UNIT 2  GROWTH OF COMMUNICATION TECHNOLOGY

Structure

2.0 Introduction
2.1 Objectives
2.2 Development of Communication Technology: An Overview
   2.2.1 Print medium
   2.2.2 Audio media
   2.2.3 Audio-visual media
   2.2.4 Telecommunication
   2.2.5 Multimedia communication
   • Convergence of communication technology
2.3 Growth of Communication Technology: Problems
   2.3.1 Political factors
   2.3.2 Economic factors
   2.3.3 Cultural factors
   2.3.4 Technological factors
   2.3.5 Educational factors
2.4 Communication Policy
2.5 Let Us Sum Up
2.6 Check Your Progress: The Key

2.1 INTRODUCTION

In ancient times when people started writing on stone or wood, communication became portable to a limited area only. As civilization advanced, various other means of communication were also invented. The printing press, the most remarkable invention in this regard brought about a revolution in communicating to larger groups. The printed words communicated to all those who could read what had been written in the printed material—on stones, wood or paper. The technological innovations added to the efficiency of the printing technology. Today we have the most sophisticated communication technologies both print and non-print. As a result, common people have increased their ability to share experiences and feelings of others.

In this Unit, we shall review the growth of communication technologies in the world in general, and India in particular. Various problems in transferring and adopting communication technologies are also touched upon in this Unit. Towards the end of the Unit, the policy on communication in relation to education has been discussed briefly. More emphasis has been given to the practices prevailing in India. However, illustrations/examples related to other countries have been presented to give an overall idea of the communication technologies used in various countries of the world.

You may recall what you have already studied about the basic concept and the process of communication in Unit 1. You have also studied the importance, types and role of communication in detail in that unit. This unit
Communication Technology: Basics

is an extension of Unit 1, but the emphasis is shifted from the general communication to the technologies of communication.

2.1 OBJECTIVES

The main aim of this Unit is to study the growth and adoption of communication technologies. After going through this Unit you should be able to:

- describe the growth of communication technology in the world;
- identify major developments in various media;
- identify and explain the problems of growth and adoption of the communication technologies; and
- analyse the importance of policies on communication for education and development.

2.2 DEVELOPMENT OF COMMUNICATION TECHNOLOGY: AN OVERVIEW

Communication is a fundamental human and social process. It makes the existence of societies possible, and by its nature, distinguishes between the human and other species (Schramm, 1973). The functioning of any society thus depends upon the quality of communication among its members (Melody, 1986). In other words, the prosperity of a society is judged by the extent to which its members can afford and use various modes of communication — the printed text, radio, television, video cassette recorders, video text, computers, etc. This is the reason why now-a-days more emphasis is being given to the manufacture, storage, processing, editing, interpretation and transmission of information to one and all. With the advancement in and access to a variety of communication technologies we are moving towards an information-based society.

We should know a bit about the history of the growth of communication technologies. So, we shall touch upon the historical development of communication technology in this section. You must be aware that the growth of communication techniques has a long history. For centuries, people developed their own ways to expand their ability to communicate as effectively and efficiently as possible under their respective circumstances. Use of signals, symbols, gestures, facial expressions, etc. were the primitive ways of communication prevalent in primitive societies. It took centuries for the first mass medium — print, to be developed and used for communication purposes.

In the following subsections, we shall discuss the growth of the individual media — print and non-print. Under non-print we shall take up four important media — the audio, audio-visual, telecommunications and multimedia communication — for discussion through which we shall try to throw some light on the growth of communication technologies as a whole with special references to the Indian scene.
Let us begin with the print medium.

2.2.1 Print medium

The growth of modern communication technology begins with the invention of printing technology. Gradually, it led to more specialised print materials — religious and political books which worked as instruments in the transformation of human beings.

You will appreciate that even in the age of the computers and satellite communication, the most powerful and pervasive educational technology is the printed text material (Altbach, 1987). There is little evidence so far, even in developed countries to show that the influence of printed materials as tools of education has declined. The printed text remains a basic tool for education throughout the world. The educators still depend on the printed text for teaching and learning.

In ancient times people used papyrus, bark, leaf, etc. for writing on. The Chinese wrote on flat pieces of bamboo or on silk fabric until an emperor, around 100 AD ordered his courtiers to discover a more convenient writing medium. As a result, the Chinese developed paper technology. The use of written words to serve educational purposes actually started in 105 AD when the Chinese made paper and ink.

In early times, the written words had to be copied by hand, which required very hard work on the part of the writers in order to get multiple copies of a written text. Because of this reason, reading materials were very expensive and were available to only a few. The need for more copies of reading materials, particularly in matters related to religion, gave birth to the reproduction of original works on a large scale. As a result the printing process started. As early as 868, the teachings of Lord Buddha were printed by movable type in China in a book form. The Chinese experimented with wood, pottery, and tin for producing printing blocks that could be assembled to form a printed page of a book. By the 1400s, the printing technology swept over Europe, and printing machines were established as a craft. Thus more mechanised printing started in the west. John Gutenberg of Germany, in mid 1400s, played a major role in bringing about the mass printing of books. It was Gutenberg who worked on the practical application of the idea of movable type. Thereafter a number of improvements were made in printing technology to increase its efficiency and effectiveness as well. Modern printing technology is the result of developments that have taken place over the past few centuries. And today, every day thousands of books are being printed throughout the world in different languages and for different purposes. As a result the printed text has become the main medium of storing and imparting knowledge. The print medium is used in various forms, such as newspapers, magazines, journals, pamphlets, handbooks, dictionaries, atlases, encyclopaedias, workbook, etc.

Technology undergoes constant change and improvement. With the passage of time, publishing a book became easier and the products came to be of high quality. During the 1980s, the computers and laser technology were added to printing and distributing print media. The computers and other
electronic devices have made it possible to store in large quantities, as the printed text materials, and use them as and when required. Manuscripts are being composed in microcomputers utilising very efficient word processing software packages. This provides the writers, the freedom of preparing a manuscript in bits and pieces that can be quickly assembled in any desired sequence. Paragraphs can be shifted from one place to another, sentences can be rephrased, spelling can be checked and corrected automatically and so on. The text thus prepared can be stored magnetically on either the hard disc or a floppy. Now-a-days, more and more writers and printers use the computers from the very initial stages of preparing learning texts through editing and printing. These new devices have improved the quality of the printed texts and, have made the entire process faster and much less cumbersome.

Having discussed the growth of print medium, let us try to encapsulate it in a conceptual framework. The emergence and growth of print medium can be tracked down through its four elements, viz. Material, Form, Medium, and Mechanisation. In the earliest times the form of communication was basically sign language – symbols, until the development of the alphabet, words and spoken language. Similarly, the materials used to communicate were barch bark, stone, leaves etc. and then use of papyrus came into and finally paper was invented. On the medium front, initially it was engravings on stone cages using metal equipments. Later on lead came into being and the Chinese used ink. As for the mechanisation of the process of communication is concerned, it is the most remarkable development that has made communication faster and cheaper. With the initial use of blocks in printing machines, it has now reached the stage of DeskTop Publishing (DTP) which makes printing so easy and time saving. A concept map of the development of print could be depicted as follows:

Having briefly touched upon the growth of the printing technology in general let us now turn to the Indian scene. You may be aware that the first printing press was brought to India almost by accident on September 6, 1556 (Moses & Maslog, 1978). Interestingly, the press was being shipped to
Ethiopia (known as Abyssinia at that time) for the Christian missionaries there. The Jesuit priest who accompanied the press died during a brief stopover in Goa (India) and the press remained in India. Thus, printing was introduced in India by chance. ‘Doctrina Christiana’ was the first book printed in India. The second printing press in India was set up in 1578 at Punikael, a village in Thirunelveli district of Tamil Nadu. The press was set up by the Christian missionaries and was used to print religious books. The third printing press — and the first non-missionary press — was set up in 1674 in Bombay.

More than two centuries after the arrival of the printing press, the first newspaper was printed in 1780 in India. The first newspaper, The Bengal Gazette, came out on January 29, 1780. Thereafter many presses were established and newspapers were brought out. The first non-English language publication in India was the Dig Darshan, a Bengali monthly founded in 1818, followed by other newspapers, magazines in some other Indian Languages. Printing in the Hindi language came rather late. The first paper published in Hindi was Oodunt Martand in 1826.

Now let us look at the other side of the picture. We need to understand clearly that new technologies used in printing are not a blessing for all countries. Many developing countries find electronic devices out of their reach, because of their cost, accessibility and technological complexity. As a result, many countries still depend on the traditional printing technology and skills to prepare and distribute the printed text materials.

2.2.2 Audio media

The radio is a twentieth-century phenomenon. The massive growth of the radio took place between 1920s and 1940s. From the day of the discovery of radio waves till today we have seen a continued refinement of radio technology and the rapid growth of broadcasting facilities. In the beginning, radio technology progressed rather slowly, but accelerated during the World War II, and finally had very rapid growth in the recent decades. More and more people got the opportunity to listen to the news and entertainment components through the radio. After the World Wars, election campaigns became potential inputs for sustained growth of the radio all over the world, particularly in U.S.A. As a result, politicians in power took special interest in commissioning more radio stations for political propaganda. Besides political propaganda, the potential of radio for disseminating economic news also stimulated the planners to establish more and more radio stations throughout the world. By 1922, there were 564 licensed broadcasting stations in USA alone (Thomas, 1987).

Commercial information and entertainment potential/value of the radio medium contributed to its rapid growth. Even today the radio is being used mainly for entertainment followed by information/news. Some countries such as France and Hong Kong make considerable use of the radio for entertainment (70 and 72 per cent of total broadcast hours respectively) (UNESCO: 1980).
To reach and inform more and more persons, necessary improvements in the radio technology were made. These improvements brought down the size and the cost of the radio sets. As a consequence, the radio with the help of transistor technology has now become a mass medium in almost all the countries in the world. People in low-income groups can buy radio sets these days and carry them in their pockets.

Use of the radio for educational purposes (used in a broader sense) came later. Due to easy access to a large number of persons, it was realised that the radio could be a potential medium of enhancing the knowledge of the people.

The television began to create meaningful competition for the radio. As a result, the radio started to make adjustments. A number of improvements were made to refine the radio technology, and the approach to broadcasting. Several technical developments such as multiplexing, stereophonic broadcasting, and the easy availability of transistors, boosted the growth of the radio. Currently Digital Audio Broadcasting (DAB) technology is being tested all over the world.

Apart from radio, the audio medium has grown tremendously because of the developments in technologies like gramophone records and tape recorders. Though the cassette tape technology has now almost replaced the gramophone disks, these media have made the audio medium more popular and accessible to the public in general. Mostly used for the purposes of entertainment, the audio tape has tremendous educational value, because of its portability and ease of use. In the audio medium, the current buzzword is audio CD, which because of its digital recording gives a very clear output of sound. We have a separate unit on radio and audio components in this course. You will read more about them in Unit 2 of Block 2.

2.2.3 Audio-visual media

Television came in on the heels of the radio. Discoveries pertaining to the television were made in the late nineteenth and the early twentieth centuries. After continued research, the Bell Telephone Laboratories could send an experimental television programme by wire from New York to Washington in the USA in 1926-27. By 1930, a number of developments took place in the television technology, and there were 17 experimental television stations in operation in the USA.

Audio-visual technologies are rapidly expanding all over the world, especially in advanced countries. Beginning with the broadcast television, now we have the video cassettes, cable TV, computers, videotext, video disc, and so on, at our disposal. The analog broadcast television is changing to a digital environment. The reach of TV is also increasing day by day.

More and more sophisticated technologies, such as, talk-back facility, videophone system, facsimile, etc., are being put into practice all over the world. Depending on their economic conditions and level of technological development and requirements, various countries are in the race for acquiring as many audio-visual technologies as fast as possible. We have discussed the visual media in detail in Unit 3 of Block 2 of this course.
Moreover Blocks 3 & 4 are also related to audio-visual media. In fact the use of communication technology in education is based on the basic premise of the effectiveness of the audio-visual media in learning and therefore has a special place in distance education.

2.2.4 Telecommunication

The transmission of telegraphic signals over wires was the first development in the field of telecommunications. In 1876, Alexander Graham Bell demonstrated his telephone set and the possibility of telephony — long distance voice transmission. This point-to-point telephone connection demonstrated by Bell was the beginning of the whole world of telecommunication, which has almost changed the way people communicate. Since then the telecommunication technology has also changed from marvel switching systems, having gone through various phases of development. The technology, which was started as a medium to transmit audio at a distance, now can transmit full multimedia — audio, video, picture, imager, text all combined together. It is this capability which has tremendous application in distance education.

2.2.5 Multimedia communication

As indicated in the previous section, the capability of telecommunication channels have increased, especially the speed of transmission, called bandwidth. The term ‘broadband’ is used to describe high-speed transmission signal channel, which is measured in megabits per seconds (Mbps). The traditional telephone services run in the speed of kilobits per seconds (kbps) and are usually referred as ‘narrowband’. The development of very small Aperture Technology, Integrated Services Digital Network (ISDN) and Broadband ISDN have made multimedia communication possible. The computing technology and the growth of Internet also plays a very significant role in multimedia communication. This is because the system of the Internet is more interactive. In the multimedia communication environment, any number of services may be demanded and supplied simultaneously. Because of the possibilities of multimedia communication at a very high speed all the media discussed above are leading towards convergence.

Convergence of communication technology

The World Communication Report (1997) presents a very clear picture of convergence of communication technology, which we have reproduced in Fig. 1. The trend is towards interactive services and the technology is moving towards that. Computing power, telecommunication technology and media expertise are all converging into interactive services through a wide variety of media — be it mass media, interactive media or self media.
Check Your Progress 1

Notes: 1) Write your answer in the space given below.
       2) Compare your answer with those given at the end of the unit.

Identify and write the current trends in each of the following media

a) Print ........................................
d) TV broadcast ....................................
b) Audio ........................................
e) Telecommunication ..............................
c) Radio broadcast .........................
f) Multimedia communication ..................

(MASS MEDIA)

The convergence of various communication technologies has become possible due to the developments in microcomputer technology. Because of
the developments, now you can receive educational programmes at your home through the Internet. The Internet is an example of the convergent technology that can handle, text graphics, audio, video, animation, etc. altogether. It can also facilitate synchronous interaction. Because of the convergence, the computer has become a gadget that can provide, education, information and entertainment at your doorstep on demand.

2.3 GROWTH OF COMMUNICATION TECHNOLOGY: PROBLEMS

The growth, transfer and adoption of technology is not as simple as it may appear, on account of the fact that we are equipped with sophisticated technologies. There are various underlying conditions that influence the way a particular kind of technology is adopted to solve educational problems. Both the developed and the developing countries have almost similar conditions to fulfil for the development of technologies. For instance, the economic strength and enthusiasm of society, the attitude of policy makers, etc. influence the adoption of new technology in both situations the same way (Thomas, 1987). We shall discuss the more significant of these factors in the following sub-section. They are:

- political,
- economic,
- cultural,
- technological, and
- educational.

2.3.1 Political factors

Communication in the developing countries is not only a socio-economic need but a political necessity too. A political system, i.e., a group of people that holds power can effect the adoption and growth of a particular communication technology in a country. In other words, the introduction of new technology in the service of social change and education depends on the underlying motivation or the will of the political system of the country concerned. You may recall that the rapid growth of computer technology in India, both through import and indigenous industrialisation was the result of the interest of the late Prime Minister of India, Rajiv Gandhi. It is an example of the force of political decisions behind the adoption of technology in India, consequent upon which the computer industry flourished in the country manifold. Today, India is one of the major exporters of software in the world.

It is true that technology influences society, but it is also true that society influences the adoption and growth of technology. We, therefore, need to ensure that, rather than getting carried away by the fashion of the day, the communication needs should be identified and evaluated from the country's point of view and then the communication policy for education and development should be formulated/ framed accordingly.
Some societies may adopt technology more easily than others because their cultural and linguistic structures may be more adaptable to information processing. You might be aware that Japan took to technology more easily than other countries in Asia. Within a country, the upper classes and capitalists adopt technology more easily and faster than the middle and lower classes; the urbanites go for technology more quickly than the ruralites. There is also social bias that influence adoption of the technology at an individual’s level. For example, the young take to technology faster than the old do. The males take to it more easily than the females (Hawkridge, 1983). Resek (1981) reported that the secondary school girls do not use microcomputers to the extent the boys do in schools, and avoid joining the ‘computer club’ because it is male dominated. Though there is no systematic evidence for the causes of this bias, some educators blame the long standing prejudice against mathematics among the girls and mathematics is associated closely with computers. These observations are based on experiences in the developed countries. We do not know much about the gender or age-based preferences of the Indian society in this case. We should take up systematic research in the use of and the preference for technologies by various sections of our society.

2.3.2 Economic factors

Cost is an important factor that influences the adoption and growth of communication technologies in a country. And this is absolutely true in the case of the developing countries which import technology from the developed countries. They lack sufficient budgetary provision to run or afford technology-based projects. Some countries have made heavy investments in acquiring various technologies without building the necessary infrastructure to make those technologies productive. As a result these countries are under heavy debts. The point we want to highlight is that investment on new technologies should be seen in terms of the economic growth of the country. We should assess the rupee value of communication technology benefits like the benefits of spending the same amount of money on other measures/areas of social development.

In this subsection, we draw heavily on the discussion presented by Thomas (1987) who focuses his attention on four major economic considerations that affect the use of communication technology in a country. These considerations are as follows:

- financial strength of the society
- attitude of the policy makers
- budget allocation for technology
- cost efficiency of technology.

Let us elaborate on each issue, in the given order.

There are countries which are economically better off with higher per capita income. The per capita income of the developed countries is much higher than that of the developing countries. Since technologies cost huge amounts, it is quite obvious that the country with the higher per capita income is in a better position to afford more communication technologies, and most
developing countries lack adequate technologies for communication. They still depend on their traditional methods of communicating. By saying this, we do not mean to suggest that the traditional methods are irrelevant. We, however, believe that those methods have certain limitations, particularly in terms of their reach and efficiency. And if societies want to work on modern social agenda, they must also modernise their communication and technologies.

The adoption and growth of new technology in a country also depends on the attitude of the policy makers towards it. If they perceive communication technology being adopted as a helping hand in the development of the country, they would see that the required technology is adopted and implemented in various areas including the educational systems. The policy makers decide the amount to be allotted or the priority to be given to developing or importing a particular technology for specific purposes. In our country, the policy makers have a favourable attitude towards the utilisation of communication technologies, and are quite liberal in recommending and implementing them. At times, they become over-enthusiastic in adopting a technology at various levels of education, even without creating the adequate infrastructure in the form of required resources, including skilled manpower, maintenance mechanisms, etc.

Then we come to the cost of technology and budgetary provisions to buy or manufacture the tools for technology. Lack of foreign exchange, lack of capital, and the unavoidable difficulties in relation to balance of payments are recognised as principal economic hurdles faced by the developing countries (Jonscher, 1985). The total budget allocated for the education sector is the basis for deciding the amount to be earmarked for the adoption of communication technology. The initial expense to be made on installation of a technology is, as you know, very high. But once a country acquires a communication technology, she can reach and teach an unlimited number of students without involving high budgetary allocation. However, the skilled personnel and receiver equipment require recurring expenses.

The last point to touch upon here is the cost-efficiency of a chosen technology. We have to assess whether by implementing the technology the desired goals have been achieved optimally in terms of money, time and energy spent on it (Thomas, 1987). So the educational planners have to judge the efficiency of the technology being recommended for different target groups. They have to provide convincing answers to several questions, such as, is face-to-face instruction more effective than that done through the radio? Is the television more effective than the radio or vice versa? Such questions are to be resolved before investing in specific communication technologies. The educationists have to ensure that the investment in technology yields greater benefits to a larger number of the students, otherwise it is no good to bring in a technology for use on a large scale.

2.3.3 Cultural factors
The communication technology plays an important role in disseminating knowledge about cultural heritage and stimulating cultural activities.
Communication Technology: Basics

Culture is a complex whole which includes knowledge, beliefs, art, morals, laws, customs, and any capabilities and habits acquired by a human being as a member of the society (Contractor, Fulk, Monge & Singhal, 1986). There are differences in these cultural factors of various societies all over the world. One society differs from another because of these variations. It is, therefore, assumed that the variations in cultural systems do function as determinants in implementing technologies, their manufacture and utilisation. In other words, these variables/variations influence individual as well as group attitude towards various communication technologies.

Thomas (1987) elaborates that the cultural element of language is one of the most important factors in the transfer of the educational software from one country to another. The radio and television programmes, computer software and even printed text are produced in different languages in different countries with different cultural backgrounds. Similarly, philosophical traditions also influence technological exchanges. The adoption of the technologies thus depends on the attitudes, values, beliefs and lifestyles the people in a country have. For example, a confrontation between modernisation and traditionalism recently started in India with the infiltration/encroachment of various technologies from the developed societies. As a result, a section of the people has become pro-innovation and pro-implementation, while others have stuck to the traditional practices. There was a hue and cry even in the mid-eighties when the computers were introduced in the banking institutions of India. The bank employees went on strike against automation in the banks. One of their apprehensions was that computers would replace them but it really did not happen. There was another apprehension that the computer would add to the already long queues of unemployed youth in the country. On the other hand the use of computers have opened up more jobs. Again, when for the first time computers were introduced for the management of a large examination system in the Central Board of Secondary Education, there were apprehensions expressed by some higher level officers, financial advisers and people in general about the need and desirability of such a step. The actual use of the computers, however, removed their apprehensions. Similarly, an important cultural factor in the formal education system is the teachers' resistance and an approach of non-cooperation to any innovation or change in their existing teaching-learning practices. They seem to be quite satisfied with their present methods of teaching and, therefore, see no reason to adopt a new technology and invite unnecessary hardships in terms of money, time and energy. This is an important reason why the modern mass media are not used adequately in spite of their availability in some countries.

Our contention here is not that we should adopt technology without considering the socio-cultural factors. We need to evolve an indigenous model of communication, which has direct relevance to our conditions. The technologies should support our culture and values under the changed conditions. Contractor, Fulk, Monge & Singhal (1986) have reviewed research on cultural assumptions that influence implementation of communication technologies. They reached the following two conclusions.
First, the implementation of communication technologies is greatly facilitated in a homogeneous culture. In other words, the successful implementation of communication technologies depends on a match between the values of the two countries: the donor and the borrower.

Secondly, the implementation of technologies is successful, only when it is used to support the activities of the traditional culture, and allows development according to the values and norms of that culture. These conclusions stand true for all cultures.

For instance, the Satellite Instructional Television Experiment (SITE) project proved successful because the television programmes were shown to the villagers without disturbing their cultural equilibrium. The viewers discussed television messages in a group (teleclub) in the light of the existing practices in the rural society. On the basis of their discussions, they either accepted or rejected the messages broadcast. In this way the utilisation of the television programmes was successful, and it could bring about changes in the viewers’ knowledge, skills and attitudes.

2.3.4 Technological factors

There are various technological considerations that influence the growth and adoption of communication technology in a country. New communication technologies are not free from technical problems. There are a number of studies that find technology itself functioning as a barrier in its own growth.

You might have come across instances where you faced a lot of difficulties in handling, using and maintaining new gadgets. For instance, lack of a regular flow of electricity can make technologies defunct. One of the major reasons of under-utilisation of the television programmes in the villages in India during the Satellite Instructional Television Experiment (SITE) and the Indian National Satellite (INSAT) project was the irregular supply of electricity. Some problems, particularly relevant to the application of technology for educational purposes are as follows:

**Appropriateness:** The technology chosen should suit the geographical conditions of the country. Those developing countries which are large, and have a difficult geographic terrain, need technologies that suit them. For these considerations, India’s policy of having her own communication satellite to cover the entire country is justifiable. The microwave or cable networking have limited coverage and are too expensive to afford for large scale operations.

**Accessibility:** We are sure that communication technologies will not be accessible evenly throughout a country for educational purposes. Many households, mostly in poor societies of rural and urban sectors in the developing world, will have none in the near future. The accessibility of modern communication technologies such as the computer, videotext, videodisc, videophone, etc., to public will remain extremely limited for many years to come. This does not mean that we are pessimistic about the situation. Far from that, we are of the opinion that the communication technology will be used first for commercial purposes, and not for educational ones in many of our countries. Certain constrains such as lack of
sufficient money, lack of interest amongst educators and administrators, lack of sufficient software/courseware, lack of political will, etc. will invariably affect the accessibility of a technology to the educational sectors.

**Handling**: An electronic device will become redundant if we do not know to operate it. There are devices which, of course, can be operated with simple know-how, but there are some sophisticated devices, which need special efforts and skills to handle them. For example, though a computer is easy to operate, it needs specialised training to use them. More so, because the technologies are changing fast, one finds it difficult to keep oneself up to date in handling and maintaining them. Updating to new operating systems for example is a case in point.

**Maintenance**: It has been observed quite often that various technologies are imported or adopted from the developed countries without having made adequate arrangements for maintaining them. Once such devices develop technical problems, they become defunct for ever. The reasons for poor maintenance facilities may be due to lack of expertise, lack of resources/infrastructure, non-availability of spare parts, or indifferent attitude of users. For instance, even the most popular/common of devices such as the television set installed in a rural primary schools in many poor countries, are not covered under an effective maintenance scheme.

**Software/Courseware**: It is a fact that there is a dearth of relevant software/courseware for educational sectors all over the world, including the developed countries. Besides, there is a serious problem of quality software in the developing countries. Most of these countries depend on the courseware imported from the developed countries. Such courseware may not suit the socio-cultural and educational needs of the students of the borrower countries. One of the concerns here is the language of the courseware, which may be difficult for the students to follow. As a result, the actual utilisation of such courseware becomes doubtful.

We must admit that designing and producing educational courseware is a complex task, which involves a lot of expertise, equipment and financial support. Designing courseware for the modern communication technologies, such as the computers, videotext, video disc, etc. is a challenging job. How efficiently the students learn from a lesson depends on how skilfully the courseware has been designed.

Though some developing countries have reached a level of sophistication in producing general radio and television programmes, they do not have a sufficient stock of the educational programmes. The non-availability of the relevant courseware hampers the growth and development of the communication technology in the educational sectors. It is, therefore, necessary to seriously plan and design appropriate software for the new communication technology, (for instance, the talk-back system) otherwise it will take unreasonably long time to get the new technology introduced.
Check Your Progress 2

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

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

i) What are the four major economic considerations that influence the use of communication technology?

ii) What are the main cultural and technological factors that influence the adoption and growth of communication technology in a country?

2.3.5 Educational factors

There are certain educational factors that influence the growth and adoption of the communication technology. These factors are linked with socio-cultural and economic considerations prevailing in a society.

Teachers, the important component of the educational system, play a crucial role in the adoption of a technology, or an innovation. We should remember that teachers can mar the success of any media at the institutional and actual operational level. They may or may not be willing to make necessary changes in their role, or to deviate from their existing practices as demanded by the technology. Their attitude toward technology is thus an important determinant. Communication technology demands a change in the role of teachers. They should realize that they are no more the only source of information required to transmit knowledge. In other words, new communication technologies will ask the teachers for new roles of teaching managers, facilitators, individualisers of teaching, advisers and so on. This is not something new we are talking about. A number of research studies on the educational media have provided empirical evidence to show that these devices demand that the teachers should play new roles.

There is an undercurrent of scepticism among some educators that the adoption of a technology may lead to further elitism in education: widening the gap between those who have access to resources and those who do not have. Adoption of technology needs a lot of resources, and every institution cannot afford to have such costly devices. Moreover, the government cannot make technology available to every student to work with. Thus adopting technology in education will rapidly create a new elite class, if it is introduced selectively.

Attainment of learning objectives is the main function of communication technologies. Besides the other attributes of software/courseware, the language of instruction is a determining factor for its success or failure. Even the same courseware produced by a foreign and a local agency in the
The same language produces different impacts. In an Indian study, for example, conducted by the University Grants Commission (UGC) Research Advisory Committee for INSAT-IB programmes, it was found that the programmes (in English) imported from other countries contributed little to the comprehension of the subject matter as compared to the programmes (in English) produced in India. The students faced problems in comprehending the language, mainly because of the pronunciation of the foreign experts. It is pertinent to mention here that the UGC imports a number of programmes from the U.S.A., the UK, Japan and other countries, but they are not used fully by the Indian students due to problems caused by differences of language and culture.

Besides, there are some additional factors that influence decision-makers to ignore or adopt technologies for educational purposes. Some of these are as follows:

- The teachers are usually not involved in planning and preparing the courseware (there is a difference between software and courseware—'software' refers to computer programming while 'courseware' refers to all teaching materials that store information, e.g., radio and television programmes) for the students. The perception of the producers may differ from that of the teacher. This is the reason why teachers do not look at these devices with favour.

- There is another problem with the courseware. From the qualitative point of view, the scope of the content of the courseware may be limited, and the presentation of the content may be inadequate. From the quantitative point of view, it is very difficult to cover the entire syllabus by one technology (medium). Therefore, other media are required to achieve the educational objectives in their totality, but it is very difficult for many countries to adopt the multimedia approach to teaching-learning.

- There is a dearth of variety in the courseware in developing countries. The material borrowed from the developed countries may not be suitable for the students of developing countries; the software may not suit the needs of individual students.

- The teachers and the students may feel that the written and spoken communications are still popular in education. The students' dependency on the books and the teachers' lectures discourages them to make use of the modern communication technology. For instance, the Japanese, in spite of being a super industrial society, continue to depend on teachers for teaching-learning purposes. Thus education still suffers from a kind of intellectual imperialism, i.e. the teachers feel that they are the only competent means of teaching the students.

- Some communication technologies are more effective for pedagogic purposes than others. Educationists prefer the technology, which has the potential to solve educational problems and can consequently improve the quality of instruction.
Check Your Progress 3

Notes: a) Write your answer in the space given below.
       b) Compare your answer with the one given at the end of the unit.

As a teacher you want to introduce computers in your institute. List the problems you may face in doing so.

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2.4 COMMUNICATION POLICY

Let us start our discussion by touching upon issues related to communication policies. In many countries in the world, broadcasting was started by private agencies but in due course of time, it was taken over, directly or indirectly, fully or partially, by the government agencies. The radio broadcasting system, which needs less resources was also started under the private initiative of an individual or a group of people. On the other hand, the television, being an expensive medium for private initiative, started on a very limited scale. Another interesting fact is that in some countries, such as, the U.K., Italy, Netherlands, the Philippines, etc., religious groups were given license to broadcast for the people.

In India, the electronic mass media — the radio, television and telecommunication, are regulated by the Government of India, which has complete monopoly over the broadcast system for the whole country. These media are being used to serve the public and political interests in a manner not very different from the press, which is under private ownership. Over the last decade, there has been a big controversy over the control and use of the radio and the television in the country. A series of debates at various public platforms including the Parliament were held (and are still being held) to discuss the policy issues related to the electronic mass media. There is a clear trend favouring the view that the electronic mass media should be an independent body accountable to the public, free from any political interference.

Due to the availability of the direct broadcast facility and also the need for more and more programmes to feed the transmission, the Ministry of Information & Broadcasting has allowed the private, public and autonomous agencies to produce programmes. As a result, the Ministry of Human Resource Development through the UGC, the Central Institute of Educational Technology, and the IGNOU, the Ministry of Agriculture and Rural Development through the agriculture universities, and the Ministry of Health and Family Welfare have started producing instructional programmes for their respective target group. However there is a long way to go.
Communication Technology: Basics

So far, we talked about the organisation of the mass media in general. Let us now come to the main issue, i.e., communication policies.

Policies are applications of theory to reality, usually in the form of social, political, economic and cultural action. In fact, large-scale communication action requires a coherent and well-defined policy. Unesco (1972) has defined communication policy as “sets of principles and norms established to guide the behaviour of communication systems”.

Communication policies, in general, have been an issue of long debate and of controversy throughout the world (Melody, 1986). The communication technology is not an incidental service. The policies that govern it emerge from social pressures. In other words the policies concerned depend on the social role we expect the communication technologies to play in the complex process of transformation that the society is going through. Their implementation should speak explicitly of the purposes to be achieved, the plans to be followed and the activities to be performed. In order to implement activities related to communication technology, one has to consciously mark out strategies to achieve social goals. They should promote a better informed and more participatory citizenry. Keeping these facts in view, the policy makers should chalk out an overall policy framework in the public interest, and address themselves to issues of communication disparity both within and among nations.

However, in practice communication policies have also been created under pressure from the technological innovations. The first concern of these policies is to find the ways of ensuring that the distribution of information and communication does not encourage class divisions in the society, and that the benefits are spread uniformly among all the classes, but in effect, the politically and economically dominant classes usually shape the policies in their favour.

This requires a re-examination of the role of information and communication in a democratic country. In a democratic society, it has been accepted as obligations for the government to keep the citizens informed and make the sources of information accessible to them. The aim of communication is to approach people through all the available media for the cause of social development. Besides our constitutional commitment to freedom of speech and expression, communication is envisaged as a support for social development. The radio and TV are being used for social development including formal and non-formal education (Chatterji, 1987). Dr. Vikram Sarabhai, the famous Indian scientist, envisaged the use of the TV as a means of education and social change, and as a result SITE project was conducted in the rural areas to serve the nation as whole. Therefore, a broad-based approach to framing policies about communication is not only desirable, but also necessary.

Various policy decisions on communication have been taken from time to time. The policy on the print medium has a longer history than that on the electronic media. The rules and regulation for the use of the electronic media, particularly, the radio and television, are being framed in India.
Various committees/commissions have deliberated on the issue, but we are still in the process of finalising them.

Having said this much on the communication policies in general, we now move on to some specific issues which are of immediate concern to us.

**Communication policies and development:** One of the areas of priority facing the developing countries is development — social, educational, cultural and economic which to a large extent depends on the nature and distribution of communication/information. Because communication is a resource to enhance social development and education, the policies on communication should be designed to give a desired structure to the overall or integrated development of society, i.e., communication should be linked with the overall developmental goals of the country. The approach to the development should decide the type of communication system needed. It has to be a system that can ensure the active involvement of the people in achieving the goals of development. Here, the communication technologies are the means, and not the ends, for development. In other words, control over the technologies is tantamount to potential control over development.

One important point that we should keep in mind is that the communication policies and development strategies, considered as essential means of solving many of a country’s problems, should be designed first and foremost to ensure that the media of ‘information’ become the media of ‘communication’. Because communication presupposes people’s access to the means of information and their participation in the common cause, different media should be involved in the process of development, which cannot be achieved fully unless ‘education’ is one of the major concerns of these policies under consideration.

Indian space research and application programmes are based on the primary purpose of using communication for development, i.e. improving the quality of the Indian life. To benefit the maximum number of the people, various communication technologies are being adopted and used in India. The proclaimed objective of our broadcasting services has been to provide support to mass education and development. As per the policy decisions taken, the technologies such as the communication satellite, audio and video, etc., are being used for a wide range of information resources for the welfare of the people, thus taking them towards the ‘information age’. With limited resources, India has set up three main priorities (Narula, 1986).

- To accelerate the pace of development by informing, educating and motivating the people for development;
- To ensure that these technologies benefit a large number of the people; and
- To provide efficient communication facilities to the masses.

Narula wants to highlight the fact that the main efforts of the government have been directed towards making the technologies available to the country reach the majority of the people, convey optimum and relevant information, and prove physically and financially accessible to the people. Thus it is based on the assumption that the technologies will reduce the
Communication gap and the gap in developmental benefits among the people.

**Communication policies and demographic factors:** The communication policies must also take into account the demographic factors and their consequences at different levels of development strategies (UNESCO, 1980). The population of the country should be taken into consideration while framing the policies with a view to providing for appropriate solutions for the expansion of resources, facilities, equipment, etc. with the changing times.

UNESCO (1980) recommended that the communication policies, particularly in the developing countries, should take into account the population growth and its effect on various development and educational strategies. We all know that the Indian education system, for example, is facing problems due to increasing population, which in turn affects the allocation of educational resources. The ways and means to communicate must provide an infrastructure to satisfy the requirements of various population sectors which are growing alarmingly. Effective communication policy will definitely help in this regard to promote education.

**Integrated approach to communication policy**

Mowlana and Wilson (1988) while analysing communication policies and planning for development, recommend an integrated approach. According to them since communication is closely related to development, the strategies a country take in communication should be considered in a system viewpoint covering all economic, political, cultural issues at national, international and global levels. As such, communication policies should consider the following elements:

*Stages in the process of communication:* (i) the source, (ii) the process of production, (iii) the process of distribution, and (iv) the process of use. Distribution and use have become most crucial areas in communication policies because of the technological advancements.

*Factors affecting communication:* They include issues related to (i) ownership and control, (ii) capital formation, (iii) bureaucracy, (iv) technology availability, (v) message integration, (vi) message development, etc.

*Balance of modern vs. traditional channels:* The communication policy should see to it that traditional and indigenous communication channels rooted in a culture and society are not divorced due to the modern technologies. Instead the communication system and policy of a country should be such that both modern and traditional channels complement each other.

As such, an integrated approach to communication policy assures effective development in a society which is the prime aim of communication technology.
Check Your Progress 4

Note: a) Write your answers in the space given below.
    b) Compare your answers with the ones given at the end of the unit

i) What are the three main priorities India has set up to use communication technology for social development?

ii) Which is the most important demographic factor we should take into consideration while framing a policy of communication.

2.5 LET US SUM UP

After going through this unit, you would have achieved the objectives stated earlier in the Unit. Let us recall what we have discussed so far.

- Communication has a long history, as long as that of the human race. At the primitive stage people developed simple ways and means of communication. In due course of time new sophisticated technologies were invented and used to expand the ability to communicate effectively and efficiently across longer distance over longer periods of time.

- The invention of printing technology was a revolution in the area of communication. It was, however, first used for the reproduction of religious works. As early as 868 A.D., the teachings of Lord Buddha were printed by the Chinese. It took centuries before the mechanised printing press came into existence.

- Due to advancements in communication technologies, the process of printing became mechanical. More recently, computers and laser technology were added to printing technology. Today, we have the most sophisticated electronic devices to produce, store, maintain and distribute the printed text.

- The printing press first came to India by chance on September 6, 1556. It was set up by a Christian Missionary and used for printing religious books.

- The audio-visual media are the products of the twentieth century. The audio media came in the 1920s and grew very fast after the World War II. They are now used for entertainment, education and information all over the world. The visual media came later in the sequence but expanded very fast. Now most sophisticated technologies, such as, video cassettes, cable TV, computers, videotex, video disc, videophone, facsimile, etc. are used for communication the world over. The
communication satellites are geared to bring the world together for the welfare of human beings.

- The growth and transfer of technology is confronted with a number of problems. The factors, such as, political will, economic strengths of a society, cultural determinants, technological complexities and the educational system itself, influence the growth and utilisation of communication technologies. These factors play a very important role in the case of developing countries, which depend on the developed countries for both expertise and financial assistance.

- Communication policies have been an issue of debate all over the world. In most of the countries in the world, the print medium is owned by private agencies. They have clear guidelines, code of conduct and regulations to follow. There is a constant pressure on the electronic media, especially the radio and television, to have their own policy guidelines that are still in the process of development/finalization. The important policy issue is to make communication technology accessible to every citizen. India, and all other developing countries, for that matter, are trying to make the optimum use of communication technologies for development. But there is a long way to go in the uses of technology to improve the quality of life by increasing productivity, educating people for better health and hygiene, population control, etc.

2.6 CHECK YOUR PROGRESS: THE KEY

1. a) Desk Top Publishing  
b) CD Audio  
c) Digital Audio Broadcasting  
d) Digital transmission  
e) Multimedia capabilities  
f) Convergence towards interactive services.

2. i) The four major economic considerations are:
    • financial strength of the society  
    • attitude of the policy makers towards communication technology  
    • budget allocation for communication technology  
    • cost efficiency of the technology  

   ii) The main cultural factors are — language, beliefs, arts, values, morals, customs, laws, attitudes, habits, etc.

3. Your answer may be as follows:
   • Authorities, including the head of the institution may not agree to cooperate  
   • Difficult to afford the cost  
   • Dearth of trained teachers  
   • Lack of appropriate software  
   • Problem of use and maintenance  
   • Lack of storage facilities
• Unfavourable teacher attitude

4. i) The three priorities should be to:
   • Reach the majority of people and inform, educate and motivate them.
   • Ensure that the technologies convey relevant information for the benefit of masses.
   • Make communication technologies accessible — both physically and financially — to the masses.

ii) Population of the country is the most important demographic factor we should consider while framing a policy on communication.