
UNIT 2 SCOPE AND EVOLUTION OF INFORMATION AND COMMUNICATION TECHNOLOGY(ICT)

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2.1 INTRODUCTION

This is an age of information technology and the use of technology can be seen ubiquitously in our daily life. It not only makes learning more comprehensive and simple but also helps to display more information in a lesser time. At the same time it brings diversity to your classroom teaching, to display more information to learners, and to enhance student learning.

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You would also agree that the use of technology not only saves time and energy but also allow for more attention to be paid by the learners. Educational technology encompasses all aspects related to the facilitation of learning process. In the Unit-1, an attempt was made to understand the concept and nature of educational technology and ICT. Your understanding of educational technology and ICT will further be broadened by going through scope of educational technology and ICT in education and a synoptic view of how educational technology and ICT in education have evolved throughout history. Hence, this unit will describe how educational technology and ICT in education have evolved. It also discusses satellite and terrestrial communication, teleconferencing, mobile learning, social networks, open educational resources, online learning and u-learning.

2.2 OBJECTIVES

After going through this unit, you should be able to:

- describe the evolution of educational technology and ICT in education;
- differentiate between terrestrial communication and satellite communication;
- explain the concept of teleconferencing;
- distinguish between audio teleconferencing and video teleconferencing;
- discuss the uses of mobile in learning of children;
- explain the concept of open educational resources;
- discuss advantages and disadvantages of open educational resources; and
- explain the concept of online learning and u-learning.

2.3 SCOPE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

Activity: As a teacher, you are acquainted with the use of ICT in education. Now, for better understanding of the scope of ICT in education, recall your experiences in the classroom and write some items as to what according to you are within the scope of ICT in education. While reading the following, please check the new points that you have not written.

ICT, as you know, is used to raise the efficiency of education. But with the passage of time, the system of education is facing new problems to be tackled. So, the hardware and software of ICT are ever expanding. Therefore, the application of ICT in education is much more than what it was a few decades back. Following are some of the applications of ICT in education that are worth noting.

Mass education: There has been explosion of population and knowledge. There is, therefore, a need to educate the masses. The problem is multiplied further by having a large section of illiterate people. So, ICT has a tremendous application to educate a large section of people and to impart a large amount of knowledge in a limited span of time. In this regard, the mass media viz., TV, radio, and other modern technologies like computers and information technology (E-mail, internet, mobile, etc.) has a lot of scope. The illiterate masses can also be made literate with the help of innovative methods and practices of teaching and learning.

Historical information: Any branch of knowledge that we deal with has a historical base. Such information is of tremendous importance for the students to understand any branch of knowledge in its totality. Such incidents when occur can be recorded with the help of audio-video CD. Such audio-video CD becomes the source of information for learners to learn. The main advantage of such CDs is that we cannot create or repeat the history once more howsoever we try hard and place it before the learner. For example, can we have the same view of the explosion of Hiroshima and Nagasaki (1946) and show it to our students? This is neither feasible nor possible. Further, for example, we cannot have the same view of Nuclear test conducted at Pokhran (1998). So such records.....in the form of a film taken when the incident is happening are of immense value to the learners which ICT can only provide.

Costly and hazardous experiments: In many fields of science and technology there are some experiments having great implications for effective learning which are not advisable for the teacher to conduct in the classroom because of cost and health hazards involved. Such experiments, once conducted carefully in the laboratory or elsewhere can be recorded with the help of new information and communication technology and be used by teachers and students for effective learning.

Gaming and simulation: If historical events which are either costly or hazardous which cannot be conducted, then ICT can rescue us by doing the same through simulation. Computer technology in this regard plays the main role. This can provide a lifelike picture of phenomena in three dimensions (3D). It can also show the operation of different parts of a phenomenon and the consequences. The other possibility is games. Children can learn, through play, many concepts that just cannot be taught in the formal set of the classroom. The gaming and simulation has a great scope in the training of military personnel and in the field of aviation.

Distance education: ICT has a great scope in distance education and open school programme. Today there is a great need for personnel training and education on regular basis for updating oneself in the field of work. In this regard, distance education programmes, a relatively less formal process of education, have acquired new status. Educational technology with its innovative practices can educate the learners who cannot come to the classroom setup for their education. In this regard programmed learning materials, modules, contact programme, and counselling are some innovations which can help distance learners.

Collection, storing and retrieval of information: There are digital cameras and mobiles which provide us the facility to take same photographs of events that take place in a fraction of second. There are also satellites that work for us day and night to provide us information about places which are not accessible to us. Information can be collected with the help of this new electronic technology both in audio and in video form. Such information can be stored with magnetic and electronic devices easily and can be retrieved within no time.

Research: As mentioned earlier, information can be collected and stored to be used for educational purposes. Information can also be collected and stored in the same way for research. Further, for analysis and reporting, computer can be used. Not only quantitative data but also qualitative data can be analysed and

there lies the role of computer and the different methods of data analysis methods and techniques. Moreover, in developmental type of research, different kinds of packages can be developed for raising the effectiveness of learning. There are many researches already conducted in this field i.e., computer assisted instruction(CAI), and computer assisted language learning packages.

With the facilities of Internet, Website, and INFLIBNET, the researchers as well as a learner wanting to inquire or find out something that is happening elsewhere can have access to a large amount of information sitting at home. He can formulate his hypotheses, problems, and ideas and get them solved while at home. In this process, the research findings are not only disseminated but also the quality of research can be increased.

2.4 EVOLUTION OF EDUCATIONAL TECHNOLOGY AND ICT IN EDUCATION

After having discussed the scope of ICT in education, let us understand how educational technology and ICT in education have evolved. The evolution of educational technology and ICT in education has not taken in a single day. The developed educational technology, which we use today, is the result of improvisation, which is done by their own potential to solve problems. Whether one talks about the discoveries and inventions, human beings are never behind. Similarly, as human being has evolved, his/her communication style has also evolved, his/her communication from non-verbal gestures to the verbal interactions, his/her medium of interactions have also changed.

Simultaneously, there has been a change in the perspective of understanding learning. The nature of learning has moved from group learning to individual learning. Technology, to support the various kinds of learning, has also evolved at the same time. In this section, we will discuss the evolution of educational technology and ICT in education. These technologies which have passed through phases which are as follows:

- a) Audio-visual phase
- b) Psycho-sociological phase
- c) Cybernetic phase
- d) Information Communication Technology phase

2.4.1 Audio Visual Phase

J.A. Commenius prepared a first ‘visualized book’ that contained 150 pictures and also said ‘let pictures be the source of delight to the children and let these become familiar with them before they enter school’. Later, philosopher like Rousseau also said that learning process must be directed to the learner’s natural curiosity and Pestolozzi put action to his words by proposing the ‘object method’. The object method is based on instruction via sense perception. Although attempts on the use of concrete aids were made much before, but the intensive development in the audio-video started in the 20th century.

This phase is designated as an extensive use of variety of devices such as moving pictures, radio, slide films to transmit ideas and experiences, which appeals to

the sense perceptions of the learners especially about the abstract concept. In other words, you can say that these devices act as supplementary devices. The audio visual device utilizes more than one sensory channel (for example, while watching any educational programme on television, you are using both the visual and auditory perception), which helps in clarifying, establishing and correcting the concepts, interpretations and appreciations. However, the materials to be used along with these audio visual aids need to be developed based on the psychological principles of learning.

Also these aids have always been used as a tool to disseminate the knowledge from one place to another. In this process of transmitting the information, it is considered important to transfer the correct message.

2.4.2 Cybernetic Phase

This phase of educational technology has evolved during the Second World War. The word ‘cybernetics’ was first used by Norbert Weiner (1948) to define the automatic control systems. Weiner defined cybernetics as the science of control and communication in men and machines. Consider a situation, when you are browsing an Internet site. Suddenly, a message pops up on the screen, that there is a “Virus” which has entered your computer. Here, the anti-virus software provided you the feedback and as a result you removed the virus from your computer. Cybernetics lays emphasis on feedback. The feedback here refers to a kind of reciprocal interaction between two or more events in which one activity generates a secondary action that in turn redirects the primary action. It is also defined as the comparative study of human control.

The feedback mechanism has three functions:

- It propels the system towards the target or the defined path;
- It compares the effect of this action with the true path and detects any deviation negative or positive; and
- It utilizes error signal to redirect the system.

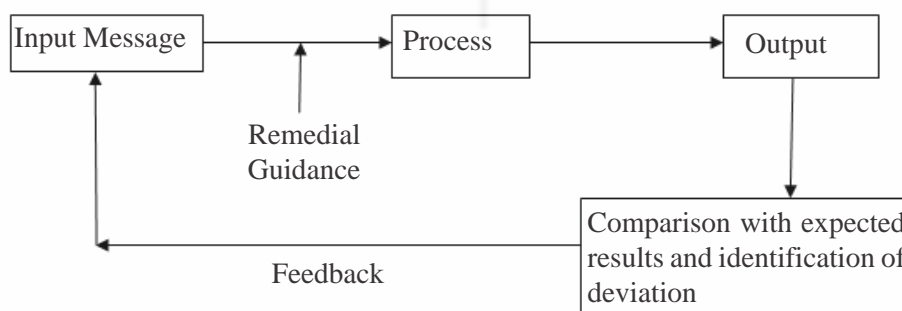


Fig.2.1: Cybernetic Model

Source: Kulkarni, S.S. (1986) *Introduction to Educational Technology*, New Delhi: Oxford & IBH Publishing Co.

In most of the industrial processes, which emerged during and after World War II, the concept of feedback became operational for correcting any deviant step. For example, in a refrigerator, the thermostat informs the system of cooling whether a certain temperature has been reached or not reached and instructs it to perform accordingly.

This information for remedial action (steering the boat according to the charted path avoiding any deviations) was crucial not only in industry but also in education. Out of this emphasis arose the programmed learning instruction movement where it was emphasized that at every step a student should be told/reinforced about his/her progress (or deviation).

Thus, the cybernetic principles have led to the concretization and direct application of principles to teaching and learning. These cybernetic principles have following implications on teaching-learning:

- a) The activity involved is geared to the learner's stage of growth-physical and cognitive.
- b) The learner is provided with some criteria for indicating to him/her specifically what progress he/she is making.
- c) The learner is presented with the activity both in verbal and non verbal context in varied situations.

2.4.3 Psycho-Sociological Phase

This phase has a long history, which can be traced back to the learning theory on the laws of learning given by Thordike, 1913. Based on his theory, Pressey (1926) developed a teaching machine. This machine provided an automatic scoring device to the learners for immediate feedback. So, this was the first step towards the formulation of systematic learning. Subsequently, the theory of B. F. Skinner (1953) on operant conditioning, whose main contribution was that human behavior could be shaped, opened a new chapter in the development of programmed learning materials.

Teaching Machines

Learning, as you know, involves both learner and teacher but now with the development of technology, the physical presence of teacher may not be required. Teaching machines represent this development in education. Teaching machines act as a liberating device that allows die individual differences. In 1924, Sidney L. Pressey created a crude teaching machine suitable for rote-and-drill learning. He showed that automated-instruction facilitated learning by providing for immediate reinforcement, individual pace setting, and active responding. According to him, "teaching machines are unique among instructional aids, in that the student not merely passively listens, watches, or reads but actively responds. And as he does so he finds out whether his response is correct or not and a record may be kept which aids in improving the materials". These machines ranged from a very simple to complex.

A teaching machine incorporates a closed loop system of teaching that cyclically:

- a) display an information to learners,
- b) seek learner response,
- c) evaluate, reinforce and control next display.

Based upon me responses in the teaching machines, they can be broadly classified under two categories;

- a) **Constructed response devices:** These devices are based on the Skinner's principles, namely emission of response is considered more effective in learning than simple recognition.
- b) **Multiple choice machines:** In these machines, it is possible to prepare branches for every reply to a given question.

The greatest value of such machines is the individualized instruction, which helps the learners to learn at their own pace. Also, it provides well-designed and structured learning situation for desired behavioral change in the learner. But it has a delimitation too, as a good teacher can always determine the effective and ineffective communication and modify their teaching on the basis of the students responses, it is not possible with the teaching machines.

In addition to the contributions made by the behaviorist, cognitive psychologist who lays main thrust on information that is perceived and processed by an individual has a profound implication on the pedagogical perspective about the meaning of learning.

With the adoption of the philosophy of a "constructivist" framework, the meaning of learning has changed from just the assimilation of information where teacher was thought to be the generator of knowledge and student as receiver of knowledge. Hence, from this theory it is clear that learning is an active process of constructing meaning on the part of each individual learner's experiences.

These different meanings of learning have implications on how we approach each educational content and on how ICT has to be incorporated coherently with the teaching and learning practices.

Human being, as you know, is a social being. Hence the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others is common phenomenon. Sociologists, particularly the school of group dynamics has also contributed a lot to the understanding of the teaching-learning process, through their work on 'group processes'.

2.4.4 Information and Communication Technology Phase

Recent innovations in information communication technology have revolutionized the means of instruction. Now, we are using Multimedia, E-mail, Internet, intranet, website and mobile to impart instruction. These are telecommunication modes through which instructional materials can be given to students. Development of the bandwidth for the Internet and intranet has enabled teachers to impart instruction within and outside the organization.

This stage is also marked with the advances in the software and hardware potential of the systems. Several organizations like, audio video research center, educational media research centers and different departments of education and educational technology are engaged in the development of educational software. As you know, open and distance learning system uses all kind of information and communication technologies like television, radio, interactive radio technology, teleconferencing, computer conferencing, mobile technology in the delivery of instructional inputs.

Check Your Progress

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

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

1) Differentiate between the first phase and the last phase in the evolution of educational technology and ICT in education.

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2) What are the important implications of cybernetics in learning?

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2.5 SATELLITE AND TERRESTRIAL COMMUNICATION

2.5.1 Satellite Versus Terrestrial Communication

Satellite-based communication is the communication which takes place between the sender and the receiver through satellite technology. It has specific utility for distance learners or for the distance learning system. Right from the advent of the communication satellites, it has been recognized that communication through satellite has unique benefits such as long distance, quality of performance, networking, including one point to multi-points to one-point transmission capabilities. Now-a-days radio and television broadcast takes place through satellites. Yet non-satellite communication or terrestrial communication has a significant role to play in meeting the communication needs of a country, where there is no provision of satellite communication. Earlier, television broadcast was taking place with the help of terrestrial technology. The fact is that the satellite and terrestrial systems supplement each other to make communication more effective. Now let us compare the satellite-based communication and the terrestrial systems of communication.

Satellite and terrestrial communication: A comparison

Satellite and terrestrial systems – as modes of communication – are not opposed to one another. Both systems supplement each other’s potential to make communication more accessible and economical.

Satellite	Terrestrial
Does not require ground-base, high-power, high-tower systems.	Needs high power, high-tower systems, (The height of the transmitter at Pitampura, Delhi is 235 metres).
Does not need much ground equipment; direct reception television sets can receive signals directly from the satellite.	Needs a number of transmitters for wide coverage.
Cost of equipment is high, however the costs are now falling fast.	Cost of equipment is low.
Being a highly centralized system it provides more positive pacing and control over the developmental process.	At times difficult because of technical and managerial hindrances in systems coordination. Further, because of the position taken by the local authorities controlling the flow of information at the regional level, it becomes difficult at times.
Use of satellite technology could inspire the teachers, students, and parents for modernization because it brings the whole world together into a remote village.	Because of limited coverage, it has some drawbacks.
Planning and implementation require more lead time.	Needs comparatively less time.
Effective for a large country or a group of countries.	Suitable for a small country or a part of the country.
Independent of distance.	Limited coverage area.
Independent of the nature of terrain.	Difficult in mountainous and sea areas.
Can meet the increasing demand of communication without additional cost.	Communication capacity is bound to the regional system installation and requires additional cost.
More effective in meeting the overall needs of people at the national level.	Serves regional information needs better.
A satellite failure can result in the entire system being inoperative which might pose severe readjustment strains on the communication.	System failure would not be as disastrous as in the case of the satellite system; readjustment and repair of damage is manageable.
Needs parking spaces for the geosynchronous satellite which is becoming more and more scarce.	Does not need parking space.
Worldwide network connections via satellite can resolve the problem of unequal educational opportunities and can provide a truly world-wide sharing of educational resources for international education.	Network is possible at the regional level only.

Source: IGNOU(2009)

2.6 TELECONFERENCING

Teleconferencing is a new technology, which connects electronically a number of users located at different places to interact through audio-video, or computer technology. The technology is very useful for the distance education system as it provides both learners and teachers of distance system to link themselves for teaching-learning purpose. All of us know that interaction is an effective way of providing feedback in the teaching-learning process. In a face-to-face mode, a learner receives immediate feedback when he/she interacts with the teacher. He/she also receives feedback from the peers. In fact, the interaction process, which takes place in face-to-face mode, may be one to one (between a teacher and a student) or one to many (between a teacher and a group of students). The same kind of interaction patterns exists also in teleconferencing. There may be interaction between a distance teacher with a distance learner, between a distance teacher and a group of learners and amongst distance learners themselves. Teleconferencing provides a platform wherein the distance learners can interact with guest speakers or scholars of national and international eminence. In teleconferencing, there are mainly teaching end and several learning ends. Teaching end is a studio with an uplink facility. In the case of Indira Gandhi National Open University (IGNOU), the studio of Electronic Media Production Centre (EMPC) serves as the teaching end. Learning ends are centres having downlink facility as well as telephone talkback system. In the case of IGNOU, all the Regional Centres and a number of Study Centres serve as learning ends. Distance learners of IGNOU came to these learning ends and interact with the resource persons at the teaching end. IGNOU used teleconferencing for the first time to organize Extended Contact Programme (ECP) of PG Diploma in Higher Education (PGDHE) students in October 1993. The IGNOU headquarters in Delhi was linked with ten regional centres throughout the country. A one-way video and two-way audio mode of teleconferencing was adopted for the purpose. Fig. 2.2 below presents the communication links involved in the programme (IGNOU, 2007).

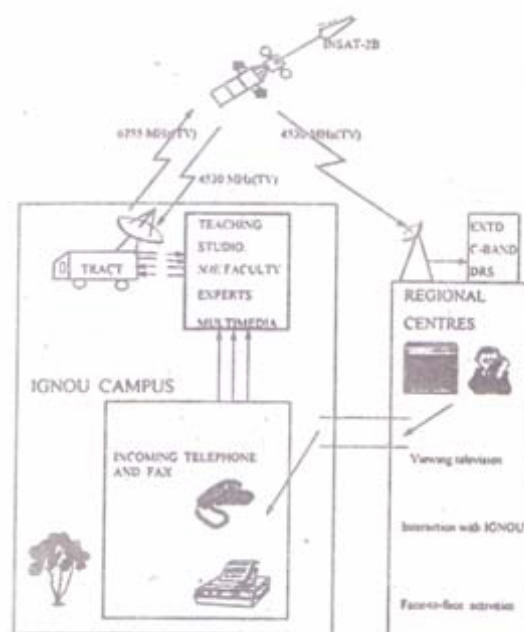


Fig. 2.2: A one-way video and two-way audio mode of teleconferencing

Types of Teleconferencing

There can be different types of teleconferencing based on different types of technological configurations. For your purpose we discuss three types of the teleconferencing system being used in India these days. They are:

- **Audio teleconferencing**
- **Video teleconferencing**
- **Computer teleconferencing**

These types have been classified according to the use of the technological configuration. Let us discuss each type in detail.

2.6.1 Audio Teleconferencing

You might have the experience of talking to a person located at a distant place over the telephone. But with the help of the latest technology, you can talk with more persons located at multiple sites. The technology which facilitates conversation with more persons located at different places over the telephone is called audio teleconferencing. This technology is useful to organize learning experiences. Through this technology distance learners can talk to the teachers as well as their fellow learners. It is an effective communication tool for sharing information/ideas/experiences to pertaining different aspects of distance learning. The role of teacher in audio-conferencing is very important as he/she designs and directs the process of conferencing towards the achievement of learning goals. He/she can motivate distance learners and remove the feeling of isolation among them. It is a fully interactive medium and interaction takes place in real time. The students can benefit from this medium immensely.

2.6.2 Video Teleconferencing

Video conferencing is the teleconferencing technology in which both learners and the teacher can see and hear each other. This is becoming a useful medium for organizing learning experiences in distance learning system. These are:

- Two-way video conferencing
- One-way video conferencing

Let us discuss each type in the following paragraphs.

i) Two-way video conferencing

In two-way videoconferencing, participants are linked by two-way vision as well as two-way audio. Both audio and visual messages are exchanged between distance teacher and learners located at different places. Both at the teaching end and learning ends, there are television screens, which display pictures from distant locations. The links are essentially telephone connections. These links are more costly than those for audio conferencing because more data must be transferred, either by broadband ISDN cable or through television transmitters and receivers via satellite.(COL, 1997).

Two-way video conferencing is very much interactive in nature. Learners can see and talk with their teachers and vice-versa. They get a lot of motivation from the teachers when they are engaged in live dialoguing. They can raise questions, clear doubts and seek clarifications from teachers. They can also see their fellow

learners at other learning ends and can also raise questions, clear doubts and seek clarifications from them.

ii) One-way video conferencing

In one-way video conferencing, audio communication takes place two-way between teaching end and learning ends and visual communication is one-way from the teaching end. The type of video conferencing begun in IGNOU in the early nineties was two-way audio and one-way video conferencing. Distance learners watch the presentations by the experts on television screens at the learning centres (namely, Regional centres/ Study centres in the case of IGNOU) and talk with experts at the teaching end (namely, studio of Electronic Media Production Centre (EMPC) of IGNOU) using long-line telephone facilities.

This technology has been very useful for organizing different kinds of learning experiences cutting across various disciplines in sciences, social sciences, humanities, management, health sciences, computer and information sciences, law, agriculture sciences, etc.

2.6.3 Computer Conferencing

The term computer conferencing refers to computer-based meeting, for exchange of pictures, words, graphics etc., between multiple sites. Special hardware and software systems are used to support computer conferencing activities in both real time and non-real time. Real time, in this context, implies synchronous communication in which messages can be sent and received as you view the screen and interact with the system and the other participants tied in the network. The non-real time elements i.e. asynchronous communication, in contrast, may encompass a series of longer messages, a central database of information and a record of current and past comments and all the participants can see (Mirabito, 1994).

2.7 MOBILE LEARNING

Mobile phones first arrived in India in 1995, and since then their application has grown exponentially. Education through mobile is often referred as *mLearning*.

mLearning makes education more accessible as it enables learners to pursue their studies according to their own schedule. The portability of mobile technology enables students to learn at all times and at all places. For those in rural or remote areas where environmental and infrastructure challenges hinder other learning modalities, particularly *eLearning*, *mLearning* presents great opportunities. *mLearning* provides a potential way forward for the expansion of education programs to larger segments of the population. *mLearning* allows a method of educational delivery that could be more cost-effective than other methods.



The technological capacities of mobile phones allow communication by voice and text and capture still and moving images. Recent 'smart phones' allow users to view PDFs, spreadsheets and word-processed files, and possess additional features such as a stopwatch and a GPS (Global Positioning System).

If mobile phones are to be used in schools, school authorities need to address certain issues. These are leadership and school culture; attitudes of teachers and students; appropriate curriculum activities; professional development of teachers; technical integration and support; and policies pertaining to the use of mobile phone.

Mobile Phones in Education can be used in the following ways:

- 1) Send SMS on mobile phones to find definitions, currency conversion, math equations, translation of texts into different languages, etc.
- 2) Use it as an internet browser to access endless information
- 3) Read news articles and current events and books on it
- 4) Download and use education programs such as Google Maps and use as GPS
- 5) Use it as a digital or video camera for school projects, publishing, etc.

Check Your Progress

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

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

- 3) Mention any three differences between satellite communication and terrestrial communication.

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- 4) Differentiate between audio teleconferencing and video teleconferencing

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- 5) Mention any three ways, mobile can be used as a helping tool in teaching-learning process?

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2.8 SOCIAL NETWORKS IN EDUCATION

Go through the situation given in the Box -1.

Box-1

Suppose one of your students wants to share his/ her doubts on any of the academic concept with other students around the world. How can the student do that? One possible solution is he/ she can get the help of social networks.

Let us discuss about such social networks. Social network sites are defined as web-based services that allow individuals to: (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site. Social networking websites allow users to be part of a virtual community. The two most popular sites are Facebook and MySpace(See Fig:2.3). These websites provide users with simple tools to create a custom profile with text and pictures. A typical profile includes basic information about the user, at least one photo, and possibly a blog or other comments published by the user. Advanced profiles may include videos, photo albums, online applications (in Facebook), or custom layouts (in MySpace). After creating a profile, users can add friends, send messages to other users, and leave comments directly on friends' profiles. These features provide the building blocks for creating online communities.

Facebook



Source:www.crunchbase.com

Myspace



Source: www.youseemii.fr/blog/myspace

Fig. 2.3: Home Page of Social Networks-Facebook and Myspace

2.8.1 Application of Social Networks in Education

Now our question is how we can make use of social network sites for teaching purpose in secondary classes. As you know even small kids now-a-days are becoming more technically literate in comparison to their parents or teachers. As teachers, you know that each student has his/ her own style of learning. Some prefer learning in the morning while others in late night. For example, if two students study during the night and if some doubts arise during the course of their study, they can make use of social network sites to clear their doubts. Similarly, they can join in some discussion boards, which are active at the same time. Otherwise they can post their ideas on any of the “forum” available. Even

they can make use of the help of online teachers through social networks. So these are some of the methods students can make use of in their studies. Here teachers also have a great role to play. They can also help students by clearing doubts through social network sites. Let us go through another example on social network sites.

An Example of Social Networking

There was a teacher from America and there was a student from India. They were interacting through Facebook accounts. The conversation was as follows:

Student: Madam, I have a doubt on periodic table. Can you help me?

Teacher: Oh....Sure.. What is your doubt?

Student: First, tell me madam, what is periodic table?

Teacher: It is the arrangement of chemical elements based on their atomic weight.

Student: How many groups and periods are there in periodic table?

Teacher: 18 groups and 7 periods.

The conversation continued for a long time. This example was cited to give an insight about the use of social networks in education. Similarly students can interact with peers, subject experts, senior teachers, etc. The use of social networks lies on the creativity of secondary teacher.

Check Your Progress

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

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

6) "A social network is one of the emerging technological tools in teaching-learning process". Comment

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2.9 OPEN EDUCATIONAL RESOURCES (OER)

As you know when students are given assignments on any subject matter, usually they make use of the library and refer to the books to complete the task. They can also get the help of open educational resources. From the Internet library, students refer to open books, which are similar to the books in our traditional library. But open educational resource is entirely a different concept. Let us understand the concept of open educational resources.

The term 'Open Educational Resources' (OER) was first introduced at a conference hosted by the UNESCO in 2000. There is no authoritatively accredited

definition for the term OER at present. Open Educational Resources are any type of educational material that is freely available for teachers and students to use, adapt, share, and reuse. “Open Educational Resources (OER) are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge (Atkins, Brown, & Hammond 2007). They are typically made freely available over the Web or the Internet. Open educational resources help both teachers and students. Teachers use OER to procure updated contents of subject of teaching, whereas students use it for multiple purposes.

2.9.1 Features of OER

- It is available to students free of cost.
- It is available for use at any time any place.
- It provides latest contents in any subject areas.
- It contains options to edit, share and reuse.

OER materials, generally contain the following elements:

- i) Learning content:** OER generally include the contents in text form. Apart from text material, supplementary contents are available in animations, pictures, PowerPoint slide, links to other related sites, references, lecture materials, reference journals, suggested reference readings, learning objects, learning modules, videos related to contents, experiments, simulated materials, real videos, images, softwares to run specific programmes, tools to create and edit contents, and other supporting softwares to access the content of OER.
- ii) Tools:** One of the chief characteristics of OER is that the content available can be edited. Any user referring to the OER materials must obtain the license to edit the related content to the existing materials. Softwares and tools required for editing are available in OER. Edition in the existing documents keeps on updating content of OER. To support editing, content creation tools, content management systems, organizing tools, content development tools, content designing tools, etc. are available in OER.
- iii) Implementation:** OER materials available need to be published for use by the public. Hence, proper licenses and policies are required to make OER available to the public. Similarly, proper rules and regulations need to be formulated for the use of OER materials. Problems related to copyright is a major concern in the use of OER materials. OER includes clear-cut policy frameworks related to the copyright concerned.

2.9.2 Locating OER

By now, you have understood the concept of open educational resources. But the question for teachers is how to locate them. Teachers can find innumerable number of OER repositories where OER materials are available. For instance, the materials of IGNOU are available in E-GyanKosh, an online repository of teaching materials

of IGNOU. You can see one of the OER material of IGNOU in the following figure, where you can search the required course material that you wish to study.



2.9.3 Advantages of Using OER

- **Expanded access to learning:** The access to OER is unlimited due to their availability on Internet. Anyone one can access to the OER materials irrespective of time and region
- **Access to materials cheap:** Distribution and access to OER materials is cheaper in comparison to other forms of distribution and access.
- **Supplementation of class materials:** OER can supplement textbooks and lectures where deficiencies in information are evident.
- **Enhancement of course quality:** They add to the regular course content, thereby enhancing their quality.
- **Quick circulation:** Since they are available on Internet, easy access and quick circulation is possible.
- **Lower student cost:** It reduces the cost of education.
- **Showcasing of innovation and talent:** Innovative and novel contents are available in OER
- **Continually improved resources:** OER keep on updating the content and hence students and teachers get latest contents that they need.

2.9.4 Disadvantages of OER

- **Quality issues:** Many OER materials are available on Internet. This may or may not be of good quality. Try to select quality OER materials for teaching purpose.
- **Lack of human interaction between teachers and students:** OER do not provide opportunity to interact among the people concerned. Teachers and students are separated during the course of using OER.
- **Language and/or cultural barriers:** OER are not available in all languages. Therefore, they may not suit to your culture and context of teaching.
- **Technological issues:** OER come in different forms. Students who are not well versed with the use of OER face problem in accessing such materials.
- **Intellectual property/copyright concerns:** The access and use of OER for personal purposes is not allowed due to copy right issues.

2.10 ONLINE LEARNING

Internet has become a powerful technological tool for organizing Learning experiences online in open and distance learning system. It can be understood as a network of computers across the globe wherein information is shared and exchanged among the people of the world in a short time. Morrison (1997) defines Internet as a vast telecommunication network consisting of a group of internationally interconnected computers that communicate electronically. Galbreath (1997) has defined the Internet as a network of networks with a universal addressing scheme allowing real-time, computer-to-computer, local-independent communication and information exchanging. Communication on Internet takes place on synchronous or asynchronous, one-to-one, one-to-many and many-to-many basis.

Internet can be used to provide online learning programmes to distance learners. Online Learning programmes comprise self-learning materials, audio-video support, assignments, academic counselling, teachers-learners conferencing, etc. Like print based material, online self-learning materials comprise text, structures, diagram, self-check exercises etc. But unlike print based material it contains animation, audio and video integrated with text material and provide the learner with a lot of scope for interactivity. Audio-video support can also be made available to learners through online independent of learning material. The design of learning materials on the net is based on using new pedagogical models based on conversation. The academic counselling can also be provided through online using lectures, discussions chat synchronously or as asynchronously, wherein the learners can raise queries and clear their doubts. Assignments and feedback on assignment responses can also be provided to students online. The most important aspect of online learning is that it facilitates collaborative learning through online conferencing. They can engage themselves in virtual classroom learning. They form collaborative groups in the form of cyberclub and Internet among themselves regarding their learning problems using e-mail. In many subject areas, like medicine, sciences and other applied areas practical training can be provided in simulated learning environment.

2.11 U—LEARNING

Ubiquitous learning or u-learning is recent development in education. U-learning is supported by ubiquitous computing technologies which refers to the small hand-held devices that can be used both for communications and computation. In earlier days, separate electronic devices were used for communication and computation like phone for communication, computers and calculators for computation. But later, devices like mobile which are handy in nature and capable of doing both these functions were invented. In addition to smart mobile phones, contactless smart cards, hand-held terminals, Personal Digital Assistants(PDA), sensor network nodes, Radio Frequency Identification (RFID), etc, also make use of ubiquitous computing technologies. These devices have sensors to interact with living environment. Thus, ubiquitous computing technologies allows both communication and services anytime and anywhere. The changes in the technologies have led to the transformation of e-learning to mobile learning and mobile learning to u-learning.

The learning based on ubiquitous technology is known as u-learning. The most significant role of ubiquitous computing technology in u-learning is to construct a ubiquitous learning environment, which enables anyone to learn at any place at any time. (Saadijah, et.al. 2010) As we know, learning is the process of acquiring knowledge and skill. To develop knowledge and skill, an appropriate learning environment is to be created. In traditional classrooms, the learning environment is fixed. But in the u-learning the student will be in a ubiquitous learning environment (ULE) or u-space. The students will carry a mobile device primarily for learning (PDA or mobile phone, etc.) having sensors attached which will help the ULE server to track and locate students. Thus, students are free to learn anywhere and anytime as they feel. In such a learning situation, students have the freedom to interact with peers, clear their queries leading to their own learning at their own pace. So, u-learning is embedded in students' daily life allowing them to learn anytime as they wish. Thus, we may broadly say, u learning is 'learning anywhere and anytime'. The definition refers to any environment that allows any mobile learning devices to access the learning and teaching contents via wireless networks in any location at any time. The commonly used definition of u-learning is "learning with u-computing technology" (Yang et al., 2008).

Let us discuss some of the applications of u-learning. First, learning with the help of nay hand-held device is u-learning. A broader application would be, say for example, a student entering the lab is detected by the sensor and necessary instruction to that particular student will be provided by the server. Similarly, students entering the school premises having sensors attached to their uniforms will be sensed and details will be collected /fetched by the teachers. Owing to the facilities provided by u-learning, the popularity is increasing day by day. Below given are some of the characteristics(Saadijah, et. al., 2010) of u-learning;

- i) **Permanency:** The information remains unless the learners purposely remove it.
- ii) **Accessibility:** The information is always available whenever the learners need to use it.
- iii) **Immediacy:** The information can be retrieved immediately by the learners.
- iv) **Interactivity:** The learners can interact with peers, teachers, and experts efficiently and effectively through different media.
- v) **Context-awareness:** The environment can adapt to the learner's real situation to provide adequate information for the learners.

Check Your Progress

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

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

7) What are Open Educational Resources? How are they useful in teaching-learning process?

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8) Explain the meaning of U-learning.
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2.12 LET US SUM UP

In continuation with the Unit-1, the Unit-2 focused on scope and evolution of Information and Communication Technology (ICT) in education. The scope of using ICT in education covers mass education, providing historical information, conducting costly and hazardous experiments, playing games and carrying out simulation, providing distance education, conducting research, etc. Educational technology and ICT in education have evolved through four different phases, namely, audio-visual, cybernetic, psycho-sociological and information and communication technology. A comparison between satellite and terrestrial technologies has been made. We also discussed teleconferencing, its types, mobile learning, social networks in education. A brief presentation was made on OER, its features, how to use OERs optimally, its advantages and disadvantages. At the end, we explained the concept of online learning and u-learning.

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2.14 ANSWERS TO CHECK YOUR PROGRESS

- 1) ICTs like films, radio and television were popular which provided one way interaction but in the last phase the two way interaction became possible
- 2) The main implication of the cybernetics was the active involvement of the learner in his/her learning.
- 3)

Satellite Communication	Terrestrial Communication
i) Planning and implementation require more lead time.	Needs comparatively less time.
ii) Effective for a large country or a group of countries.	Suitable for a small country or a part of the country.
iii) Independent of distance.	Limited coverage area.
- 4) The technology which facilitates conversation with more persons located at different places over the telephone is called audio conferencing. Video conferencing is the teleconferencing technology in which both learners and the teacher can see and hear each other.
- 5)
 - i) Reading news articles and current events and books on it
 - ii) Downloading and use education programs such as Google Maps and use as GPS
 - iii) Using it as a digital or video camera for school projects, publishing, etc.
- 6) Social networks are important tools in the teaching-learning process. Social networks are online communities, where individuals can share everything among themselves. In educational context, students and teachers can share among themselves their experiences and problems so that teaching-learning process becomes an interesting activity. We define social network sites as web-based services that allow individuals to: (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users

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with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system.

- 7) Open educational resources are educational materials and resources offered freely and openly for anyone to use and under some licenses to re-mix, improve and redistribute.
- 8) U-learning refers to any learning environment that allows any mobile learning devices to access the learning and teaching contents via wireless networks in any location at any time. The commonly used definition of u-learning is “learning with u-computing technology.

