, objects, photographs, video clips, slides helps in better understanding of the subject matter. Needless to mention that in addition to serving a pedagogic purpose, the audio visual support may enhance learners; involvement in the subject matter. Thus it becomes essential to find out how method, media, mode and content of teleconferencing affect 'the overall effect of teleconferencing programmes'.

Teleconferencing promises to meet the challenges of creating an interactive learning environment, a much sought-after element in distance education. It has been suggested, that the technologies can not only influence but also create new techniques of delivery which in turn affect the educational culture and learner's way of understanding and creation of contact (*Bates*, 1995). However, the blind pursuit of technology for its own sake could negatively affect the student-teacher interaction owing to the novelty of the technology (*Tykwinski and Poulin*, 1991). Several studies that have looked into the concerns and attitudes of teleconferencing users also indicates that fear of the technology can have a negative impact (*Treagust, Waldrip and Horley*, 1993), and that teachers' main concerns were their lack of experience with the technology, and self consciousness about their performance and presentation (*Tykwinski and Poulin*, 1991).

These concerns need to be addressed for teleconferencing to be productive (*Bramble and Martin*, 1995). Hence the views of producers and

resource persons who are one of the backbones of teleconferencing programmes production need to be explored in a systematic research manner.

Further, *Moore* (1989), describes three types of interaction relative to distance education: learner-content interaction; learner-teacher interaction and learner-learner interaction. Learner-content interaction is the basis for and defining characteristics of all types of education.

Learner-teacher interaction is regarded as essential by most distance and face-to-face educators. The goal of such interaction is to stimulate, motivate and facilitate educational activities and use of learning strategies. Distance education using teleconferencing provides significant advantages in this area since interactions between student and instructor are individual and not impaired by the necessity of meeting group needs. The provision of feedback and the testing of new knowledge are the most valuable feature of student-instructor interaction (*Moore*, 1989). Do students perceive those interactions between teacher and student that are not private – that take place within the social context of the teleconference – as a valuable contribution to their learning or do they see them as a waste of precious individual learning time? Additionally, is the direct provision of feedback from teacher to student the most valued component of the educational experience or is the creation of new knowledge by the social learning group an equally valued part of the educational teleconference?

The effect of learner-learner interaction has been little studied within a distance education context. Only those types of distance delivery that support group-based as opposed to individual – study have begun to address this form of interaction. Learner – learner interaction is rightfully described by *Moore* as "a new dimension of distance education that will be a challenge to our thinking and

practice in the 1990s" (1989, p.103). On the other hand, *Clark* (1983), warns that the "media are mere vehicles that deliver instructions, but do not influence achievement any more than the truck that delivers our groceries changes our nutrition" (*Clark*, 1983, p.445). Educators have been searching for the "effect" of the medium on learning. Not surprisingly, the results of this research have been inconclusive (*Kozma*, 1991,1994). Media can be used in many different ways to support and enhance learning. Additionally, the students using the media can adapt their learning behaviors and styles to accommodate the strengths and weaknesses of the media. Thus, to discover what learners or teachers like, dislike or find effective or ineffective about any particular medium without consideration of the views and reactions of recipients and makers of the teleconferencing medium based programmes and other components of the learning context tell us very little. *Draper et al* (1994)), noted that "what performs more or less well is not some material or medium (a lecture, learning materials, a teleconference program) but the whole learning and teaching episode" (p. 7).

In order to ensure that the media is not isolated from its context, the present study would investigate the contexts in which the teleconferencing media is used and seeks to uncover variations in method, media, mode and content or usage that influence students' perceptions of learning using this technology (two-way audio/one-way video). This may help distance education field to know that the effect of the media itself is not one factor in the entire teaching-learning context.

Further, a scientific investigation into the various stages of teleconferencing with reference to teleteaching is all the more important when teleconferencing becomes a routine feature of the educational situation rather

than an occasional activity. For example, in a developing country such as India, the distance education institutions together are using more than eight hundred hours of teleconferencing with the help of single satellite transponder and hope to acquire more transponders in the next few years (*Rao and Khan*, 1998). Other future plans of expanding distance education through interaction mode include reaching students through cable network within the surroundings of their homes where they can use their personal phones for talkback purposes. The Countrywide classroom of UGC has also successfully experimented to test the potential and feasibility of talkback approach for the students enrolled in higher education (UGC-ISRO, 1992). There is a growing demand and readiness to accept teleconferencing in education. Its rapid evolution in educational and other training areas is increasing the urgency of scientific investigations into the technology's appropriate use.

1.17 Rationale of the Study

In the purview of present structure of distance education where teleconferencing plays a vital role in IGNOU network of the learning resources, the researcher thought it necessary to explore how the IGNOU teleconferencing programmes would be effective in terms of achievement of the students. Also how persons at different levels of teaching-learning process view this mode. This would include the reactions and views of learners, resource persons, anchor persons, producers and coordinators. Thus it will help examining the questions for the real pedagogical significance on the grounds of expected influence on the learners as well as teachers.

Views vary on the use of communication technology in education. More specially, they vary on the use of teleconferencing as means of enhancing the

quality of education; still technical and non-technical problems in the appropriate use of teleconferencing and in this instance one-way video and two-way audio persist leading to nagging doubts about the usefulness of the whole exercise.

Important among these concerns are questions relating to the changing role of the teachers/experts communicating with unseen participants, pacing the content and varying the format of presentation and even determining what should be the educational content for an interactive session. Concerns about the language used, voice quality fluctuation, working telephone and fax lines, uninterrupted power supplies at receiving ends and any number of logistic details focused towards interaction makes it all the more important to study the persisting system of IGNOU teleconferencing as the very essence of this system lies in "interactivity".

The study also emphasizes the infrastructure and other physical facilities required during the various stages of planning, production and implementation of teleconferencing programme on the part of the different personnel involved and pre-preparation on the part of learners for participating in the teleconferencing programmes. Further, the quality of training and the quantum of coverage need to be studied to appraise the programme. Such appraisal would provide appropriate feedback to the system for its improvement.

The present research attempts to study to what extent male and female learners, those working or not working vary in their reactions regarding the present status of two-way communication system. In addition, their earlier exposure to video and television for education can have an important bearing on the level of acceptance or dissatisfaction by the learners towards

teleconferencing. It was therefore important to know their level of exposure to electronic media and teleconferencing for educational purposes.

Various difficulties experienced by learners as well as resource persons and other personnel involved at different stages of the programme required to be investigated in order to have smooth running of the system. This may be useful in modifying the present IGNOU teleconferencing system which is still at its transient stage. Thus, contributing towards the effectiveness of students' learning at a distance. In the light of this direct, the present investigation has focused on the study of IGNOU teleconferencing for distance learners.

1.18 Statement of the Problem

A study of IGNOU Teleconferencing For Distance Learners.

1.19 Objectives of the Study

1. To analyse the teleconferencing programmes of IGNOU subjects in terms of contents, methods, media and modes.
2. To study the effectiveness of teaching the distance learners through teleconferencing in terms of mean achievement scores.
3. To study the reactions of distance learners regarding preparation, presentation, duration, talkback, technical and non-technical problems and utility aspects of IGNOU teleconferencing with respect to selected variables (sex, type of programme, employment, medium of instruction, level of exposure to electronic media and teleconferencing).
4. To study the views of IGNOU personnel (producers, anchor persons, resource persons) involved in planning, production, coordination and implementation stages of IGNOU teleconferencing programme.

5. To study the feedback on IGNOU teleconferencing programmes with respect to coordinators views regarding attendance, technical/non-technical problems, motivation, participation, utility and benefits of IGNOU-TC programme.

1.20 Explanation of the Terms

Effectiveness: In the present study, effectiveness is the difference in the mean scores at the pre-test and post-test levels. In addition to difference in the mean scores, reactions also represent effectiveness.

Teleconferencing Programmes: It includes the IGNOU subject and course based programmes transmitted through two-way audio and one way video configuration.

Distance Learners: It includes registered IGNOU students.

Talkback: The term "talkback" refers to the post telecast question-answer session where learners from respective receiving ends can ask questions, clarify their doubts, using fax or STD phone (toll free numbers) to the area experts present at teaching end.

1.21 Null Hypotheses of the Study

1. There will be no significant difference in the mean achievement scores of learners on pre-test and post-test regarding the effectiveness of teaching the distance learners through teleconferencing programmes.
2. The reaction of respondents will not differ significantly with respect to sex regarding the preparation of IGNOU teleconferencing (TC) programmes.
3. The reaction of respondents will not differ significantly with respect to sex regarding the presentation of IGNOU teleconferencing (TC) programmes.

4. The reaction of respondents will not differ significantly with respect to sex regarding the duration of IGNOU teleconferencing (TC) programmes.
5. The reaction of respondents will not differ significantly with respect to sex regarding the talkback of IGNOU teleconferencing (TC) programmes.
6. The reaction of respondents will not differ significantly with respect to sex regarding the utility of IGNOU teleconferencing (TC) programmes.
7. The reaction of respondents will not differ significantly with respect to sex regarding technical and non-technical problems of IGNOU teleconferencing (TC) programmes.
8. There will be no significant difference in the reaction of respondents with respect to sex regarding overall aspects of IGNOU teleconferencing (TC) programmes.
9. There will be no significant difference in the reactions of respondents with respect to employment regarding the preparation of IGNOU teleconferencing (TC) programmes.
10. There will be no significant difference in the reactions of respondents with respect to employment regarding the presentation of IGNOU teleconferencing (TC) programmes.
11. There will be no significant difference in the reactions of respondents with respect to employment regarding the duration of IGNOU teleconferencing (TC) programmes.
12. There will be no significant difference in the reactions of respondents with respect to employment regarding the talkback of IGNOU teleconferencing (TC) programmes.

13. There will be no significant difference in the reactions of respondents with respect to employment regarding the utility of IGNOU teleconferencing (TC) programmes.

14. There will be no significant difference in the reactions of respondents with respect to employment regarding technical and non-technical problems of IGNOU teleconferencing (TC) programmes.

15. There will be no significant difference in the reactions of respondents with respect to employment regarding overall aspects of IGNOU teleconferencing (TC) programmes.

16. The reaction of respondents will not differ significantly with respect to medium of instruction regarding the preparation of IGNOU teleconferencing (TC) programmes.

17. The reaction of respondents will not differ significantly with respect to medium of instruction regarding the presentation of IGNOU teleconferencing (TC) programmes.

18. The reaction of respondents will not differ significantly with respect to medium of instruction regarding the duration of IGNOU teleconferencing (TC) programmes.

19. The reaction of respondents will not differ significantly with respect to medium of instruction regarding the talkback of IGNOU teleconferencing (TC) programmes.

20. The reaction of respondents will not differ significantly with respect to medium of instruction regarding the utility of IGNOU teleconferencing (TC) programmes.

21. The reaction of respondents will not differ significantly with respect to medium of instruction regarding technical and non-technical problems of IGNOU teleconferencing (TC) programmes.

22. The reaction of respondents will not differ significantly with respect to medium of instruction regarding overall aspects of IGNOU teleconferencing (TC) programmes.

23. There will be no significant difference in the reactions of respondents with respect to type of programme regarding the preparation of IGNOU teleconferencing (TC) programmes.

24. There will be no significant difference in the reactions of respondents with respect to type of programme regarding the presentation of IGNOU teleconferencing (TC) programmes.

25. There will be no significant difference in the reactions of respondents with respect to type of programme regarding the duration of IGNOU teleconferencing (TC) programmes.

26. There will be no significant difference in the reactions of respondents with respect to type of programme regarding the talkback of IGNOU teleconferencing (TC) programmes.

27. There will be no significant difference in the reactions of respondents with respect to type of programme regarding the utility of IGNOU teleconferencing (TC) programmes.

28. There will be no significant difference in the reactions of respondents with respect to type of programme regarding technical and non-technical problems of IGNOU teleconferencing (TC) programmes.

29. There will be no significant difference in the reactions of respondents with respect to type of programme regarding overall aspects of IGNOU teleconferencing (TC) programmes.

30. There will be no significant difference in the reactions of respondents with respect to the level of exposure to electronic media regarding the preparation of IGNOU teleconferencing (TC) programmes.

31. There will be no significant difference in the reactions of respondents with respect to the level of exposure to electronic media regarding the presentation of IGNOU teleconferencing (TC) programmes.

32. There will be no significant difference in the reactions of respondents with respect to the level of exposure to electronic media regarding the duration of IGNOU teleconferencing (TC) programmes.

33. There will be no significant difference in the reactions of respondents with respect to the level of exposure to electronic media regarding the talkback of IGNOU teleconferencing (TC) programmes.

34. There will be no significant difference in the reactions of respondents with respect to the level of exposure to electronic media regarding the utility of IGNOU teleconferencing (TC) programmes.

35. There will be no significant difference in the reactions of respondents with respect to the level of exposure to electronic media regarding technical and non-technical problems of IGNOU teleconferencing (TC) programmes.

36. There will be no significant difference in the reactions of respondents with respect to the level of exposure to electronic media regarding overall aspects of IGNOU teleconferencing (TC) programmes.

37. There will be no significant difference in the reactions of respondents with respect to the level of exposure to teleconferencing regarding the preparation of IGNOU teleconferencing (TC) programmes.

38. There will be no significant difference in the reactions of respondents with respect to the level of exposure to teleconferencing regarding the presentation of IGNOU teleconferencing (TC) programmes.

39. There will be no significant difference in the reactions of respondents with respect to the level of exposure to teleconferencing regarding the duration of IGNOU teleconferencing (TC) programmes.

40. There will be no significant difference in the reactions of respondents with respect to the level of exposure to teleconferencing regarding the talkback of IGNOU teleconferencing (TC) programmes.

41. There will be no significant difference in the reactions of respondents with respect to the level of exposure to teleconferencing regarding the utility of IGNOU teleconferencing (TC) programmes.

42. There will be no significant difference in the reactions of respondents with respect to the level of exposure to teleconferencing regarding technical and non-technical problems of IGNOU teleconferencing (TC) programmes.

43. There will be no significant difference in the reactions of respondents with respect to the level of exposure to teleconferencing regarding overall aspects of IGNOU teleconferencing (TC) programmes.

1.22 Delimitation of the Study

The present study is delimited to learners attending teleconferencing programmes in Baroda study Centre (M.S. University Campus) from 1999 to 2001 for their reactions and achievement.

1.23 Scheme of Chapterization

There are total seven chapters in the present thesis. Chapter one of the thesis presents introduction followed by concepts of distance education and communication technology. It also discusses the present scenario of IGNOU, concepts and types of teleconferencing (TC), focusing mainly on IGNOU TC system and related studies reviewed. Also, the rationale, statement of the problem, explanation of the terms, hypotheses and delimitation of the study are presented in the same chapter.

Chapter two presents the analysis of IGNOU TC programmes subject-wise in terms of contents, methods, media and modes. Chapter three deals with effectiveness of teaching the distance learners through teleconferencing. Chapter four discusses the reactions of distance learners regarding different aspects of IGNOU-TC, whereas chapter five highlights views of different personnel involved in planning, production, co-ordination and implementation of IGNOU-TC programmes. Chapter six presents feedback given by co-ordinators on IGNOU-TC programmes. Each of these chapters mainly includes introduction, sample, instrumentation, procedure for data collection, analysis and interpretation of the data followed by findings and discussion.

Chapter seven presents the summary, findings, implications and conclusion of the study.