
UNIT 1 INTRODUCTION TO COMMUNICATION TECHNOLOGY

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1.0 INTRODUCTION

Communication is as old as human civilization. Early human beings used to communicate with fellow human beings for their survival. Although communication is a part of all living beings in some forms or others, it constitutes a vital process of social life of human beings. Right from childhood till the old age, the development of a human being largely depends upon the communication he/she is engaged in. Therefore, understanding the nature and process of communication has been of great interest to many disciplines such as linguistics, journalism, management sciences, commerce, business studies, political science, psychology, technology and education. In distance education, communication plays a significant role as both distance learners and distance teachers communicate with each other using a variety of communication technology. The present Unit will make an attempt to explain the concept of communication as a basic human process. We shall also discuss and explain the broader framework for the study of communication and the implications of communication in distance education. Moreover, the Unit will touch upon different media and technology for communication.

1.1 LEARNING OUTCOMES

After going through this unit, you are expected to be able to:

- *Define* the concept of communication;
- *Explain* the functions and process of communication; describe the barriers in the way of effective communication;
- *Describe* the different kinds of communication with examples of each;
- *Enumerate* educational communication as a system;

- *Explain* how communication takes place in distance education system;
- *Classify* media according to different authors;
- *List* the attributes of various educational media;
- *Compare* the print and non-print media in terms of their merits and limitations; and
- *explain* the use of ICT for people with disabilities.

1.2 COMMUNICATION: THE CONCEPT

Communication is defined in many different ways. Some explain it as an 'art' – something creative, while, others say it is a science – a learned behaviour/skill and partly a science as it involves certain learnable techniques and psychomotor skills. However, communication is better described as a science because it is based on certain principles that can be verified and used to make it effective. Our assumption here is that communication is a scientific study, which produces skilled communication practitioners. Thus, we shall study 'communication' as a science and seek a scientific explanation for the concept of communication.

In ordinary parlance, communication exchange of ideas between two persons. When we search for a scientific meaning of communication, it refers to the act of communication, transmission, or exchange of ideas, thoughts, views, opinions and information between the sender and the receiver. Although, most communication takes place through verbal means or spoken words, communication also happens through written words, sound, gestures and postures, pictures, diagrams, graphics, etc.

It is difficult to define communication through a single definition. Different people perceive it in different ways in the different contexts, provided by the various environments or surroundings where communication takes place. Starting from the sharing of meaning to persuading others to elicit the desired/intended responses, communication has been defined to suit situational purposes. We may agree that 'the search for the single definition of communication seems to be a futile quest'. At best we can define communication according to its components. There are three main components of communication: *the source, the channel, and the receiver*. From the source's point of view, communication is essentially persuasion, i.e., to assure you as a communicator that your communication has taken place, or that the desired outcomes are achieved. From the receiver's point of view, communication is a process to elicit the desired responses. As a source you would be happy if the receiver could behave in the way you intended him/her to behave. From the channel point of view, communication is a medium, a carrier of information from the source to the receiver and/or vice-versa. In other words, we can say that communication is defined in terms of the functions to be performed or the objectives to be achieved. According to Shanon and Weaver (1949) the primary concern of communication is to reproduce as faithfully as possible a message sent from one place to another place. On the basis of different explanations, Schramm (1973) defined communication as the functions of persuading, informing, teaching and entertaining people. Therefore, communication is a process by which people create and share information with one another in order to reach a common understanding (Rogers, 1986).

Communication is one of the most complicated human activities; it involves the use of biological systems, cognitive systems, and socio-psychological systems (Richey, 1986). As different sensory organs are involved in carrying information or messages from the source to the receiver, communication involves different biological system. In human cognitive structure, through

the process of communication, new information is acquired, assimilated and accommodated in the existing information. For example, a child knows the concept of animal. When she is introduced to a new animal, say Chinese Panda, the new information gets accommodated, in the existing information in the cognitive structure. Therefore, communication uses the cognitive systems. Moreover, the messages or information exchanges through a communication process are generated in a socio-psychological context. For example, the concept of 'family' taught to tribal children is understood by them according to the socio-psychological context they are placed in.

1.2.1 Functions of Communication

On the basis of the explanation we have given in the preceding paragraphs, we conclude that communication involves individual as well as collective activities of sharing ideas, facts and information. Thus communication performs various socio-psychological functions. MacBride (1980) has discussed some functions of communication in a social system. The main functions are as follows:

- i) **Information:** Communication refers to collective storage and dissemination of information for wider utilization by people. In this way it enables people to participate in and take intelligent decisions on, any issues of social relevance. Information has been taken as a resource for development – socio-cultural and economic.
- ii) **Socialisation:** Communication helps individuals become active members of the society to which they belong. People learn social norms in order to live cohesively. Having access to a variety of information, individuals get opportunities to understand each other and appreciate other people's feeling, emotions, ideas and expectations in a social system.
- iii) **Motivation:** Motivation of the individual members of a society plays an important role for its development. Communication fosters the individual and community activities, and motivates the people to meet goals, which have been mutually agreed upon. Well-informed individuals take the initiative of social welfare.
- iv) **Education:** Dissemination of information enhances the individual's intellectual development and helps one acquire the skills and aptitude required to become a productive member of society. In this way, communication and education are two sides of the same coin. The quality of education depends on the quality of communication between society and its members.
- v) **Entertainment:** Entertainment and recreation are important means of making individuals and society healthy. People find enjoyment and entertainment through various communication activities, viz. dance, drama, sports, music, etc. These means of communication provide personal and collective enjoyment.

What we have given here is a brief account of the functions of communication. You may add a few more functions of communication based on your own experience. Now let us take a look at the means of communication.

1.2.2 Means of Communication

There are various tools and media which serve as means of communication among human being. Starting from the signs – the primitive means, to super computer-based-communication, there are various techniques, technologies and materials generally used to collect, produce, carry, receive, store,

retrieve and disseminate information. All human beings make use of one or the other means of communication depending upon their accessibility and effectiveness. We shall discuss some of the prominent means of communication in this sub-section. Since this is an issue that concerns everybody, we shall discuss the potential of each means of communication as well as its weaknesses.

- i) **Signs and sounds:** Since primitive times, human beings have been using simple signs for communication. Body language and other non-verbal languages, viz., facial expression, gestures, music, songs, drawings, paintings, etc. are in use in different societies. In the tribal societies these means of communication are used for a variety of purposes, despite their obvious limitations (MacBride, 1980). These means of communication became refined and their reach was extended to still larger uses with the passage of time.
- ii) **Language:** A number of languages and dialects are used for communication purposes all over the world. In India, there are 22 scheduled languages listed under the Eighth Schedule of the Constitution and over hundreds of dialects used for communication. Language plays an important role in communication in both the face-to-face situation and at a distance – at the national or the international levels. The use of language is an important factor in educational communication too. Problems arise as a large section of the people does not understand each other's language, and this hampers the effectiveness of communication among them.
- iii) **Postal system:** The postal system is the most vital network for point-to-point delivery of information. It serves as the focal point for communication at a distance throughout the world. You may be aware of the fact that most of the communications of open universities, including IGNOU, takes place through post only. The postal system is the most accepted means of communication in both developing and developed countries. India has one of the biggest, well-established and efficient postal services in the world, which makes it possible for us to reach each and every corner of the country.
- iv) **Telephone:** One of the interpersonal communication networks is the telephone system. No other media can match the telephone for direct and spontaneous communication (MacBride, 1980). The use of the telephone in education is not yet popular in India. The limited telephone network and the high costs, besides the lack of initiative on the part of the educators in the country, are the main handicaps in using the telephone extensively in distance education. The growth of telephone communication, however, has been quite rapid in our country in recent years, especially with the emergence and rapid proliferation of mobile telephony. As of April 2010, the total number of telephone subscribers in India was 638.05 million (including 601.22 million wireless and 36.83 million wire line connections) with an overall tele-density of 54.10%.
- v) **Mass media:** The invention of the printing press and the radio waves has revolutionized the communication system throughout the world. These means have increased the reach and effectiveness of communication. Textbooks, newspapers, radio and television broadcasts have stepped into the area of mass education. By overcoming geographic barriers, broadcasting is successfully transmitting information to an unlimited audience. It crosses the boundaries of countries. The innovations in communication technology have opened new horizons for communication.

- vi) **Satellites:** The satellite-based communication has opened new horizons for the transmission of information over long distances. Satellites have brought the entire world together. One can transmit or receive information from any part of the world in no time at all. Many countries have their own communication satellites. The satellites so far launched by India are largely used for various domestic purposes. Besides the television and radio broadcasts, the Indian National Satellites (INSAT) are capable of providing facilities for the meteorological data, telephone networking, remote sensing, etc. In 2004, India launched a dedicated satellite for education.
- vii) **Computers:** The computers are the most advanced and sophisticated means of communication. They are a force in education, as they perform a number of functions with complete efficiency. They have made communication more interactive and individualized, especially because of the email and the web. We will study more about these in Block 4.

1.2.3 Process of Communication

Having discussed the concept, functions and means of communication, let us now discuss another important theme – the process of communication. The process of communication most widely accepted is that of Shannon and Weaver (1949), which identifies five elements in the process, viz, the source, the receiver, the channel, a coding system and noise. The Process of communication is the method by which a sender reaches a receiver with a message. There are basically four major steps involved in the communication process. A schematic representation of these steps is presented in Figure 1.1.

Sender: The source, or sender, is the originator of a message (see Figure). The communicator need not be a person; a memorandum, newspaper, professional journal, or organizational position such as the office of the principal, may be the source. The effectiveness of a message depends on the level of credibility that the receiver attributes to the sender.

Idea: The sender must create an idea or choose a fact to communicate. The idea or fact is the content of the message. In other words, the source must have something to say before the content can be “said”.

Encoding: The source initiates a message by encoding a thought, that is, organizing an idea into a series of symbols such as words or pictures that he or she feels will communicate the correct meaning to the intended receiver. The sender selects a particular medium because encoding must be done in relation to transmitting medium as well as the receiver’s characteristics. A telegram, for instance, usually is worded differently from an office memo, and both are different from face-to-face conversation.

Conceptual Filters: The conceptual filters of the sender, that is, the person’s particular psychological characteristics, also limit the encoding process. Communication skill, knowledge of the subject, and personality factors such as attitudes, values interests, and motivational needs are traits or mental conditions that combine to limit, screen or filter what is encoded and the quality of the message.

Transmitting: Transmitting transforms the encoded message into a signal and places it into a channel. The symbols that have been ordered inside a person’s mind are placed into physical movement. Transmitting therefore, involves the message, channel, and medium.

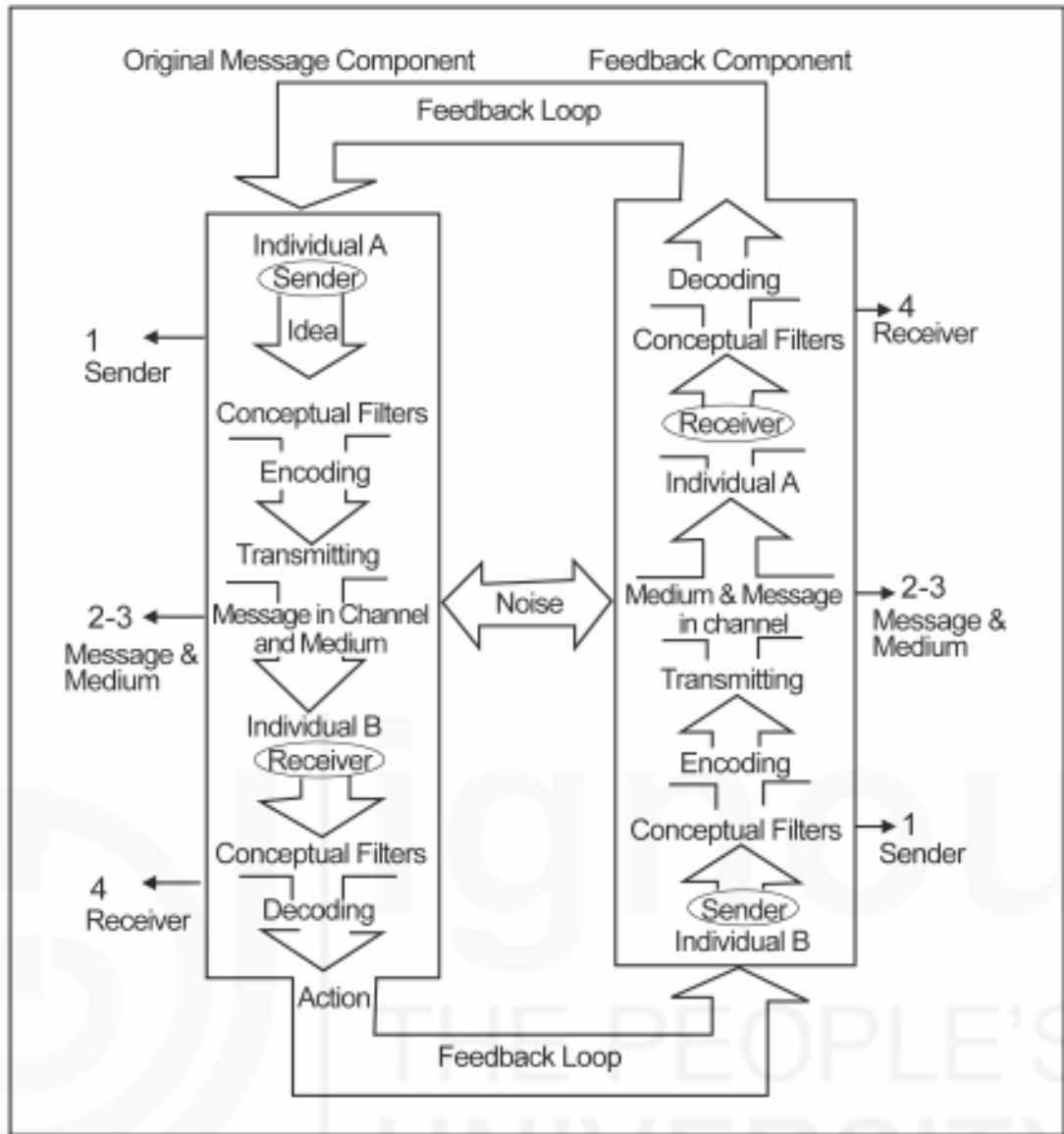


Figure 1.1: Communication Process

Source: Hoy & Miskel (1991). Quoted in IGNOU (2000)

Message: The message is the idea that an individual hopes to communicate to the intended receiver. The exact form of the message depends to a large extent on the channel and medium used to carry it.

Channel: The channel is the routing pattern that the message has to follow. The idea becomes a physical reality in the channel as opposed to a psychological reality in the sender's mind.

Medium: The medium is the carrier of the message. The content can be transmitted in a verbal-oral medium as in direct face-to-face speech, or electronically via telephone, computer, radio or television. Similarly, the medium can be verbal-written as in memos, letters, electronic mail, and newspapers. The transmission also can be made through non-verbal medium as in body language or gestures and symbolically with things that surround us such as office furnishings, clothes, etc.

Receiver: Internal processes similar to those in the source also occur in the receiver. The physical stimulus is taken from the channel by the receiver's sensory organs, ordinarily the eyes and ears and is sent to the mental decoder, where the receiver gives meaning to the message. If the listener is effective, the meaning is well understood. If the receiver does not function, the message is lost.

As is the case with the sender, no receiver can totally ignore his/ her psychological characteristics or conceptual filters.

Feedback: In broadest sense, this concept refers to any response from someone who has received a message. More specially, feedback is defined as messages conveyed to a receiver about task performance. The feedback loop provides two-way communication. Two-way communication is a reciprocal process; each participant initiates and receives messages. Each is a source or receiver only temporarily, with roles shifting as messages are passed. The use of feedback improves the communication process by reducing the chance of major disparities between information or idea received and the one intended.

Noise: Noise is any distraction that interferes with sending or receiving the message. Successful message transmission presumes that whatever situational noise exists is not great enough to observe the signal or divert the receiver's attention from it.

Check Your Progress 1.1

Notes: a) Write your answers in the space given below.

b) Compare your answers with those given at the end of this unit.

Define the following terms, in two lines each.

1) Channel

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2) Code

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3) Noise

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1.2.4 Types of Communication

Communication can be discussed at four levels, which are:

- Interpersonal communication
- Group communication
- Organisational communication
- Mass communication

Interpersonal communication: Interpersonal communication includes conversation between two persons. This is a common type of communication, in which two persons share their feelings, emotions, thoughts, ideas, etc. Interaction between two friends, between teacher and students, between mother and child and the like are a few examples of interpersonal communication. Talking on the telephone to someone is yet another example of interpersonal communication at a distance.

Group communication: In this type of communication, the members of a groups interact with each other. A group is a collectivity of people who have common interests. Discussions in a workshop, a seminar, or a family are examples of group communication. Group communication is used to take a collective decision on a problem, an issue or a matter of common concern. The participants involved in a group communication take active part in communication to achieve a set of goals, to develop social contacts or to find the solution to a problem faced by the group. Group communication is represented diagrammatically in Figure 1.2. The family, section in an office, and a classroom are examples of group communication systems.

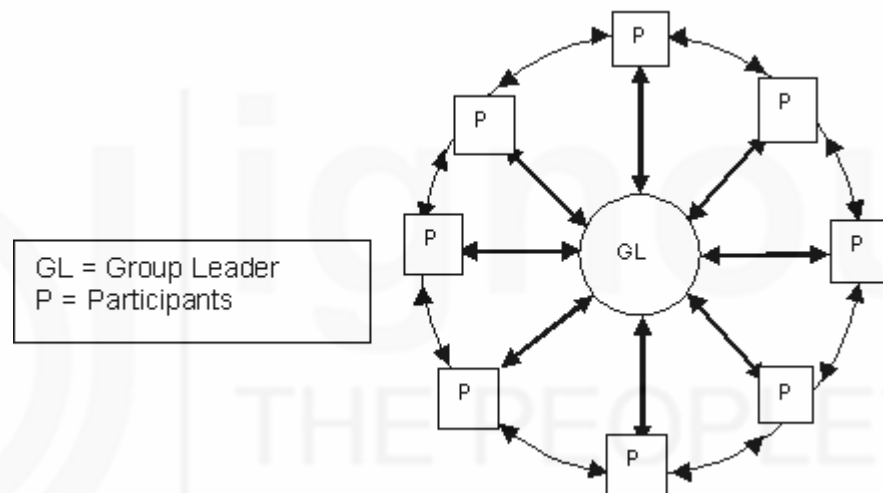


Figure 1.2: Group Communication

Organisational communication: It is that communication which revolves around one organization. Since an organization consists of groups of individuals, it can be said to be multiple group communication system having interaction among each other. Communication may start from any point in the organization, but the immediate ways of the information is only within the organization. Notifications are normally used as means of communication in such organizational communication system.

Mass Communication: Mass communication involves more than two people but it is beyond group and organizational communication. As the term 'mass' indicates, this type of communication includes ideas, thoughts, etc. communicated to large number of people using mass media. In mass communication we include face-to-face, as well as, print and non-print communication. For example, the radio and television programmes are broadcast to educate, inform or entertain a large number of people.

Mass communication has three characteristics. We discuss them briefly here:

- i) **The audience is large and heterogeneous.** You know that radio and television, being mass communication media, have a large audience with different backgrounds, tastes, ages, occupations, etc. Both the illiterate and the literate can make use of these media. The newspapers, another mass medium, have a comparatively smaller audience.

- ii) *The source is an institution or a group of people.* For example, the Ministry of Information and Broadcasting, Government of India, is engaged in broadcasting television and radio programmes all over the country. The Times of India group is one of the private institutions engaged in printed mass communication in India. Similarly, IGNOU is engaged in creating and disseminating knowledge to a large number of students throughout the country, and it is an example of a mass education institution.
- iii) *Some kind of mechanism is used to reproduce information.* The mechanism could be the printing press, programme production studio, transmitters, the TV and the radio receivers, the Internet, World Wide Web (WWW), etc.

1.2.5 Barriers to Communication

There are various stages through which a message has to pass through from the source to the receiver(s) and vice-versa. These cause a number of interruptions and distortions in the way of effective communication. Sillars (1988) discusses two types of barriers that usually distort the flow of communication, and these are discussed below.

Barriers caused by the senders and receivers: The act of communication is broken down by the senders and the receivers themselves. The reasons may be a lack of understanding between each other, poorly defined objectives, failure to comprehend the language used, etc., or both the sender and the receiver may not be clear about what to communicate.

The receiver may not perceive the message as intended by the source (communicator). Similarly, defensiveness, permanency of attitude, situational misunderstanding, unfounded certainty, etc. are forces that can lessen the effectiveness of communication among the participants.

The individual's background and experience also influences the effectiveness of communication. Personality characteristics – aptitude, attitude, interest, motivation, etc. can interrupt the smooth flow of information. Similarly, hidden distracters, such as tension, frustration, anxiety, etc. among students can also lessen the effectiveness of educational communication. You, as a source, cannot force a student, as a receiver, to learn unless he or she is mentally ready to receive educational messages or has the necessary pre-requisites and study skills to grasp it.

At times, it is difficult to avoid barriers created by the source and the receiver. To overcome such barriers, we need to take special care at the stage of planning and developing the instructional materials. Use of different teaching arrangements (for instance, the print materials supported by the audio – video programme) can be used to bypass or overcome some of the distracting barriers. The use of language that is understood easily by the sender and the receiver may facilitate sharing the content.

As mentioned earlier, selection of the wrong medium may be disastrous for getting the message across. For example, if you want to discuss minor details of a system or, more specifically, if you want to discuss the flow of blood in the human body, the audio medium may not be as effective as the visual medium. So the use of appropriate medium can make communication effective and efficient. Similarly, choosing an unsuitable time for effectiveness of communication may be enhanced if the timings of communication are appropriate.

Barriers caused by the external factors: There are certain external factors that can disrupt the flow of communication. Any type of ‘noise’, such as, physical noise caused by the plying of vehicles, the sound of a type – write, conflicting messages, poor printing impressions, poor reception of the sender and the receiver.

One of the barriers of effective communication is indifferent behaviour and lack of sufficient motivation (of course, due to some internal or external factors) on the part of the receiver(s). The participants may not be ready to receive information and willing to actively participate in its transaction.

The domestic or social problems faced by a student may cause him/her to be less attentive than he/she might otherwise be. Similarly, lack of incentives, such as poor employment opportunities after passing a course may make communication defunct.

There are certain technical interruptions which create a lot of distortion in the communication process. Poor maintenance of equipment, substandard tools, defective receiving sets, weak transmission waves, etc. inhibits effective communication. The interference of some of the barriers can be reduced to a large extent if the sender/source understands the models or theories underlying the process of communication. We shall discuss some such measures as follows:

- i) Both the parties involved should know that communication needs to be attended to. Both should take initiative in sharing information.
- ii) Both the parties should recognize each others communication signals, i.e. they should understand each other’s language. Both should work at the same wavelength.
- iii) Both the parties should be capable of thinking and feeling in somewhat similar ways. They should understand each other’s message correctly; otherwise, they will not understand each other.
- iv) Both the parties should engage jointly in a purposeful communication act. Comprehension of message is not enough in itself. For communication to succeed there must be an outcome; the participants should display the communication specific intended behaviour. Information must be successfully shared so that a tangible outcome can be displayed.

Check Your Progress 1.2

Notes: a) Write your answers in the space provided.

b) Compare your answers with those given at the end of this unit.

1) Write two educational implications of interpersonal communication.

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2) Give at least one example each of different types of communication.

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1.3 EDUCATIONAL COMMUNICATION

The word 'communication' came from the Latin word 'communicare', meaning 'to share'. The act of teaching and learning is also an act of sharing the content, the skills and the attitudes. Thus, education can be seen a communication process between society and individuals (Hills, 1986). Hills further elaborates that education should be looked at constantly in order to determine how well it is communicating the norms of society. In other words, educational communication concerns itself with the process of how the teachers and students act and interact to enhance the knowledge, and the messages related to the curriculum (the content, the skills and the attitudes and related activities which educate, inform, train, enlighten, inspire and entertain the students). The receivers are the students and various teaching strategies such as demonstrations, tutorials, textbooks, assignments, audio-visual components, libraries, etc. are used as media to transfer the contents.

With the advancement in communication technologies, it is now possible to impart education throughout the world via satellites, which have the potential to communicate even live events to the students at their work-place. Thus, education has crossed many barriers of space and time. As a consequence, the methods of teaching and learning have also changed. Technologies such as computers, video-tapes, video discs, teletexts, communication satellites and teleconferencing services have stepped in to improve the nature of educational communication. These technologies have made the teaching learning process more lively and interactive. They have enhanced the pace of learning and also improved the means of retention and retrieval of information. Interestingly Hills (1986) regards the computer as man's fourth brain', taking its place alongside the other three – cerebrum, optic lobes and cerebellum.

Let us take the example of the Shannon and Weaver (1949) model of communication, and discuss its application to educational communication. In this model, the source of information is the teacher or the educational institution, i.e., the agency which intends to transmit knowledge, skills, values and culture to the future generations. The teachers supply and manage information in a way so as to make it understood by the students. The teachers make their ideas visible by coding them in a series of symbols in the form of spoken or written words, or visual signals.

As there are various channels of communication used in education these days, the main question in selecting the appropriate channel of communication is whether it clearly and accurately communicates with the students as desired by the source (the teacher or educational institution). The teachers have a variety of audio-visual media, viz., broadcast, audio/video cassettes, computers, teletext, teleconferencing, etc., which can be exploited to achieve the desired objectives at a faster pace and for larger student bodies.

The important point is that information should reach the students without any distortion. There are many sources of noise, which can reduce the effectiveness of the teaching and learning process. The interruptions (noise) in the way of communication should be removed. The biggest potential source of noise in distance education is the reading material that constitutes the master medium. The reading materials need to be prepared with clear objectives, to be written in simple language and be presented in a logical sequence. The materials should be self-explanatory, self-directed, self-contained and self-evaluating.

As mentioned earlier, the students should receive the information that is intended by the teacher or distance education institution. For this, they should possess the minimum pre-requisite of knowledge and skills to comprehend the message, undertake notes, answer the self-assessment questions and work on the prior knowledge possessed by the students. In other words, the course materials should be based on the background or prerequisite knowledge of the target students.

Feedback plays an important role in improving the quality of the course materials and achieving the desired objectives. The teacher should get information about how his/her materials/units, audio or video programmes are being received and assimilated by the students. Such information will make communication more effective and will eliminate errors in decoding and the problems caused by 'noise' in the entire teaching/learning process. On the other hand, the students should also get feedback on their progress of comprehension of the content discussed. Feedback about their performance will motivate the students to draw more from the learning materials.

Tiffin and Rajasingham (1995) discusses education as a communication system, which is purposive, receives certain inputs like students, teachers, knowledge, problem, and processes them at different communication levels so that the learners become knowledgeable to apply learned skills and knowledge to given problems. Education as a communication system also shares the characteristics of an open system, viz. negative entropy, feedback, steady state, differentiation, equifinality, teleology and hierarchy. Let us discuss these concepts in order to understand and apply them to distance education.

- i) **Negative-entropy:** Open systems resist the trend towards disorder and more towards increased organisation. For this purpose, they depend on feedback system and the environmental supra system.
- ii) **Feedback:** Feedback is a special input about the system and its environmental conditions; and about its functioning. This enables the system to take corrective steps to adjust its malfunctioning, if there is any.
- iii) **Steady state:** It is a condition of dynamic equilibrium, in which the system maintains its structure as stable, despite fluctuation in environmental condition.
- iv) **Differentiation:** Open systems not only adapt to changing environment, but also move in the direction of higher level of organisation or growth. Growth leads to differentiation of functions and to specialisation.
- v) **Equifinality:** It is the ability of open systems to reach a given state or condition by several different paths. Because of their inherent resilience and capability to adjust in changing environmental open systems arrive at a given desired state through various alternative methods.
- vi) **Teleology:** It is a characteristic of open system that indicates the purposefulness of the system and works according to its objectives.
- vii) **Hierarchy:** Open systems are hierarchical, that is, they are both independent framework consisting of a number of integral lower level sub-systems, and each one is a dependent member of the higher level system.

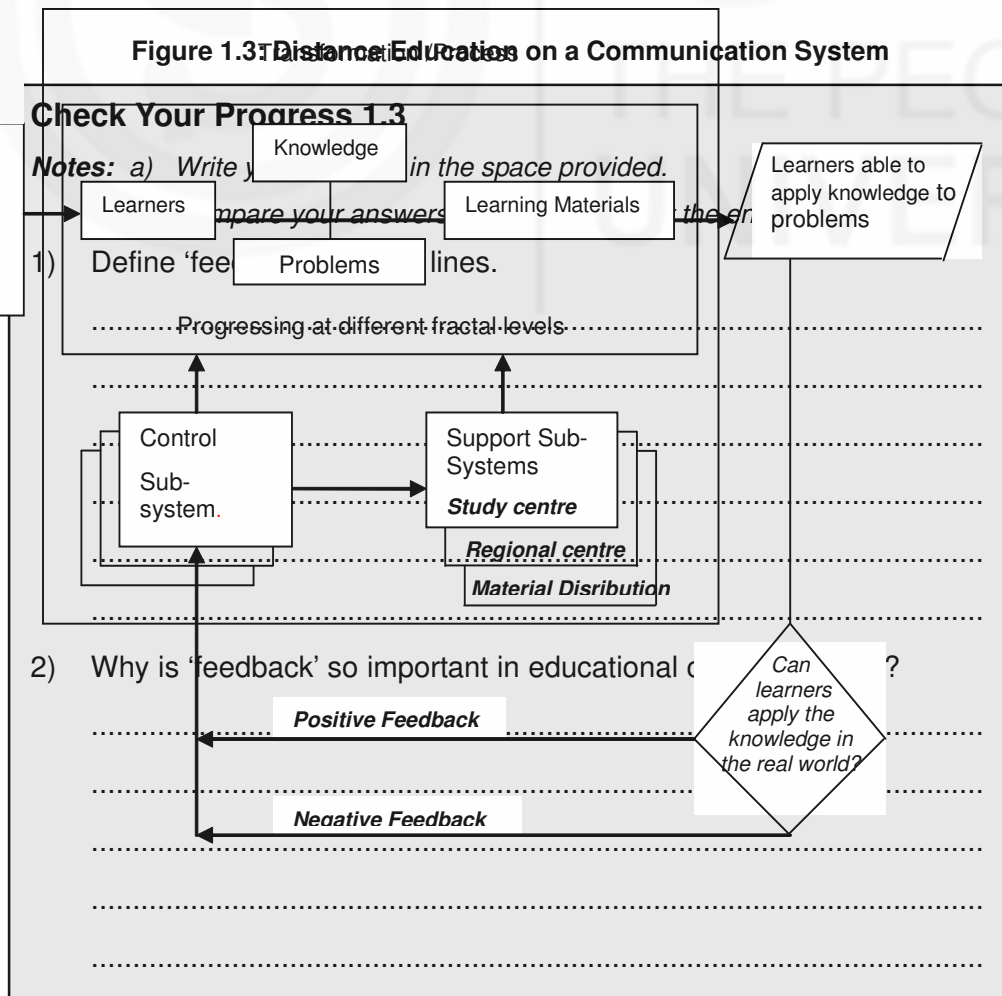
All these characteristics can be easily applied to education as a communication system. Figure 1.3 depicts distance education as a communication system having the characters of an open system. Processing at different fractal levels in the figure indicates the communication types. Support sub-system in distance education includes, study centre, regional

centre, material distribution system, etc. The control sub-system includes the Instructional Design (ID) and administrative sub-system that looks after the system in general.

Transformation/Process

Outputs

Learners
Learning
Materials
Knowledge
Problems
Resources



1.3.1 Communication in Distance Education

Distance education, as you know, is an act of sharing content and learning experiences, with students at a distance through a wide range of communication technologies. In distance education, the act of communication is performed through self-directed learning by arranging various teaching-learning environments. A distance teacher, unlike a face-to-face teacher, communicates with the students through different communication media. These communication media include self-learning print materials, face-to-face counseling or tutorials, assignments, audio-video programme, telecast, broadcast, Interactive Radio counseling (IRC), teleconferencing, E-mail, CD-ROMs, Internet, computer conferencing, mobile etc. The communication process in distance education system is depicted in the Figure 1.4.

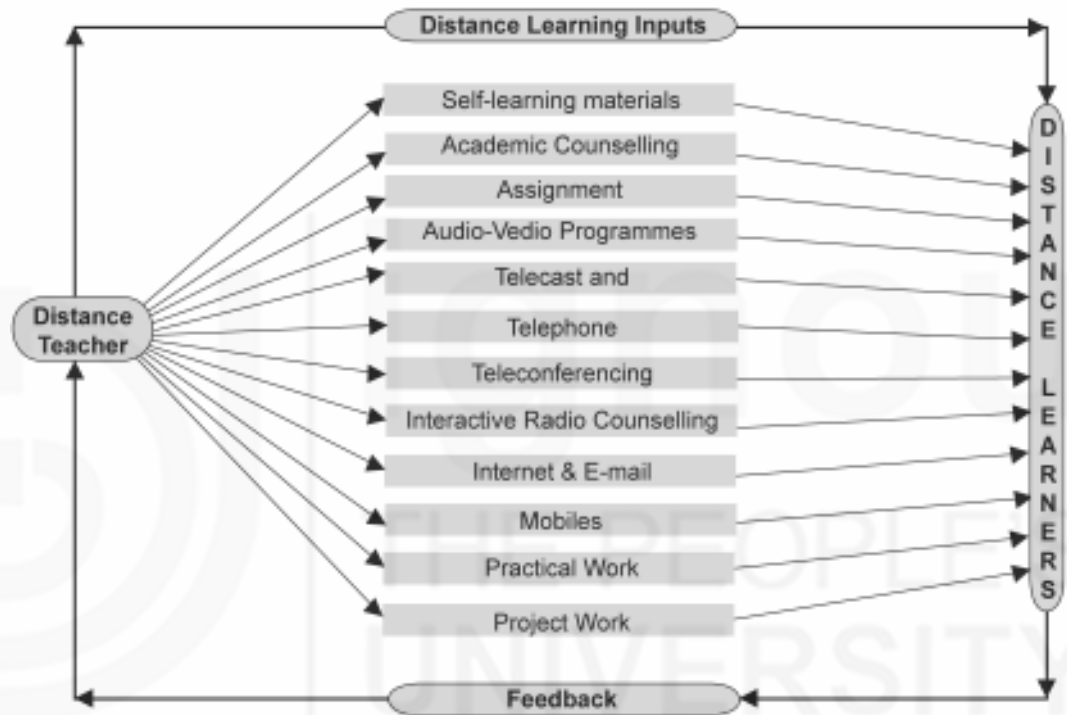


Figure 1.4: Communication in Distance Education

Print material is the principal medium of communicating learning experiences to the distance learners. Print materials in the form of self-learning units should be self-explanatory, self-directed, self-contained, self-motivating and self-evaluating. The introduction to the units should be motivating and provide a bridge between the information existing in the learners and the new information to be acquired by the learners. The materials need to be written in simple language. There should not be any use of ambiguous terminologies, double negatives and passive voice in the materials. Illustrations, examples, diagrams and cartoons need to be provided to strengthen the understanding of the materials. Materials should be presented on a logical and sequential manner. All these aspects are very important for the optimum communication through print materials. But sometimes, the course writers do not write the materials as per the specifications given to them. They may use difficult language; do not illustrate concepts with examples; do not support their presentations with diagrams or provide complicated diagrams. All these contribute to poor communication between the learners and the teachers. Academic counselling

provides distance learners a platform to communicate with teachers on a face-to-face basis. The success of communication during academic counselling depends on how well the learners and counsellors have made preparation for the counselling session. For example, a student does not understand a concept in a particular course and asks the counsellor to explain it. But, the counsellor has not gone through the materials before coming to the counselling sessions, and then he/she may not be in a position to communicate properly.

Assignments constitute a powerful medium of communication in distance education. Academic counsellors provide different types of comments on the performance of students in the assignments. These comments are helpful to students for improving their performance. But sometimes, academic counsellors do not provide any comments on the assignment response as a result there is no communication between the academic counsellors and the distance learners.

Effective communication can take place through audio programmes provided the script, narration, music are properly ensured. Similarly, good script, narration, visuals, music and overall editing of the video programmes enhance communication between the distance teacher and the distance learners.

Tele-conferencing has been proved to be a powerful communication medium in distance education system. Through audio-conferencing, the distance learners can interact with distance teachers and get to know many things pertaining to the academic programmes they intend to pursue. Even various contents can be taught to the students through audio-conferencing. Video conferencing — both one way video and two way audio, and two-way audio and two-way video is effective medium of communication. But in order that teleconferencing sessions are effective, proper pedagogic design has to be done beforehand.

Internet has come as a boon to facilitate effective communication in distance education. Through e-mail, students can know details about their programmes, information regarding the examination schedule, their results, grade sheet, etc.

Similarly, mobile technology has become a very convenient tool of communication between the distance teacher and the learners. Students also interact with distance teachers through interactive radio counselling, during practical activities, workshop activities and project work.

To communicate with the students at a distance is more difficult than with those who study in a face-to-face situation. There are several barriers between the distance education institutions and the students learning at a distance. For example, there is no provision, in most cases, for immediate feedback from either side. Most of the students and teachers do not know each other. In such a situation where you do not know much about your students, you have to be extra careful to ensure effective communication to achieve the educational objectives or bring about the desired changes in their behaviour. So, whatever medium is used, communication should reach the receiver(s) successfully.

Check Your Progress 1.4

Notes: a) Write your answers in the space provided.

b) Compare your answer with the one given at the end of this unit.

Write a short note on 'communication in distance education' in about 100 words.

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1.4 MEDIA AND TECHNOLOGY OF COMMUNICATION

It has been said that the various kinds of media are extensions of man. All modes of communication would be examples of media (for example, letters, television, films, communication, roads and railways). Educational media are, therefore, extensions for the teachers, and facilitate the communication between the teacher and the students. The media (in the Distance Education context) constitute an integral part of the process of planned instruction. We know that distance education has four essential characteristics: (i) the learners and the teachers are at a distance from each other; (ii) most of the educational content it conveys to learners are through one or more media e.g. print, television, radio etc.; (iii) a professional agency is responsible for the programmes; and (iv) the instructional system provides for two-way communication between the learner and the teacher, the tutor or the administrator. Thus educational media are carriers of educational information and instructional material over a distance between the tutor of distance education institution and the learners.

1.4.1 Classification of Communication Media

Communication media include the various instructional aids that are used in the instructional process. These can be classified according to the senses they stimulate and the messages they transmit.

The above classification of communication media provides a clear and comprehensive picture of different instructional aids which could be used by teachers. By and large, the non-projected aids are used by most of the teachers because of their availability in educational institutions and ease of handling them. However, now-a-days, most of the educational institutions are gradually being equipped with more advanced communication media.

- i) Audio
 - a) Voice (any human sender of the message)
 - b) Gramophone records
 - c) Audio tapes, to be used in a tape-recorder or language laboratory
 - d) Stereo records/ tapes
 - e) Radio
 - f) Telephonic conversations.
- ii) Visual (Verbal) print or duplicated
 - a) Textbooks, supplementary books
 - b) Reference books, encyclopaedia, etc
 - c) Magazines, newspapers, etc.
 - d) Documents, clippings from published material
 - e) Duplicated written material
- iii) Visual (non-projected, two dimensional)
 - a) Messages/ pictures on roll-up board
 - b) Flat pictures, cut-outs
 - c) Posters, charts, graphs, etc.
 - d) Cartoons, comics, etc.
- iv) Visual (non-projected, three-dimensional)
 - a) Models, mock-ups, display materials
 - b) Diagrams
 - c) Globes or maps (three-dimensional)
 - d) Specimens (animate or inanimate)
 - e) Puppets
- v) Visual (projected-still)
 - a) Slides
 - b) Film strips
 - c) Overhead transparencies
 - d) Micro image system: micro film, micro card, micro fiche
- vi) Audio-visual (projected-motion)
 - a) Film
 - b) Television
 - c) Close-circuit television
 - d) Video cassettes
- vii) Multi-media packages (for more than one sense)
 - a) Slide + tape + workbook
 - b) Slide + tape + workbook
 - c) Radio + slide or posters (Radio vision)
 - d) Film + posters + workbook (print materials)
 - e) Television + workbook (print materials)
 - f) Any of the above + group discussion
 - g) Any of the above+ introductory and summarizing talk by teacher/ leader of the group
- viii) New emerging media (all of these are multisensory)
 - a) Tele-conferencing (group discussion through telephones)
 - b) Cable television (localized television where feedback is possible)
 - c) Satellite television/ communication satellites
 - d) Computer networking
 - e) Video discs
 - f) Mini computers/ micro computers/ word processors.

Various media experts have proposed taxonomies of educational media. Romiszowski (1974) developed his taxonomy on the basis of sensory channels used in carrying information. His media classification is shown in Table 1.1.

Table 1.1: Romiszowski's classification of educational media

Sensory Channels	Major Illustrative Media
Audio	Teacher's voice, language laboratory, audio tapes, radio broadcasts etc;
Visual	Pictures, charts, models, handouts, film slides, transparencies, programmed instructional material etc.;
Audio-Visual	Open channel television, closed circuit television, videotape, etc.;
Tactile	Working models, simulated devices, adaptive teaching machines etc.

Romiszowski's classification is based on a single criterion i.e the sensory channels used in receiving information. It is, therefore, considered quite inadequate. Schramm (1977) proposed a two-tier classification of educational media i.e. big media and small media. According to Schramm, big media are "the glamour boys of the field" and they are more expensive and based on new technologies. Small media, on the other hand, are relatively much cheaper and based on early and intermediate technologies. Television, sound film, computer and interactive video are some examples of big media; transparencies, slides, various types of boards represent small media.

However, Bretz (1971) has developed the most comprehensive taxonomy of educational media and it has found acceptance among most media experts. Bretz's media taxonomy is based on two criteria i.e. the type of information they communicate and whether they are primarily recording media or telecommunication media. Bretz divides information as *audio* or *visual* and *still* or *motion*. He further sub-classifies the visual sector as comprising picture, line graphic and print. Picture and print are the two extremes of the visual continuum; line graphics occupy the middle position. Bretz initially subdivided the audio sector into four categories viz.; the human voice, natural or artificial sounds, noise and music. However, he treated the audio sector as one whole and did not subdivide it. In other words Bretz divided educational media into seven classes.

They are listed below:

- Class I : Audio-motion-visual media
- Class II : Audio-still-visual media
- Class III : Audio-semi motion media
- Class IV : Motion-visual media
- Class V : Still-visual media
- Class VI : Audio-medium
- Class VII : Print medium

Various classes of media have different capabilities to carry different types of information. For example, Class I media is the most versatile and powerful because they can record and transit all types of information. Class VII media have the most restricted capability.

Bretz's classification is based on quantitative as well as qualitative principles of valuation. However, the greater versatility of Class V media compared to that of class VI media compared to that of class VI media is superficial because of the sub-classification of the visual sector. Had Bretz subclassified the audio sector, then the differences between these two classes would have more or less disappeared. Lastly, Bretz describes his taxonomy in terms of hardware. The great variety of hardware available and being developed from time to time makes its complete listing almost impossible.

Having discussed Romiszowski's and Bretz's taxonomies of educational media, let us try to assimilate them into a simple classification/ grouping for better and easy understanding. Many educational technologists prefer to categorise media into basically two groups: interactive, and non-interactive. Within these two broad groups they put all educational media. From another point of view educational materials could be classified into five categories, viz. (i) print (ii) audio, (iii) video, (iv) 3-dmodels, and (v) integrated. Now, let us make a matrix of these five categories and the former two groups to classify the range of educational media available to us. Table 1.2 depicts the simple classification based on this matrix.

Table 1.2: A Simple classification of educational media

Media	Non-interactive media	Interactive media
Print (Text/ graphics)	Textbooks, Pictures, charts SIM (interactive partially), Teletext	
Audio	Audio tape, Radio, Audio vision (partially interactive)	Radio-phone in Audio conferencing, Audiographics Telephone
Video	Videotape, Television, Cable T.V.	Interactive TV, Video teleconferencing (one way/ two-way audio)
3-D models	Physical objects, models, Home Kits	Computer generated 3D models
Integrated	Radiotext, Word Processing and Presentational software, WWW (partially non-interactive)	Computer based media Interactive Multimedia Internet, WWW, Videotext

1.4.2 The Print Medium

It is common knowledge that 'print' has been in use as a pedagogic medium for quite a few centuries; it was used even before the first mechanical printing press was set up by Johannes Guttenberg in Germany. It has been the major if not the sole medium of formal face-to-face education. Recent studies have revealed that even in distance education, print continues to be used as the most dominant medium. Dichanz (1982) in his "Reflections on the Use of Media in Distance Education" stated that in West Germany, 90% of all study materials at the Fern-Universitat are printed materials and that there is little variety in the use of media. The U.K. Open University enjoys a good reputation for its innovative use of various educational media and Hawkrigde has this to say about the Open University: "Print is the principal medium through which Open University students learn. They spend about 90% per cent of their time reading and writing, except in some science and

technology courses for which the proportion may be somewhat lower on account of practical experimental work". In India too, the picture is more or less similar. All distance education institutions in India use print as their major educational medium.

Limitations of print medium

Like any other pedagogic medium, print too has its merits as well as limitations. Predominant use of print as an educational medium on a large scale can be attributed to two factors: i) its merits, and ii) its low cost vis-à-vis other media. Print is often described as "frozen language", absolutely cold, dead, unrelated to reality and totally cut off from the context of experience and therefore irrelevant. All the shortcomings of language are also attributed to 'print'. These are chiefly four:

- i) Language is a poor substitute for direct experience.
- ii) Language can be misleading and therefore it cannot be trusted.
- iii) We participate and live in an oral culture, so education through print is dispensable as well as undesirable.
- iv) Problem-solving calls for direct action, hence print cannot be a substitute of direct action.

Besides these ideological criticisms, there are some practical limitations as well.

- i) Print is a demanding educational medium because its effective use depends upon a reasonably adequate level of literacy among learners.
- ii) Print is effective only when the reader possesses well-developed cognitive skills for comprehending the text and evaluating its thought content.
- iii) Reading is a linear sequential process in which words as well as lines have to be processed in a certain sequence i.e. left-to-right, right-to-left or top-to-bottom. A visual image on the other hand can be processed as a whole and understood almost spontaneously. One just looks at it and understands its content depending upon his/ her power of observation.
- iv) Reading printed material is much more time-consuming than viewing the same content through images e.g. a TV programme.
- v) Reading is unsuited for developing skills, irrespective of whether these skills are interactive or managerial or psychomotor. Reading a printed lesson can provide theoretical information about how to drive a car but it cannot provide a person with the skills required for driving a car.
- vi) The language of the printed lesson is chosen according to the writer's assumption about average readers. Once written, the language of a printed lesson is fixed; it does not change for below-average or weak learners. Hence it is argued that print is not an appropriate pedagogic medium to do justice to learners of different abilities; usually weak learners and learners with reading disabilities are the worst sufferers.

Merits of print medium

These criticisms establish that even the most widely used pedagogic medium needs to be defended; however, defending it is not a difficult job. Print has certain merits that account for its widespread and universal use in all modes of education including the distance mode. Briefly put, 'print' has the following merits as an educational medium.

- i) Print provides relatively permanent instructional material that can be processed whenever one wants to.

- ii) Processing printed material takes more time and greater time devoted to the task ensures more and better learning.
- iii) Print allows the learners to learn at their own pace and in a style best suited to them because it gives them more options for selecting a better learning strategy or even initially trying out many strategies and choosing the most effective one. Thus print individualizes learning in a unique manner.
- iv) Use of print as an educational medium is in perfect consonance with our highly developed cultural ecology. In fact, all developed cultures are heavily print dependent. Education through imitation, demonstration and the oral word characterizes a primitive rather than an advance culture.
- v) Certain kinds of thinking involved in the process of education make the use of print medium almost inevitable. Defining, qualifying logical constraints, elaborating or sequencing complex reasoning necessities the use of print.
- vi) Abstract thinking involves the use of symbol systems and therefore print is uniquely suited to abstract thinking. As we move away from concrete of learning, use of language becomes indispensable and print assumes special importance.
- vii) Print remains the cheapest educational medium to use even today. It scores over almost all other media in terms of cost, portability and freedom from dependence on any hardware for its users.

Thus we can conclude that like all other educational media print has its strengths as well as weaknesses. Print is exceptionally useful for:

- Developing understanding of complex concepts and processes;
- Developing basic learning skills of reading and writing that help a learner become more and more autonomous; and
- Helping learners to take stock of their learning through interpolated questions (as is being done through self-check questions in these lessons); this enables the learners to review their learning and structure it properly by establishing linkages with preceding portions or lessons.

In fact we would do well to remember that even the big media such as computer and television technologies use print even if very briefly. Notwithstanding the merits of print medium, our focus in this unit is on non-print media as such. So, let's discuss these in the next sub-section.

Check Your Progress 1.5

Notes: a) Write your answers in the space provided.

b) Compare your answers with those given at the end of this unit.

- 1) Describe any three major shortcomings of "print medium".

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- 2) List any four features of the print medium that account for its wide spread use in education.

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1.4.3 The Non-print Media

The non-print media are loosely called the “electronic media” as well, but certain non-print media are not at all electronic e.g. 3-D models and home experiment kits. However, most of these are electronic based and they can, therefore, demolish distance in a unique manner. Let us first examine some of the merits that non-print media have in the context of distance education.

- i) **Greater delivery capabilities:** The non-print media, especially those in the electronic category, can simultaneously reach learners at different places and also give them a feeling of belonging, of being members of a large organization and thereby take care of their feeling of isolation, and the feeling that just because teachers do not teach them in face-to-face situations, they do not matter to the system.
- ii) **A supplement to the master medium:** We know the most DE institutions use print as their principal or master medium. The non-print media can provide excellent support to the print media because of their versatile capabilities. There are certain qualities that make educational media function as a good supplement. Portability, complete control over when to use it as well as over its functions, and possibility of its use by the individual against that by the group are a case in point. These features of the non-print media as means to supplement the master medium are clearly shown in Table below.

Table 1.3: Non-print media as a supplement: Criteria-based analysis

MEDIA	CRITERIA			
	Portability	Individualized use	Control over use	Control over functions
Television	Yes (portable models only)	Yes	No. TV Schedule pre-determined	No
Radio	Yes	Yes	No	No
Film	Yes (for portable models only)	Yes (though costly)	Yes	Yes
Photographs	Yes	Yes	Yes	Yes
Slides	Yes	Yes	Yes	Yes
Audio Tape	Yes	Yes	Yes	Yes
Video Tape	Yes	Yes	Yes	Yes
Computer	Yes (only for Notebooks)	Yes	Yes	Yes
Videodisc	Yes	Yes	Yes	Yes

- iii) **Greater suitability to iconic and enactive modes of experience:** Bruner has proposed a three-tier classification of experience: Enactive (involving activity), Iconic (using pictures, graphic or 3-D representations) and symbolic (based on the use of symbols). Print is suitable for symbolic experience. The non-print media can make educational experience more comprehensive. For example pure verbal description in print cannot teach a person how to tie even a simple knot, but silent, or sound films or videotape can convey this information most effectively. Similarly, work on home experiment kits can enable a student to master the use of various techniques through the enactive mode. Print is an ineffective medium for providing such learning experiences.

- iv) **Feedback through recorded performance:** Some non-print recording media can record the learner’s performance and provide extremely useful feedback. For example, audio-tapes provide excellent feedback about one’s mastery of the sound system of a language or video tapes provide much needed corrective feedback for other types of performance. Print medium is of little use in this respect.
- v) **Facilitate diverse learning objectives:** In distance teaching the instruction moves away from the conventional face-to-face teaching mode and a reasonable reliance on various other media becomes necessary to meet diverse learning objectives. Printed matter cannot meet all learning objectives very efficiently. William H. Allen’s (1967) chart of presumed effectiveness of different instructional models are presented in Table 1.4 (quoted in Schramm, 1977):

Table 1.4: Instructional media in relation to learning objectives

Instructional media	Learning Factual Information	Learning Visual Identifications	Learning Principles, Concepts and Rules	Learning Procedures	Performing Skilled Perceptual Motor Acts	Developing Desirable Opinions & Motivations
Still Pictures	Medium	High	Medium	Medium	Low	Low
Motion Pictures	Medium	High	High	High	Medium	Medium
Television	Medium	Medium	High	Medium	Low	Medium
3-D Objects	Low	High	Low	Low	Low	Low
Audio-Recordings	Medium	Low	Low	Medium	Low	Medium
Programmed Instruction	Medium	Medium	Medium	High	Low	Medium
Demonstration	Low	Medium	Low	High	Medium	Medium
Printed Textbooks	Medium	Low	Medium	Medium	Low	Medium
Oral Presentation	Medium	Low	Medium	Medium	Low	Medium

- vi) **Contribute to specific learning activities:** Certain non-print media formats and delivery systems contribute particularly well to the distance student’s learning activities. For example, audio-tapes or computers can be used effectively to drill and provide practice to learners in arithmetic and language learning. Electronic media can help promote the ‘discovery’ approach to learning. For example, a film can be exploited, for discovery teaching in the physical sciences. Students keep watching the various sections of the film until they perceive the relationships between the visuals. Then they are curious to find out the principles that explain those relationships. Likewise, in the social sciences various media types can be used to present learners with visual and auditory experiences that provide related information and questions. Films and simulations are often used to present ‘real life’ or ‘laboratory learning’ situations for inquiry into problems and discovery of their situations.
- vii) **Motivate learners psychologically:** The use of electronic media has proved psychologically exciting for students — both at the preparation and the participation stages and consequently it promotes learning. Several of the introductory functions, such as directing attention, arousing motivation, providing a rationale, etc., may be served by non-print media more effectively than by a printed text. Variety and newness of these media interest and motivate students to learn.

These media have the power to stimulate interest and appeal to the neo-literate while the print material turns out to be a stumbling block for such learners. For example, the experience of television shows that “the excitement of television sometimes leads participants in a project to undertake tasks they might otherwise hesitate to attempt” (Schramm, 1977: 171).

- viii) **Help learners get involved:** Many studies have emphasized how the non-print media achieve learner involvement and participation and thereby facilitate learning. Continuous active participation is lacking in learning at a distance through conventional texts where students’ response to the instructional stimuli and the reinforcement of correct response are delayed. Some electronic media lend themselves more to student participation than the print material. A study by May and Lumsdaine (1958) found that psychomotor skills are learned better if practiced while watching a film in which those skills are shown to have been found to facilitate learning. Even covert responses like silent repetition of key vocabulary and specified points in a lesson are found to be effective. A group discussion after the use of video cassette or film can also be used to enhance learning. Research by Kothari et al (2003) reveal that same language sub-title improves language literacy as it engages the audience.
- ix) **Promote participatory learning:** Moreover, electronic media directed instruction increases learners’ concentration on a task because teachers employing television for instruction have found that televised instruction receives more concentration and has fewer diversions than classroom instruction. Because instruction through media is structured, the objectives are clearly defined, and the instructional environment is created to achieve those objectives. Print material is also structured with clearly stated objectives. Print material is also structured with clearly stated objectives but fails to create the desired atmosphere. Non-print media help *provide a learning atmosphere in which students actively participate in the learning process.*
- x) **Accommodate individual needs:** Non-print media have the flexibility of accommodating individual needs and interests, especially through computers. The emergence of technological advances has coincided very well with the increasing awareness of individualized instruction. The variety and flexibility of new media offer the opportunity to adapt any media combination for use in individualized instruction. For example, programmed instructions or the system of audio tutorial instructions are specifically designed for individualized learning. Audio tutorial relies on audio recording to individually guide students’ learning activities. Through individualized instruction, it is possible to treat groups of students to suit the common characteristics they exhibit. For example, students with disability, who have particular needs, get special instructional treatment. In this way we can best adjust instruction to the characteristics of any given group of students. Adjusting instruction to these special groups requires a heavy reliance on technically developed media and materials and the appropriate selection of those materials to meet the specific needs.
- xi) **Help learners monitor the information input:** Some technological devices like audio cassettes and video cassettes allow the learners the freedom to choose how much information they would like to be exposed to. They also allow the freedom to listen to and/ or view the whole/ part of an information pack as many times as they would like to. Besides, these technologies also enable them to choose their own convenient time to receive any given information.

- xii) **Extend the role of a teacher:** With the use of non-print media, the role of a teacher extends further than merely being a dispenser of information. Media utilization permits teachers to become creative managers of the learning experience. They can find more time to spend on diagnosing students' problems, holding consultations individually, and offering counsel and guidance.

Check Your Progress 1.6

Notes: a) Write your answers in the space provided.

b) Compare your answers with those given at the end of this unit.

- 1) Briefly describe how non-print media can supplement the print-medium.

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- 2) Describe three pedagogic uses of non-print media, which are unique to them.

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1.5 TECHNOLOGY FOR PEOPLE WITH DISABILITIES

The most important application of any technology is to make life easy, and who needs this more than the people with disabilities? We are falling behind in providing necessary assistance (communication or education) to the deaf, physically or the visually disabled. There are millions of people in the developing world, who require special and improvised communication technology.

Classification of Disabilities

We can categorize disabilities into primarily four groups:

- Related to vision: people with near or complete blindness; low vision; and colour blindness.
- Related to Hearing: people with difficulty in hearing; and deaf.
- Related to Mobility: people with physical problems due to paralysis, polio, and loss of limb.
- Related to Cognition: people with lack of processing capabilities in the brain such as lack of short-term memory; and learning disabilities.

It is generally a difficult task to prepare digital learning resources that can be accessible to all the above groups of people, as the design needs are different. Nevertheless, today, it is possible to provide equivalent learning resources in alternative formats to people with disabilities with the help of Assistive Technologies (AT).

Assistive Technologies

AT is a generic term used to describe any device or system that helps disable people to live, learn, work, and enjoy life. AT makes it possible for people with disability to do more for themselves and change some of the functions that were previously difficult because of impairment. AT allows independence and empowers disabled individuals and brings in equality. Some of the assistive technologies (IMS, 2002) applicable in educational institutions with particular reference to the digital technologies are given below:

- **Screen Readers** are software products designed for blind people. A screen reader transforms a graphic user interface into an audio interface.
- **Voice Recognition Softwares** allow people to give commands and input data to a computer by speaking. These software use a microphone and are generally useful for people who have difficulty in typing using their hands.
- **Speech Synthesizers** are text to speech programs that read and speak aloud textual materials on computers.
- **Screen Magnifiers** are software solutions for blind people with low vision, and work like a magnifying glass. They enlarge the text displayed on screen and also have capabilities to change colours.
- **Braille Embossers** transfer computer generated texts into embossed Braille output.
- **Refreshable Braille Displays** are tactile devices that move small plastic/metal pins up and down to create Braille letters on a flat board. The user reads the Braille letters with his/her fingers. After a line is read, the display can be refreshed to read the next line.
- **Adaptive Keyboards** are designed for users with physical disabilities who can't use standard keyboards. These keyboards come in different sizes and/or alternative key configurations to suit one-hand use. For people who can use mouse, on-screen keyboard softwares are also available.

Table 1.5 matches the assistive technologies to different types of disabilities.

Table 1.5: Assistive technologies for the disabled

Disabilities	Assistive technologies
Visual Impairment	Screen readers, Screen enlargers, Speech recognition systems, Speech synthesizers, Refreshable Braille displays, Braille embossers
Hearing Impairment	No specific At, as these people can make use of computer well. It is said that deaf people can be good programmers.
Physical Impairment	Adaptive keyboards, Speech recognition systems, Speech synthesizers, Touch screens
Cognitive Impairment	Speech synthesizers, Speech recognition systems, Reading tools and Learning disability programs

Accessible Website Design

In the recent times, most of the educational institutions provide information about their activities through websites. Some even have attempted online courses and programmes often referred to as e-learning. A sophisticated institutional website is also considered as an indicator of the status and pride. But, most of these websites are completely inaccessible by people with

disability as these websites do not follow the web accessibility guidelines of the World Wide Web Consortium (W3C). In a recent study conducted in the USA covering top 50 nationally ranked Liberal Arts College and Universities, Irwin & Gerke (2004) revealed that only 3 had accessible home pages meeting Bobby (<http://www.cast.org>) level 1 access guidelines. It would be interesting to see how many of Indian websites are actually accessible to people with disability. Freed et al (2003) provide eight guidelines and 21 checkpoints to provide accessible software and websites. These are:

- 1) Provide access to image for users who are blind or visually impaired through text equivalents.
- 2) Provide access to multimedia presentations for users with sensory disabilities.
- 3) Provide access to forms for users who are blind or visually impaired.
- 4) Provide access to data in tables for blind users.
- 5) Provide access to textbooks.
- 6) Provide access to interactive activities for all users with disabilities.
- 7) Provide access to graphs for users who are blind or visually impaired.
- 8) Provide access to scientific and mathematical expressions for all users with disabilities.

1.6 LET US SUM UP

‘Communication’, as a scholarly field of study, is a science that produces skilled communication practitioners. It deals with the process of informing, motivating, teaching and entertaining people. It also involves creating and disseminating information, facts, ideas and feelings to its users. In this unit, we discussed that communication has manifold functions of which the main ones include informing, persuading, sharing, socializing, motivating, educating and entertaining people. These functions are carried out by various means of communication – signs, words, written language, postal services, the telephone, the radio, the television, the computers, etc.

There are six components of communication: i) the source and receiver, ii) the channel, iii) the symbol of code, iv) the noise, v) the feedback and vi) the context in which communication takes place. The effectiveness of each component contributes to the overall effectiveness of the communication process. There are various interfering variables, which distort the effectiveness of communication. The personality factors of the source and receiver, the choice of medium, the domestic and social problems, physical and technical disturbances, etc. are some of the prominent barriers to communication. These barriers can be overcome or reduced to a large extent, provided all the understanding between the source and the receiver does increase the effectiveness of communication.

We also discussed education as a communication process, and identified the media used in communication in distance education. We discussed the merits of non-print media at length to emphasize the advantages of various media and technologies used for teaching and learning. We also highlighted the need for accessible design of learning materials and resources to enable people with disabilities to have equal opportunity in learning.

1.7 KEYWORDS

Assistive technology: is a generic term used to describe any device or system that helps disable people to live, learn, work, and enjoy life.

Communication: is the art and science of persuading, informing, teaching and entertaining people. It involves a sender, a message, a receiver, a medium (channel), and feedback to complete the communication.

Equifinality: is a characteristic of an open system to reach the objective/goal of the system through a variety of means.

Teleology: is the study of purpose in a natural phenomenon. Open systems show the characteristics of purposefulness.

1.8 REFERENCES AND FURTHER READINGS

- Bretz, R. (1971). *A Taxonomy of Communication Media*, Englewood Cliffs, N.J.: Educational Technology Publications
- Dichanz, H. (1982). 'Reflections on the Use of Media in Distance Education', in *Learning at a Distance: A World Perspective*, Edmonton, Canada
- Freed, G., Rothberg, M., & Wlodkowski, T. (2003). *Making Educational Software and Websites Accessible: Design Guidelines including Math and Sciences Solutions*, Boston, MA: Media Access Group at WGBH, Available at <http://ncam.wgbh.org/cdrom/guidelines2000>
- Hills, P.J. (1986). *Teaching, Learning and Communication*, Croom Helm, London.
- Hoy, W.K., & Miskel, C.G. (1991). *Educational Administration: Theory, Research and Practice*, Now York: McGraw Hill.
- IGNOU 2000). Unit 4 Organizational Behaviour, in ES-335: Teacher and School, New Delhi: IGNOU
- IMS (2002). *IMS Guidelines for Developing Accessible Learning Applications*, Ver. 1 White Paper, <http://www.imsglobal.org>
- Irwin, M. M., & Gerke, J. D. (2004) Web-based information and prospective students with disabilities: A study of Liberal Arts College, *Educause Quarterly*, 27 (4), pp. 51-59
- Kothari, Brij, Takeda, Joe, Joshi, Ashok, & Pandey, Avinash (2003). "Chapter 13: Same Language Subtitling: A Butterfly for Literacy?". *Reading Beyond the Alphabet*. SAGE Publishing. pp. 213-229
- MacBride, S. (1980). *Many Voices, One World: Report by the International Commission for the Study of the Communication Problems*, Paris: UNESCO.
- May, Mark A. & Lumsdaine, Arthur A. (1958). *Learning from films*, Yale University Press, New Haven, Conn
- Mcquail, Denis, & Windahl, Sven (1981). *Communication Model*, Longman Group U.K. Ltd., London.
- Richey, R. (1986). *The Theoretical and Conceptual Bases of Institutional Design*, London: Kogan Page.
- Rogers, Everett M. (1986). *Communication Technology: The New Media in Society*, The Free Press, New York.
- Romiszowski, A.J. (1988). *The Selection and Use of Instructional Media*, Kogan Page, New York.
- Kulkarni, S.S. (1986). *Introduction to Educational Technology*, Bombay: Oxford & IBH Publishing Co. pp. 143-144.
- Schramm, W. (1973). *Men, Message and Media-A Look at Human Communication*, Harper & Row Publishers, New York
- Schramm, Wilbur (1977). *Big Media, Little Media*, California: Institute for Communication Research, Stanford University.

Shannon, C.E., & Weaver, W. (1949). *The Mathematical Theory of Communication*,
Urban: University of Illinois Press.

Sillars, Stuart (1988). *Success in Communication*, John Murray (Publisher) Ltd.,
London.

Tiffin, John, & Rajasingham, Lalita (1995). *In search of the virtual class: Education in an
information society*, Routledge, London.

1.9 FEEDBACK TO CHECK YOUR PROGRESS QUESTIONS

Check Your Progress 1.1

- 1) Channel: The means or medium through which communication takes place between the source and the receiver is called the channel.
- 2) Code: A Code is a set of symbols that create meaning for both the source and the receiver. For example a written or spoken word is a code.
- 3) Noise: The factors which disturb or prevent proper exchange of information between the source and the receiver are called noise.

Check Your Progress 1.2

- 1) The educational implications of interpersonal communication could be outlined as follows:
 - a) Personal contact programmes should be organised for distance learners.
 - b) Telephone and postal correspondence should be used.
 - c) Instructional materials should be directly addressed to the students.
 - d) Self-study groups should be formed.
 - e) Comments on the student assignment-responses should give the feeling that the student is, as it were, talking to the teacher and the peer group.
- 2) Examples of different types of Communication are as follows:

Intrapersonal communication	:	Reading a book
Interpersonal communication	:	Teacher and Student
Group communication	:	Class room
Organisational communication	:	School, offices
Mass communication	:	TV, Radio broadcast.

Check Your Progress 1.3

- 1) Feedback: Feedback is communication in response to a previous message. In other words, feedback refers to the process by which the sender and the receiver get information as to whether the information has been received and understood.
- 2) Your answer may, among other things include:
 - giving information on the progress of the student,
 - suggesting modifications in the content and approaches adopted in presenting the content,
 - telling whether the objectives of the course have been achieved, and to what extent,
 - facilitating pedagogic interaction between the teacher and the student, and thus motivate the student for learning, and
 - breaking the feeling of isolation among the students.

Check Your Progress 1.4

Communication in distance education takes place though the use of a variety of media. The student and teacher being at a distance, communication takes place through the use of printed text, audio, video, telephone, teleconference and other

face-to-face methods. Students are provided support through counselling at the study centres, where the learners and the tutor discuss the content of the course. The print materials also are prepared with special care to help the learner understand the concepts easily in an interactive manner. It is also told that in print material, the teacher is in-built. Assignments and feedback on assignment responses play a significant role in communication at a distance.

Check Your Progress 1.5

- 1) Four major shortcomings of print medium are:
 - a) it is unsuitable for affective and psychomotor objectives;
 - b) it is time-consuming because it has to be processed in a linear-sequential manner; and
 - c) its language is fixed and usually based on literary skills of average learners.
- 2) Four features of the print medium due to which it is widely used in education:
 - a) Cheapest medium even today.
 - b) Provides most for cognitive objectives and in some measure for affective and psychomotor objectives.
 - c) Can be used at any time and place.
 - d) Not dependent on any hardware.
 - e) Provides for more time to be spent on processing and therefore, results in more and better learning.
 - f) The only suitable medium for certain higher order cognitive skills. (Any four in any order).

Check Your Progress 1.6

- 1) Non-print media can supplement the print medium in areas and functions for which print is not best suited.
- 2) Three unique pedagogic uses of non-print are:
 - decrease in psychological isolation of learners and make them feel part of a large system.
 - introduce variety and heighten learner motivation.
 - ideally suited to presentation in enactive and economic modes of experience.