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CENTRE FOR DISTANCE EDUCATION

CRITICAL UNDERSTANDING OF ICT

B.Ed. II YEAR

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The Syllabus adopted from 2015-16 onwards

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Unit: I - Information and Communication Technology

STRUCTURE

1.1. INTRODUCTION

The world is filled with various technologies in the present scientific and technological age, such as polymer technology, paper technology, cloth technology and glass technology. In educational field too, the term 'Educational Technology' is being used with great interest. It is believed that with the proper use of science and technology in the field of education, desirable results can be achieved in teaching, learning and testing.

Communication is very important in human life. It creates a link or bond between two individuals, groups, organizations in order to understand each other. It creates one to one to many interactions, reciprocation, know- how, which facilitates the relationships and benefits each other. Without communication life becomes meaningless, difficult to connect between any two individuals, groups or systems and so on to lead a happy life.

The term, information and communication technologies (ICT) refers to forms of technologies that are used to create, store, share or transmit, exchange information. This broad definition of ICT includes such technologies as: radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing and electronic mail.

In this unit, let us discuss all the above in detail. This unit presents a platform for the student teachers to know about the features, scope and importance of educational technology and information communication technology.

1.2. OBJECTIVES

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

- explain the concept, objectives and characteristics of educational technology
- describe the advantages, challenges and impact of educational technology
- explicit the concept knowledge explosion, preservation and retrieval
- recognize the meaning of communication and its different types
- explain the elements of communication and its process
- describe the concept and importance of ICT
- expound the Scope and Characteristics of ICT
- analyse the aims and objectives of National Policy on ICT in School Education in India.

1.3. EDUCATIONAL TECHNOLOGY

Educational Technology is a new area like educational philosophy, educational sociology, educational psychology, measurement and evaluation in education. Educational Technology provides the basis for the planning and organization of resources for learning and helps in achieving the teaching objectives.

1.3.1. Concept

To help you understand the meaning of Educational Technology, Technology is essential. Therefore, we are throwing light on the meaning of the terms education, science and technology in this section.

The Latin word 'Educatum' means to train. 'E' means from inside and 'Duco' means to draw out, to lead out or to bring up. These terms, probably the routes of the word ‘education’ refer to the process of education i.e., drawing from within. Each child is born with some innate tendencies, capacities arid inherent powers. Education draws these powers out and develops them to the full. Latin words 'Educare' and 'Educere' mean to bring up, to lead out and to develop etc. In this way, the word education means to develop the inborn qualities of a child to the full.

It is very important to understand the meaning of Technology first and then the meaning of Educational Technology. It is because the entire creation and construction which the science has encouraged is all due to the medium of Technology. The progress of developed countries like America and Russia took place on the basis of science and technology only. J.K. Galbraith, in his book The New Industrial State, has given two main characteristics of every technology. These are: (1) Systematic application of scientific knowledge to the practical tasks, and (2) The division of the practical tasks into sections and sub-sections. In the field of education, any technology which meets these two norms of the characteristics is called educational technology. Educational Technology defines teaching-objectives in behavioral terms. It is that science on the basis of which various methods and techniques are developed and constructed in order to achieve pre-determined teaching objectives. Thus, when the teaching objectives get determined, then educational technology comes into existence to achieve them.

First of all, it creates conditions by interpreting the input during the teaching process. It selects and applies the appropriate strategy for achieving the teaching objectives. In the

end, looking at the output or abilities of the pupils, it is evaluated whether the teaching objectives have been achieved or not. If not, then what changes should be brought about in the teaching strategy or strategies so that the teaching objectives may be achieved. Hence, educational technology includes three processes. These are:

1. Functional analysis of teaching-learning process in which the teacher observes all those
   components which are applied as input and these come to light through output.
2. Separate or combined search and analysis of those components which are used in the teaching-learning process during input and output.
3. Presenting the acquired learning experiences in the form of research-outcomes.
   The following definitions will make the meaning of educational technology clear:

- "Educational Technology is the application of scientific knowledge and learning and the conditions of learning to improve the effectiveness and efficiency of teaching and training."- G.O. Leith
- "Educational Technology may be defined as the application of the laws as well as recent discoveries of Science and Technology to the process of education." - S.S. Kulkarni
- "Educational Technology is that branch of educational theory and practice concerned primarily with the design and use of massages which control the learning process." - E.E. Hadden
- "Educational Technology is concerned to provide appropriately designed learning situations which, holding in view of objectives of the leaching or Training, being to bear the best means of instruction." – Richmond

1.3.2. Growth of Educational Technology

The history of educational technology dates back to the early 19th century. Even in nineteenth century, the educational technology existed in the form of educational toys and other learning tactics. But its frequent use came to light in 1926. In Ohio state university, it was used in the form of a teaching machine by Sidney Presscy. Then around 1930-40, Lumsdain and Glaser tried to make education as mechanical by presenting some special types of scrambled books, cards and boards. It should be remembered that the most important work was carried out during 1950 when B.F. Skinner developed Programmed Learning while carrying on experiments with animals.

In 1950, Bryrumor, in England, used educational technology facilities for the first time. It is to be cared that in 1960, as a result of industrial revolution in America and Russia, other countries also started progressing in the field of educational technology. In this way, the beginning of educational technology took place in 1950's from America and Russia and now it has reached almost every country of the world. Now we see in teaching, due to various technological inventions like radio, tape-recorder, television, computer, CCTV i.e. closed circuit T.V., electronic video tapes and other audio-visual aids, many other numerous technologies have developed which are being used in the areas like industry, commerce, health, security and education.

The development of these devices has helped in the indoctrination of behavioral technology and in the field of teaching technology, models and designs. In other words, now the process of teaching has been mechanized. As a result, now in the three aspects of human knowledge, various types of machines are being used through which an effective teacher can provide benefits to the large groups of the students with the help of his knowledge. In this way, the concept of educational technology has developed in the field of education as a result of the mechanizations of teaching.

1.3.3. Objectives of Educational Technology

The main objectives of Educational Technology are:

- To modernise the learning methods and techniques after systematizing them so that these may be turned effective according to the needs of the changing era for the unknown future.
- To bring about desirable modifications in the behaviours of the teacher's and pupils by improving the teaching, learning and evaluation conditions.
- To make the classrooms teaching easy, clear, interesting, effective, understandable, objective and scientific.
- To help in increasing various facilities by solving the most complicated problems of human life so that the human life may carry on its progress continuously.
- To identify the educational needs and aspirations of the community.
- To determine the aims, objectives and in general the structure of education.
- To develop an integrated curriculum of arts, science and human values.
- To identify and locate material resources and strategies for achieving the desired aims of education.

- To develop specific models of teaching to bring about an improvement in the teaching-learning process.
- To design, modify and develop appropriate equipment/aids suitable and relevant to the educational process.

1.3.4. Characteristics of Educational Technology

The characteristics of Educational Technology are as follows:

- Educational technology is based on the application of the scientific knowledge.
- Educational Technology has contributed in developing various methods, for example, micro-teaching method, simulated teaching, interaction analysis, audio-visual aids and programmed learning method.
- In the field of educational technology, psychology, science, technology, system, art, audio-visual aids and machines are used.
- Educational technology is helpful in making the teaching process objective, easy, clear, interesting and scientific.
- In educational technology, the provision of measuring tools is emphasized for the evaluation of learning outcomes.
- Desired changes are possible in the behaviour of teachers and pupils.
- Educational technology is a continuous and dynamic technology.
- Educational technology encourages learning by controlling the environment.

1.3.5. Advantages of Educational Technology

The advantages of Educational Technology are as follows:

The use of technology would be to improve and extend learning or understanding. Increasingly, motivation, interest, convenience, and realism of experiences are also purposes; and they are meritorious purposes, though they should be subsidiary to the major ones. No matter how well chosen are the words describing a building or the comfort achieved in an automobile by the use of a new spring design, words will never provide the insights that seeing the building or riding in the automobile will readily yield.

A textbook picture or a slide of the building cannot provide an equivalent of the experience available through the use of film or videotape. Film, videotape, computer-assisted instruction, laboratories, work-sample kits, and other educational technologies offer an enormous range of learning experiences well beyond those of the lecture or recitation in a

classroom. It is important to understand that this increase in range of experiences, even when available, may only increase the insights and understanding achieved by students about concepts and principles initially presented in textbooks and lectures.

The students is provided with a wider range of sensory involvement and a better sampling of materials and experiences but uses them only to master traditional objectives largely limited to acquiring factual knowledge and the simpler skills. From our observations of the use of available educational technology, we conclude it is still highly underemployed. For example, many history classrooms have an extensive range of excellent maps; yet in some classrooms, the maps are seldom used and then for a very limited purpose, such as locating a city.

Educational technology can be used to extend the range of educational objectives by bringing into the student's environment much more potent deeper, richer, more complex, more realistic experience than could otherwise be had. The Ramayana can be read in a classroom over a period of weeks accompanied by lectures by the professor and the reading of various commentaries. If it happens that the play is being presented on television with an excellent cast, watching that broadcast, preceded by some introduction and followed by some discussion, should be a richer experience than simply reading and discussing the play.

Various forms of educational technology also provide the possibility of preserving peak and unique experiences. These would include films or videotapes of the performances of great musicians, of surgeons or of natural events that arc unusually picturesque or cataclysmic.

Educational technology may also provide learning experiences that are more pleasant and convenient than the traditional lecture, textbooks or classroom discussion. For example, educational television can bring significant learning into the home. Without time-consuming travel, an individual can sit in a comfortable chair on a stormy night and learn as much as in an uncomfortable classroom. Educational technology can also provide learning experiences that are less dangerous than the reality might be. The use of trainer equipment with realistic film for the education of pilots is effective and does not endanger their lives or risk an expensive plane. A film or videotape of a complicated laboratory experiment may give students insights into all aspects of the experiments while avoiding the possibility of accidents or explosions or the waste of materials.

1.3.6. Challenges of Educational Technology

The access to information continues to grow exponentially; school cannot remain mere venues for transmission of a prescribed set of information from teacher to student over a fixed period of time. Schools must promote learning to learn i.e. acquisition of knowledge and skills that make it possible to learn continuously over a life time. There is a paradigm shift from teacher-centered learning to student-centered learning. Today technological influence is so much that every aspect is going by e-electronic i.e. right from e-content, e-library, e-learning strategies, e-classroom, e-learning tools and technologies like moodle, lecture cast, web conferencing, and so on.

In this context it is very apt to explore the possible challenges for educational technologies to be implemented in education. The various challenges from time to time depending on the changing trends in technologies and their utility needs to be explored. In this process, some of the challenges are brought to light.

Environmental factors: The following factors are the challenges of educational technology. Inadequate hardware and software; Inadequate technology for using in the classroom; Quantity and quality of software is not up to the requirement; Upgradation of the peripherals and other requirements are not attended regularly; Problems with respect to support which is related to technical, pedagogical and management issues.

Training in technology to teachers: Mostly teachers lack the training in use of technology through in-service-training programs and they also lag in required knowledge, competencies and skills and "know-how" of using new technology in teaching. It is very difficult for teachers to use the technologies successfully in the absence of above said skills. Inspite of having positive attitude towards technology and willing to improve the effectiveness of teaching through technology due to various factors they are not able to implement. Well experienced, enthusiastic teachers do not have suitable training to use in the classroom their skills, ideas and ways to integrate technology.

Personal factors preventing teachers to use technologies: Various personal and psychological factors like confidence, fear, will and motivation are detrimental in using technology in the classroom. Most of the teachers who do not use computers lack self confidence in using computers and other technologies in teaching. Teachers also feel the discomfort of adopting to a new technology (due to unlearn and relearning), feel frightened

and threatened to computer technology. Teachers with high authority with traditional teaching in the classroom fear and cannot think of failure with technology integration in teaching with similar effectiveness.

Teacher Attitude: Some teachers appreciate the beauty of technology and its effectiveness in teaching over traditional teaching and show positive attitude whereas some other teachers show negative attitude and are reluctant to use technology. The attitudes of teachers, vary significantly towards technology.

Resistance to change: Generally teachers do not cooperate or show positive view on new issues in curriculum or practices as it needs, efforts and also a question of status quo, as teachers' willingness to learn from others have difficulty. They feel the technological experiments are beyond their purview and scope of job and resist such change.

Challenge of new models of teaching: New models are creating unprecedented challenges to traditional models of schooling. The various online and open courses of study at higher education are widely used as they are very popular and the distance learning and new models are used by the regular and traditional practitioners.

Providing adequate technology access: Due to a lack of funds and attitudes, there is no access in terms of environment and suitable hands on experience to students. They are not able to equip themselves or cope with the new developments or use new technology. If we can provide access to all the students in their purview wave, then they can create a space to overcome the challenge of accessing technology.

Technical support for technology use and maintenance: It is very important that teachers need to be strengthened in using technology by handholding help where anxieties and other problems are encountered. But when teacher encounter technical problems, they need technical support at that time. Sometimes when a teacher is using technology in the classroom and if suddenly technology fails the whole planning and completing that task would suffer like the file does not open, projector fails, system fails etc.

Impact of Educational Technology

The prevalence of technology drastically affects many areas of society in positive ways, including education. Modern-day students not only have computers to help them with

their schoolwork, they also use the Internet for research while teachers use technology to enhance their lessons. Let us discuss some of the major impacts of educational technology.

Research: If a school's library is outdated or lacking in a selection of titles, a student might find it difficult to compile the necessary research for an essay or research paper. As long as the school has a computer lab, students are able to use the Internet and digital encyclopedias to obtain the research they need. While students should be wary of the legitimacy of some of the content they read online, many schools use software like the Encyclopedia Britannica to help students do research.

Globalization: When schools in different parts of the state, country or world connect, students can "meet" their counterparts through video conferencing without leaving the classroom. Some sites, such as Glovico, are used to help students learn foreign languages online by pairing a group of students with a teacher from another country.

Educational Games: In younger grades, teachers expose children to computers through educational games. Instead of playing board games that focus on education, students can learn the basics of spelling, counting and other early educational lessons through computer games that make learning fun. Because many schools have at least one computer in each classroom, the teacher can make that computer a vital part of learning for young students.

Distance Education: In the past, students could take distance or continuing education classes, also called "correspondence courses," at community colleges and universities. After enrolling in a course of this style, a student would receive course documents in the mail and would be required to mail assignments to his teacher at the educational institution. The process could be long and complicated. Thanks to technology, continuing education students can take courses over the Internet at their convenience.

Web Seminars: Not every school has the resources and budget to send its students on field trips related to the course of study. When this is the case, the students' education can suffer. But thanks to technology, students can use the Internet to virtually attend Web seminars put on by museums and other educational institutions. NASA, for instance, offers a program that allows students to talk to astronauts in space.

Check Your Progress - 1
Note:

a) Tick mark the right answer in case of question (i) and write your answer in the space given below in the question (ii)
b) Compare your answers with those given at the end of the units.

(i) What is the abbreviation of CCTV?

A. Closed Circuit Television

B. Common Circuit Television

C. Closed Common Television

D. Continuous Circuit Television

(ii) List out some of the characteristics of Educational Technology.

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1.4. INFORMATION TECHNOLOGY

Information Technology (IT) is a label that has two meanings. In common usage, the term "information technology" is often used to refer to all of computing. As a technical term, it refers to a a vast set of tools, processes and methodologies (such as coding/programming, data communications, data conversion, storage and retrieval, systems analysis and design, systems control) and associated equipment employed to collect, process and present information. In broad terms, it also includes office automation, multimedia and telecommunications.

Information technology has taken the educational landscape by storm, increasing the learning potential of students and empowering teachers with engaging presentation tools and advanced class-management systems. From preschools to institutions of higher education, a plethora of electronic devices -- laptops, tablets, smartphones, and even smart-boards has opened access to vast amounts of information. These tools promote wider participation in the academic community and benefit educators and students alike for (i) Knowledge explosion (ii) Preservation and (iii) Retrieval.

1.5 KNOWLEDGE EXPLOSION

The 21st century is known as a Knowledge Age. We are in the midst of a knowledge explosion. The amount of information and knowledge available to us today is staggering. This is also the phase of human history where knowledge grows exponentially. The growth of knowledge happens at a very high speed, unprecedented in the past. New branches of knowledge are emerging through hybridization. For example, the cross-disciplinary approach to the study of biology and chemistry has given a new field of knowledge as Bio-Chemistry.

The emergence of knowledge society scientific advances and technological innovations are at the root of the complex transformation processes that have taken place during the last half a century. Since World War II, the products of scientific research and technological innovation have become more and more deeply enmeshed in all aspects of human activity, to the extent that a "knowledge society" has been seen to have emerged during the last several decades. The term 'knowledge explosion' refers to the evolvement of such type of human societies where sufficient quantity of quality knowledge is accessible to the majority of humans. The state of 'knowledge explosion' actually is the result of this type of very large-scale educational activities. Present day print and electronic media also has made it possible, for large number of people, to get as huge quantity of knowledge and information as never had been possible to get by a common person. In this way more and more people are having more diver's sets of information in their minds. The facilities of interaction with other people who live on distant places also have been immensely increased which has resulted in such a phenomenon, which can be termed as 'knowledge sharing'.

1.5.1 Knowledge Preservation and Retrieval

Universal access to information is a prerequisite for building knowledge societies. Throughout history, libraries and archives have been the guardians of the documentary heritage of humankind. But in a world increasingly being shaped by digital technologies, the traditional guardian institutions (libraries, archives and museums) are challenged to keep pace with the rapid growth in information. There is a need for storing information and knowledge in digital forms as any content in 'digital storage' is preserved for longer time. As you know, it is easy to scan a printed document and preserves the soft copy in a computer; moreover, it remains intact even after the paper document decays.

Information Retrieval (IR) is the activity of obtaining information resources relevant to an information need from a collection of information resources. Searches can be based on

or on full-text (or other content-based) indexing. Automated information retrieval systems are used to reduce what has been called "information overload". Many universities and public libraries use IR systems to provide access to books, journals and other documents.

In this information age, the solution to the problem of classification should not be to invest huge resource into manually classifying and tagging documents, but rather to use the content of documents to deduce and infer their classification. The Information Retrieval systems are programmed to provide a set of documents for each taxonomy (or class), or even clusters the documents solely based on their content, and utilizes contextual information to make better and more transparent classes of documents that are directly relevant to specific users, or groups of users.

Check Your Progress - 2

Note:

a) Tick mark the right answer in case of question (i) and write your answer in the space given below in the question (ii)

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

(i) What is the expansion of IR?

A. Information Return

B. Information Refund

C. Information Retrieval

D. Information Resend

(iii)Write a short note on "Knowledge Explosion'.

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1.6 COMMUNICATION

Communication is a basic prerequisite of all human performance and interaction. In a broad sense communication refers to the transmission of thoughts, information and commands by employing the sensory channels. The art of communication ensures that the message is conveyed intact – undiminished and undistorted. Communication is also considered to be a process of exchange. i.e. give and take of information by message. Communication tries to blend into a mutual understanding of a fact, principle or theory.

1.6.1 Concept and Meaning of communication

Etymologically speaking, the word communication is derived from a root word 'communis' which means 'common', i.e it reveals that it is an act of sharing commonness or common understanding with others or between two individuals or groups or organizations. In the words of Edgar Dale who created a dent through his case of experiences in the world of audio-visual media. It can be defined as "the sharing of ideas and feelings in a mood of mutuality".

Communication refers to the transmission of thoughts, information and commands by employing the sensory channels. Communication is a process of sharing or exchange of experiences, information, views, opinions, ideas, sentiments, thoughts, feelings and so on, between the source of communication(sender, teacher, any source of information) and the receiver(receiver, learner, seeker of information) through the same means, media(verbal or non-verbal).

1.6.2 Elements of Communication

The process of communication is dependent on each and every element. To help you understand how the process of communication happens and how these elements are dependent on each other mutually for effective communication, a brief meaning of each element is presented below:

Communication Context: The context could be physical, social, psychological or temporal i.e. Physical: Which includes the dimensions or size of the space, room, hall orientation or the event which takes place. Social: What kind of social relationships exist among people and how the communication depends on social context. It could be formal, informal etc. Psychological: How an individual communicates at the personal level or

otherwise. Temporal: Time also matters, i.e. after a daylong work how it affects, or during mornings, how it would be received, therefore the specific time of the day matters.

Similarly what is the period of time i.e., how is the situation at that period, will make all the difference in communication. So, always, it is the context which plays a very important role in the process of communication.

Source/Sender: Source or Sender can be a person or the event or any other source which can be verbal apart from any other mode. From where the communication begins or starts, can also be the source.

Receiver: A person who interprets the message or receives the information or has been communicated about something.

Message: Verbal or non-verbal cues are sent by a source. They could be words, figures, gestures, movements etc. which forms a message.

Symbol: Symbol is denoted for something else. It can be verbal, non-verbal, words or symbols. E.g: addition is communicated as +, colour for same thing or emotion, red for danger or stop etc.

Channel: A channel or medium through which the matter is conveyed. They could be visual (sight), auditory (hearing), tactile (touch), gustatory (taste), and olfactory (smell). Any such one or through many of the above, the message is sent.

Encoding: Process of using symbols to express the idea or feeling.

Decoding: From the received message it needs to be understood i.e the symbols sent need to be expressed or translated into the ideal. If some symbols are sent as a message, that is translated into the meaning of the same or idea.

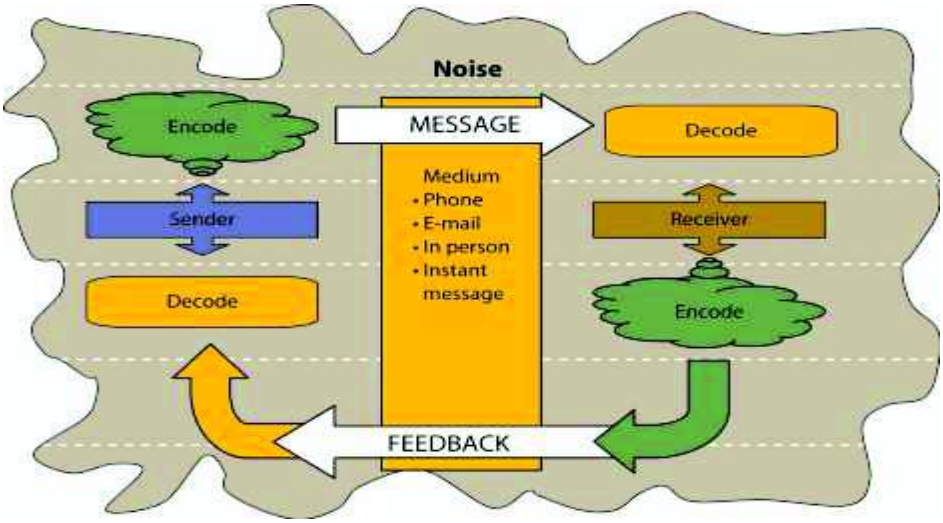
Feedback: This feedback gives a clear idea to the sender whether the communication is properly reached or not. It will be known through the response or feedback given by the the receiver to the sender.

Noise: Which distorts the message, it can be external or internal to the source and the receiver.

1.6.3 Process of Communication

The process of communication is a two-way process. It happens between two persons one to one or one to many in a group communication. Communication between the sender and the receiver through some media/ channels of communication. Here the sender or the source, sends an idea as a message to the receiver, through some channel or medium.

The following diagrammatic presentation makes it clear about the process/ model of communication.



From the above models of communication and the earlier discussion on the elements of communication it is very clear as to how the process of communication takes place. A brief description would throw more light on the process of communication.

Source of Communication or Message: Any communication starts from the source, or sender of the message, i.e. the communicator will take the initiative in sending message. During the process the sender person or event or object gets ready to transmits the information, ideas, thoughts, opinions, feelings etc. which are in their position are sent to the receiver or the person with whom it is communicated. For instance, in a classroom teacher is like the source or sender of message i.e. transmits or gives lecture in the classroom to the children/ students who are receivers of the lesson.

Contents of Communication or Message: The intended material or information or any other contents or expressions. The message or contents can be structured or unstructured, informal or formal etc. keeping in view, the situation or the context is taken into consideration while selecting the appropriate means or media while sending the message.

Media or Channel of communication: The media suitable to the message i.e. either verbal or non-verbal as a channel of communication is utilized. The process of selecting as media and setting or structuring everything to communicate effectively to the receiver is called encoding process. Then the encoded material is transmitted through an appropriate channel or media (sensory organs or any other mode) will be sent to the receiver. Then the receiver will try to decode the message and gives feedback which reveals the appropriate or intended message and whether it reached the receiver or not. Likewise the communication process between the two (sender and receiver) will continue.

Receiver of the communication: Receiver is the person who is on the other end who encodes the material and responds back to the source of information. Thus the communication is maintained with a flow of information between sender and receiver. The communication will be effective if coding and decoding is done appropriately.

Feedback/ Response: Feedback is very important in the flow of communication in order to know whether the intended message was received and effective. Also it shows the receivers response whether he/she could receive or has the ability to decode and give the right response to the source or sender. Thus the communication process completes its complete cycle with a feedback.

Thus the communication is a two-way process where two ends should be connected throughout the process till the intended purpose is completed between the sender and receiver.

1.6.4 Barriers of Communication

While understanding the various aspects of communication , it is very vital to know or identify what are the barriers in the process of communication. Any kind of distraction or disturbance between the sender and receiver or within the sender or receiver would break the communication or distort the communication. Such disturbances are called Communication Barriers. They can be external or internal. They can be physical, language, psychological or background.

External barriers: At the time of communication if any external or outside media, which comes in between the sender and receiver are considered to be external barriers. For instance, barriers can be if there is a classroom lecture going on and suddenly there is a big

noise or sound or a any loud sound, noise outside, if the school which is on the main road, traffic horns, or any such physical disturbance. It could be a polluted environment or it could be the ventilation, aeration, condition of the building infrastructure, physical amenities. They all will have an impact on the communication. All such factors, which become a hindrance and would distort or create discomfort for effective communication are considered as barriers in the process of communication.

Internal barriers: Internal factors can be whether sender or receiver, i.e. when either of them have any barriers at the personal or individual level in sending the message or receiving the message. It could be due to various reasons. They are: Poor physical health or illness; Less intelligence or academic potential; Poor mental health or balance; Psychological problems or disorders; Social prejudices, personal insecurity or imbalance; Inability to comprehend various forms or types of information.

Physical Barriers: Due to some barriers which are concrete and physically obstructing communication in the environment. It could be: noise, invisibility, environmental and physical discomfort, distraction and ill health. For instance, in the dark, where there is no visibility if a person communicates through non-verbal communication, it cannot reach the receiver, as visually they cannot perceive. Even the colors, signals, symbols are difficult to perceive. Similarly, when there is a big woofer with a music system, one cannot hear the other person. Also it depends on an environment and any kind of physical discomfort, where a person's sitting posture or the clothes they wear or the glasses they wear or books they read are with any kind of physical discomfort that does not allow both the receiver and sender for an effective communication.

Language Barriers: Verbalism, verbosity and unclear graphics or symbol. A person who does not know others language and cannot understand cannot communicate clearly. Similarly if a child communicates in a sign language to the other child or person who does not know the language, the very communication gets affected. If the sign boards are not properly drawn or indicated in other language to the foreigner, it could be communicated. If the voice or accent is not understandable to the other person, like the accent of American English to Indian natives then it is difficult to follow and vice-versa. Sometimes, some specific cultural, social customary symbols or signals can also become barriers in communication.

Psychological Barriers: (Prejudice, disinterest, inattention, imperceptions, redundancy, lack of recognition, unrewarding) These are very personal in nature. They could be due to ones social background with certain fixed notions or prejudices which become blocks in the mind for receiving any information. If somebody is prejudiced with religious customs, beliefs cannot be communicated with scientific explanation. The person will not oblige or will be ready to receive or listen to it. If a child has no interest in mathematics or has a fear for it, nothing is communicated in the classroom even if the best explanation is given. Similarly, when something is not interesting or irrelevant, one cannot perceive it. Likewise if anything is boring and monotonous, it will not be communicated. Therefore personal feelings, emotions and other related psychological factors will also come in the way as barriers in the process of communication.

Background barriers: Past experiences, cultural practices, working environment, ones background knowledge or expertise can be considered as background barriers. Ones past experience may become become a barrier as somebody already has knowledge about a product and they will not listen to the person who communicates, as it is known to him/ her. Even if something very important is conveyed they will not be receptive as they think they know and do not pay attention. So, the background becomes a barrier in communication. Sometimes, one who does not trust others will also not receive the same and becomes a background barriers, will become distracters in communication process.

1.6.5 Types of Communication

Communication type depends upon the nature and type of media or the channels which are used by the sender and receiver. Based on the channel of communication it can be classified broadly into the following categories:

Verbal Communication: Language is the epitome of communication. In order to know each other or say or give and take or any transaction between persons, needs some language. Every group, society, region etc will have a specific style of language is with words and sentences which follow certain rules of grammar, syntax, semantics, pragmatics, morphology etc. Similarly the basic structure of a sentence also follows some specific rules in communicating with others. It could be either oral or written language or oral and written together.

- **Oral Language**: Through the expression of feelings, ideas, thoughts within ones own context. For instance, teacher giving a lecture, somebody reciting poem, reading out

something or explaining about something etc. Where orally communication happens. Here sender speaks and receiver listens.

- **Written Language:** Written language will follow the rules of grammar in the respective languages. It could be regional language, national language, and international language. To communicate ones ideas, thoughts or feelings in the script form. If the script is correctly written and the receiver also knows language the correct message will be sent without any gap or distortion. For instance, using blackboard or some other written form through some teaching aids like charts diagrams or handouts where the communication is through written script(words/ sentences/cues/symbols etc). At times and usually in the classroom both oral and written communication go together. In an informal communication, mostly, it happens orally.

Non-Verbal Communication: Without using any oral or written language the communication is done. Especially sign language is used for deaf and dumb people. Similarly in the primitive time when no language was available, body movements were used, gestures were used to communicate oneself, even in our day to day functioning the non-verbal or through gestures many things are communicated. Even children before they acquire full-fledged language they use body language to communicate. They are effective and communicate many things. Non verbal communication goes hand in hand with verbal communication without any conscious effort and is very effective in communication.

- **Facial Expressions:** As face is the index of mind every individual expresses many feelings, emotions, temperaments, attitudes and so on without any effort it will be revealed with their expressions on their face. It could be the way eyebrows frown, movement of forehead, cheek, lips etc. Each and every part of the face indicates a specific communication. One can show anger, anxiety, fear, happiness, like, dislike, annoyed feeling etc. Any kind of expression that they have consciously and spontaneously exhibited through their facial expressions.
- **Language of Eye:** Language of eye is very powerful and effective and most important mode of non-verbal communication. One can pierce into somebody's heart and mind, one can show their anger or can totally just with a look or sight without even spilling a single word. This does not need any interpreter. It is universally acceptable and understandable language. Eyes can show anger, greed, fear, smile, pleasantness, satisfaction, etc. They indicate ones mood, condition, feelings etc.

- **Body Language:** Body language is very important and communicates many things and even clarifies verbal language. For instance, a dancer through their body language, performance on the stage through various postures and gestures of their body parts many things are expressed it could be a dance drama. Body language also has some cultural social base. For instance, to wish somebody will touch the cheeks, lips, shake hands, fold hands, fold hands, bending down body, touching feet etc.

1.6.6 Teaching as Communication

To ensure that teaching and learning represent the two sides of a single coin or the two sides of any given class is, and always has been, education's main objective. The possibility of organizing teaching in such a way as to foster better learning has been one of the main premises of education since Comenius (1592-1604). However, when dealing with the organization and execution of such teaching in classrooms we find teachers who may or may not have the skills necessary to communicate with their students, skills that can facilitate or preclude fulfillment of the teaching proposal. In regard to communication in the classroom, show that an important characteristic of the distinction between the dialogic and authoritative approaches is that a discursive sequence can be identified as dialogic or authoritative regardless of its having been enunciated by one sole individual, or interactively.

1.6.7 Application of Communication Technology in Education

School can be seen as an institution that both upholds and reforms tradition. School is a sanctuary of closed knowledge, protecting its educational autonomy with every means available. The closed code of school can be contrasted with, for example, the open code of the Internet. For the media-savvy teacher, Communication Technology constitute a never ending source of information and pedagogical challenges, as they provide an opportunity to establish virtual classrooms uniting school classes in different parts the world. In a progressive school, Communication Technology might serve a fundamental pedagogic purpose of generating discussions across all barriers.

Check Your Progress - 3

Note:

a) Tick mark the right answer in case of question (i) and write your answer in the space given below in the question (ii)

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

(i) Which of the following is not an "Elements of Communication"?

A. Sender

B. Channel

C. Encoding

D. Suggestion

(ii) Which of the following is a non-verbal communication?

A. Oral communication

B. Written communication

C. Facial Expression

D. E-mail communication

(iii)List out the barriers of communication.

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1.7 INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Information and communication technology is defined as the use of hardware and software for efficient management of information. i.e. storage, retrieval, processing, communication, diffusion and sharing of information for social, economical and cultural upliftment. Information and communication technology (ICT) is defined as the implementation of different branches of technology in information and communication processing. In a broader sense, ICT is taken to refer to the whole set of enabling technology concerned with communication, manipulation of information (hardware and software), networking, data storage, transmission –encompassing data ,voice and video.

1.7.1. Concept and Importance of ICT

ICTs stand for Information and Communication Technologies and are defined, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony. Information and Communication Technologies consist of the hardware, software, networks, and media for collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services. ICTs can be divided into two components, Information and Communication Infrastructure (ICI) which refers to physical telecommunications systems and networks (cellular, broadcast, cable, satellite, postal) and the services that utilize those (Internet, voice, mail, radio, and television), and Information Technology (IT) that refers to the hardware and software of information collection, storage, processing, and presentation. For the purposes of this policy, Information and Communication Technologies are defined as all digital devices, tools, content and resources, which can be deployed for realising the goals of teaching-learning as well as management of the educational system. According to National Research Council, Learner-centered environment is where "the careful attention is paid to knowledge, skills, attitudes and beliefs of the learners in the classroom". ICT finds its use in education for the following reasons:

- ICT assists students in accessing digital information
- ICT promotes collaborative learning in a distance-learning environment
- ICT offers opportunities to develop critical thinking skills.
- ICT produces a creative learning environment.
- ICT improves the quality of teaching and learning.
- ICT supports teaching by facilitating access to course content.

1.7.2. Scope of ICT

ICT has a vast scope in the field of education. At all levels of education, whether at school or college, ICT has promising results. These encompass the areas such as teaching-learning in and outside the classroom, in regular face-to-face set-up or distance mode. Thus**,** the scope of ICT in education can be discussed in detail under the following sections.

Use of ICT in teaching-learning process: The common use of ICT for teaching includes preparation for notes, teaching learning resources and examinations. This does not enable teachers to radically change their pedagogical practices. Teachers need to go beyond

such simple use by involving students to use ICT so as to transfer students' learning. The best way of using ICT by teachers in teaching-learning process is to see that students are motivated to use technology which takes care of concentration on technology or on the teacher at a given time in the classroom.

Use of ICT for Publication purposes: The educational uses of ICT for publication purpose is mainly to disseminate information or ideas and share them with the school community, public, governmental organizations within the country or abroad. These products of publication take the shape of a newsletter, brochure or a website. Students can publish a newsletter by procuring the information related to an organization-Governmental or Non-Governmental. While taking up publishing work, student play roles such as editors, reporters, authors and designers of the newsletter. Later they also plan, design, create and distribute them in and outside the school for the people concern.

Use of ICT in Evaluation: Evaluation is a significant part of teaching which comprises the learning process and also the provision feedback to learners. Teachers in traditional face-to-face situations use interaction as an opportunity to provide feedback to learners, besides communicating their strength and weaknesses. With the advent of technological developments, there is limited opportunity for face-to-face Interaction. Now, teacher uses a combination of two forms of evaluation: Formative Evaluation: This is used as a learning tool, and to give and gain feedback on learner ability and performance. Summative Evaluation: This is an evaluative method for grading and making a judgement about the participant's achievement in a course. Formative evaluation can take the form of any one or many of the following types of assignments:

- **Portfolios**: Portfolios are the collection of a student's work over a period of time. They take the form of action plan with out.comes which is at various stages of implementation; a series of paintings with student self-reflection; or a collection of essays accompanied by an annotated bibliography and critique.
- **Reports, essays and journals:** These belong to specific kind on interest. These are aimed at developing critical thinking skills and to make judgements about various actions, plans, ideology, movements in history or a discipline specific collection of readings.
- **Case studies and scenarios**: These are used to develop analytical skills based on a specific area or knowledge.

- **Online (asynchronous) conference discussions and synchronous oral examinations**: These evaluation techniques favour learners who are skilled in presenting thoughts and ideas through inter-personal interaction.

Use of ICT for Research purpose: Products and processes of ICT provide access to a lot of information on innumerable topics produced by people of diverse areas and fields across the globe. This information is either singled out in combination of the form of text, images, sounds, videos and animation. For research, sifting through a number of websites in search of relevant, authentic and high quality information is a challenging experience. So, while looking for resources one of the easiest and safest methods of researching is to use directories. These aspects lead to collaboration of research work in which the different areas or processes of the research project can be shared to produce quality results and achieve the desired goals.

Use of ICT for Administration: ICT for administration purposes include the preparation of school announcements, reports, letters and student registration. ICT makes the work of the heads of school easy and manageable and document storage saves a lot of space, as physical files are replaced by electronic ones.

Use of ICT for Personal Purposes: At the personal level, ICT is used for communication, personal development and entertainment purpose. Again, most usage will be to search for and store information, and submit online application-subscription, purchase or other personal uses.

Use of ICT for Professional development: ICT uses for professional development is indicated in searching for information for self-study and communication. This enhances teacher's confidence in their areas of specialization. To further their teaching career, few teachers use ICT and consequently motivate others to use ICT.

1.7.3 Characteristics of ICT

The characteristics of ICT in education can be discussed in detail under the following headings:

Student-centric: In these classrooms, students play an active role in their learning and teachers serve as mere guides. They are more facilitators of learning than lecturers. They

help students think critically and learn by doing and act as a resource while their students discover and master new concepts. Student-centric classroom environments put students' interests first and are focused on each student's needs, abilities and learning styles.

Computing devices: Computers are readily available in modern classrooms, since they are essential tools for 21st century students and replace the utilities of pen and paper. They not only give students the means to conduct online research and master the technology skills they need, but they also give teachers the opportunity to enhance their lessons. The ability to deftly operate a computer is a critical 21st century skill. Computing devices greatly assist in teaching and learning and make them more engaging and effective.

Active learning: In modern classrooms, students are actively engaged in what they learn. Students participate in more active learning by working in groups or on computers and complete projects and other interesting activities that help them discover new skills. Students can learn actively by talking and listening, writing, reading and reflecting. When students are encouraged to take an active interest in learning, they are more likely to retain the knowledge they've accumulated.

Adaptive learning: Any classroom will always have students of different types of learning abilities in it which often makes it difficult for teachers to make sure that all of them understand the concepts. The modern approach of adaptive learning gives students the freedom to learn at their own pace and in the way they are most comfortable with. There are various kinds of software available for adaptive learning that teachers can use to enhance the learning of their students.

Invitational environment: The classrooms should not be cramped or overcrowded. Modern classrooms should have the basic material required for teaching such as, interactive whiteboards and LCD projectors. The BYOD (Bring-Your-Own-Device) approach can be adopted, so that students can bring their laptops or tablets to the classroom for better personalized learning. Teaching with technological material is more effective, stimulates student engagement, eases the work of teachers and makes it easy for students to focus on learning.

1.8 AIMS AND OBJECTIVES OF NATIONAL POLICY ON ICT IN SCHOOL EDUCATION IN INDIA

The National Policy on Education 1986, as modified in 1992, stressed the need to employ educational technology to improve the quality of education. The policy statement led to two major centrally sponsored schemes, namely, Educational Technology (ET) and Computer Literacy and Studies in Schools (CLASS) paving the way for a more comprehensive centrally sponsored scheme – Information and Communication Technology @ Schools in 2004. Educational technology also found a significant place in another scheme on upgradation of science education. The significant role ICT can playing school education has also been highlighted in the National Curriculum Framework 2005 (NCF) 2005. Use of ICT for quality improvement also figures in Government of India's flagship programme on education, Sarva Shiksha Abhiyan (SSA). Again, ICT has figured comprehensively in the norm of schooling recommended by the Central Advisory Board of Education (CABE), in its report on Universal Secondary Education, in 2005. With the convergence of technologies, it has become imperative to take a comprehensive look at all possible information and communication technologies for improving school education in the country. The comprehensive choice of ICT for holistic development of education can be built only on a sound policy. The initiative of ICT Policy in School Education is inspired by the tremendous potential of ICT for enhancing outreach and improving quality of education. This policy endeavours to provide guidelines to assist the States in optimizing the use of ICT in school education within a national policy framework.

Aims:

- The ICT Policy in School Education aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socioeconomic development of the nation and global competitiveness.
- It also aims to devise, catalyse, support and sustain ICT and ICT enabled activities and processes in order to improve access, quality and efficiency in the school system

Objectives:

To achieve the above, the ICT Policy in School Education endeavours to:

Create

- ✓ an environment to develop a community knowledgeable about ICT
- ✓ an ICT literate community which can deploy, utilise, benefit from ICT and contribute to nation building
- ✓ an environment of collaboration, cooperation and sharing, conducive to the creation of a demand for optimal utilisation of and optimum returns on the potentials of ICT in education

Promote

- ✓ universal, equitable, open and free access to a state of the art ICT and ICT enabled tools and resources to all students and teachers
- ✓ development of local and localised quality content and to enable students and teachers to partner in the development and critical use of shared digital resources
- ✓ development of professional networks of teachers, resource persons and schools to catalyse and support resource sharing, upgradation, and continuing education of teachers; guidance, counselling and academic support to students; and resource sharing, management and networking of school managers and administrators, resulting in improved efficiencies in the schooling process
- ✓ research, evaluation and experimentation in ICT tools and ICT enabled practices in order to inform, guide and utilise the potentials of ICT in school education
- ✓ a critical understanding of ICT, its benefits, dangers and limitations

Motivate and enable

- ✓ wider participation of all sections of society in strengthening the school education process through appropriate utilization of ICT

Check Your Progress - 4

Note:

a) Tick mark the right answer in case of question (i) and write your answer in the space given below in the question (ii).

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

(i) What is the abbreviation of ICT?

A. Information Communication Technology

B. Information Community Technology

C. Information Communication Techniques

D. Idea Communication Technology

(ii) What are the characteristics of Information Communication Technology in Education?

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1.9 LET US SUM UP

Educational Technology is that dynamic, progressive and important mechanism in the field of education which modifies and analyses the various steps of teaching and learning with the help of indoctrinated principles and laws of modern psychology, sociology, engineering, administrative theory, mathematics and other social and physical sciences. It develops educational efficiency by formulating and remodeling according to the needs. Also, it plays its important role not only in the classrooms but also in the entire school environment, educational administration and educational references. Globalization is powered in part by tremendous and rapid ICT advances, and young people are often among the first to take advantage of new developments in this area. After reading this unit, you will get the tremendous ideas of Educational Technology, Information and Communication Technology.

1.10 UNIT END ACTIVITIES

1. Discuss the importance of Educational technology
2. Explain in detail audio visual aids and their uses in education.
3. Describe the meaning and scope of Information and Communication Technology.
4. Discuss the various barriers of communication in your classroom
5. Suggest some of ways to enhance the classroom communication.
6. Describe the features of the computer and its educational uses.

1.11 CHECK YOUR PROGRESS: ANSWERS

1. (i) A

   (ii) **Characteristics of Educational Technology**

   - Educational technology is based on the application of the scientific knowledge.
   - Educational Technology has contributed in developing various methods, for example, micro-teaching method, simulated teaching, interaction analysis, audio-visual aids and programmed learning method.
   - Educational technology is helpful in making the teaching process objective, easy, clear, interesting and scientific.
   - In educational technology, the provision of measuring tools is emphasized for the evaluation of learning outcomes.
   - A desired changes is possible in the behaviour of teachers and pupils.
   - Educational technology is a continuous dynamic technology.
   - Educational technology encourages learning by controlling the environment.

2. (i) C

   (ii) **Knowledge Explosion**

   Knowledge Explosion refers to uncontrolled growth of knowledge. The 21st century is known as a Knowledge Age. There are two aspects of knowledge growth – one, knowledge is growing tremendously and the other the growth is happening at a high speed. As a result, knowledge explosion is felt like a whirlwind which affects the whole society, especially the scientists, teachers and students who essentially work with knowledge.

3. (i) D

   (ii) C

   (ii) **Barriers of Communication**

   - External barriers
   - Internal barriers
   - Physical Barriers
   - Language Barriers

- Psychological Barriers
- Background barriers

4. (i) A

(ii) **Characteristics of Educational Technology**

- Active learning
- Adaptive learning
- Invitational environment
- Students understand and follow the rules and procedures
- Mutual respect
- Students take responsibility of their learning
- Performance-based assessments
- Collaborative learning

1.12. REFERENCES AND FURTHER READINGS

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Unit: II - ICT in Education

STRUCTURE

2.1. INTRODUCTION

Individualized instruction provides different tasks for each learner and provides support at the individual level. It is based on the idea that all learners are different and therefore have different needs, so an individualized or personally tailored approach to instruction ought to be more effective, particularly in terms of the tasks and activities that pupils undertake and the pace at which they make progress through the curriculum. Individualized instruction is about using teaching strategies that connect with individual student's learning strategies. The ultimate goal is to provide a learning environment that will maximize the potential for student success. The rapid growth in ICT has brought remarkable changes in the twenty-first century, as well as affected its adoption and integration by teachers in teaching-learning process. The effective integration of technology into classroom practices poses a challenge to teachers and administrators. In this unit mainly focus on how the ICT is used in teaching and learning process.

In this unit, the concepts of knowledge acquisition, communicative skills for teachers and students, individualized instruction, programmed learning, ICT integration and challenges in Education will be explained.

2.2. LEARNING OUTCOMES

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

- understand knowledge acquisition and multi-sensory approach
- discuss the ways to develop the Classroom Communication
- know the different Communicative skills for Teachers and Students
- define the concept of individualized instruction
- differentiate between various styles of programmed instruction
- acquire the skills to develop programmed learning material
- enumerate the changing roles of the teacher in ICT
- describe the roles of the learner and the teacher in ICT
- identify the challenges of integrating ICT in Education

2.3. KNOWLEDGE ACQUISITION AND MULTI-SENSORY APPROACH

Knowledge acquisition is a method of learning, first proposed by Aristotle in his seminal work "Organon". Aristotle proposed that the mind at birth is a blank slate, or tabula rasa. As a blank slate it contains no knowledge of the objective, empirical universe, nor of itself. As a method, it is opposed to the concept of "a priori" knowledge, and to "intuition" when conceived as religious revelation. It has been suggested that the mind is "hard wired" to begin operating at birth, beginning a lifetime process of acquisition through abstraction, induction, and conception.

The acquisition of empirical knowledge, which begins the process of filling the tabula rasa, is thus by means of the experience of sensation and perception. The "five senses" referred to by the word sensation are metaphorically the interface between empirical (sensate) reality and the consciousness of the knowing subject. A knowing subject for the purpose of this discussion of knowledge acquisition may be defined as any conscious creature capable of deriving direct and immediate sensate data from its environment. Sensate data, or sensation, are distinct from perception. Perception is the recognition within the knowing subject of the event of having had a sensation. The tabula rasa and must learn the nature of sensation as the awareness of something which is outside itself. Commonly recognized sensory systems are those for vision, hearing, somatic sensation (touch), taste and olfaction (smell). Perception is the retention of a group of sensations transmitted through the sensory system(s), which gives the knowing subject the ability to be aware, not only of the singularity of stimuli presented by sensation itself, but of an entity, a thing, an existent.

Retention of percepts allows the human mind to abstract information from the percepts. The abstraction is considered the extensional definition of the percept. An extension is "every object that falls under the definition of the concept or term in question." This is the same as a universal (metaphysics) or genus or denotation, or class (philosophy). Once a universal (class) has been identified, then the next step in the acquisition of knowledge is the abstraction of the intension, which is the particular, the species, or the connotation. Connotation as its meaning as particular is "the assertion that at least one member of one class of things is either included or excluded as a member of some other class." This means, for example, that a poodle is the particular in a class or universal concept called "dog" or "canine".

Knowledge acquisition is the process used to define the rules and ontologies required for a knowledge-based system. The phrase was first used in conjunction with expert systems to describe the initial tasks associated with developing an expert system, namely finding and interviewing domain experts and capturing their knowledge via rules, objects, and frame-based ontologies. Expert systems were one of the first successful applications of artificial intelligence technology to real world business problems.

Multi-Sensory approach

Multi-Sensory approaches teach reading and writing (including spelling) through using Auditory (hearing), Visual (sight) and Kinesthetic (movement/touch) pathways. This gives multiple pathways for the information to reach the brain. It is diagnostic as it involves constant testing and reflection on the knowledge of the student. It is systematic and seeks to unite the components of written language. Thus, it treats sound-symbol knowledge, oral language (grammar and pronunciation), written language conventions and handwriting in an organised and integrated fashion. Teaching and learning in this way is an exciting journey of discovery. It is a fast paced and creative process where learning is fun since each small step is mastered and the learner is aware of what they have gained. Everyone now can call themself a success. Confidence is built through growing mastery of written language. The students can see themselves as successful learners and this helps each individual learner gain independence and a great “can do” attitude.

All of us learn through all our senses. Some of us learn better through one sense than another. Some pupils learn best through visual approaches; others through auditory approaches; yet others through a combination of the two. For some pupils the written word is

not an optional extra but an integral part of their learning process. Many pupils enjoy work which involves an active, physical response and learn well where such methods are employed. One of the advantages of using visual, audio and tactile materials to support textual ones is that the resulting mixture of styles means that teaching will be appropriate for a wider range of learners. So we are all using our all senses from time to time. Some examples of multisensory approaches:

- **Sight:** text, pictures, graphics
- **Sound:** listening to teacher and others, to recordings, videos; talking, shouting, whispering, singing, rhymes, story-telling, clapping rhythmically to indicate syllabic stress, etc.
- **Touch:** handling objects, making things, describing shapes, gesturing, using computer keyboard, etc.)
- **Taste:** sampling food and drink, 'savouring the language' (articulation intonation)
- **Action:** manual and physical activity; games involving manipulating objects or moving about.

Check Your Progress - 1
Note:

a) Tick mark the right answer in case of question (i) and write the answer to question (ii) in the space given below.

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

(i) Who first proposed the method of Knowledge acquisition?

a. Aristotle
b. Plato
c. Alexander
d. Freud

(ii) List out the different gateways of Knowledge.

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2.4. CLASSROOM COMMUNICATION

Effective communication is the essential requirement for the success of teaching learning activities of any classroom. Therefore, for all practical purposes, the teacher should invariably try for achieving utmost efficiency and effectiveness in the process of classroom communication and interaction with the students. For this purpose necessary improvement should be made with regard to the contribution of each factor and component related with the process and mechanism of classroom communication. Let us think about the role of these components on these lines.

Source of Communication: Effectiveness of classroom communication very much depends on the strengths and qualities of the sources of communication i.e. teacher. All teachers should therefore try to imbibe the virtues and qualities of an effective communicator or sender of the message. In brief, the following things may contribute in improving the communicator image of a class teacher.

- Sound physical and mental health.
- Proper teacher like dress and mannerism.
- Proper teacher like behavior in dealing with the students.
- Appropriate voice, control and efficiency in the use of language mutually sharable with the students.
- Appropriate mastery over the subject matter, content or message delivered to the students.
- Proper knowledge, skill and efficiency in the use of various media and channels of communication.
- Efficiency in classroom control and response management.
- Efficiency with regard to thinking skills like ability to think and reason well, ability of imagining, creative thinking, analyzing, synthesizing, generalizing or drawing inferences etc.
- Efficiency with regard to the use of audio-visual aids appliances and multimedia.
- Proper attitude towards self-implying that the teacher as a communicator must possess self confidence in his abilities of believing, saying and doing.
- Proper attitude towards the students implying that the teacher should have a sense of respect, understanding and faith in the abilities of the students.

Communication Material: The effectiveness and success of the communication process in any classroom situation very much depends upon the quality and nature of the communication material. If the contents and message has some attraction, force and value to the receiver, it will surely catch his attention and make him quite attentive and active participant in the communication process. On the contrary, if there is nothing new, novel or valuable in the message or piece of instruction imparted by the teacher, it will neither attract nor motivate the students to take genuine interest for becoming active partner in the ongoing classroom communication. Therefore, it is the prime duty of the teachers to think seriously about the quality and nature of the content material and message given to their students.

Communication Media or Channel: Communication media or channels just lie in between the source and the receiver like a bridge or connecting link. What the teacher says or shows to his students can do it only with the help of some or the other verbal or non-verbal communication means. The nature and quality of the traffic flowing on the bridge is very much dependent on the appropriateness, strength and quality of the bridge. Similarly the effectiveness and strength of the communication flow between the teacher and students will surely depend upon the nature and quality of the verbal and non-verbal means, media and channels employed in the classroom communication. For this purpose the following things should always be kept in mind.

- Use that language which is quite known and under stable on the part of the students.
- The verbal means should be supported by the non-verbal clues, gestures, body language, physical movements etc. for giving required strength and effectiveness to the process of communication.
- To reduce the evil effects of verbalism, attempts should be made to make use of appropriate audio-visual aid material and appliances, suiting to the very nature and timing of the communication.
- Have variety, novelty and creativity in making use of different means and media for the communication of the intended message. Always prefer the multimedia approach over the single or the limited usual means.

Receiver of the Communication: Where the initiator or source of communication is the teacher, students lie on the other end for actualizing the process of communication. Actually what goes inside the classroom communication is always intended for the benefit of the students. That is why, it can only be carried out effectively with their active involvement

and cooperation. In case the students are not interested or not capable of receiving and understanding the meaning of the message or do not respond in a proper way for maintaining the flow of communication, the communication, will turn into one side affair and thus lose its purpose and significance. These characteristics of the students for achieving required effectiveness in classroom communication may be summarized as below.

- They must have proper and sufficient previous knowledge and general background for receiving and understanding the communicated message.
- They must have required proficiency and abilities in terms of communication skills like listening, observing, reading, writing, speaking, mapping, drawing, measuring, surveying, thinking, analyzing, synthesizing, evaluating and drawing inferences, etc.
- They must show proper zeal, enthusiasm, curiosity as well as need for maintaining the chain of communication.
- They must not put themselves into a passive recipient of the information or message given by the teacher but should make themselves, enquirer and active partner in the setup of the classroom communication.

The Environmental Conditions and Situations: The effectiveness of classroom communication also depends upon the appropriateness or inappropriateness of the situation or environmental conditions prevailing at the time of classroom communication. The psychological and physical factors involved in these environmental conditions and situations directly or indirectly influence the efficiency and effectiveness of the teacher (source), students (receivers) and media or channels of communication. Consequently efforts should be made for bringing necessary improvement in the environmental conditions and situations of the classroom communication by adopting the following measures.

- The classroom should be appropriately spacious as to accommodate the required number of students with the seating capacity norms. They should provide appropriate ventilation, lighting sound and seating arrangement along with sufficient space for instructional and communication activities.
- The classroom should be so situated as not to be affected by the outside disturbances, noise, etc.
- The classrooms should have all the necessary arrangement for the use of audio-visual material, equipment and appliances etc. needed for the effective classroom communication.

- As far as possible efforts should be made to have healthy and useful interaction between and among the teachers and students during the classroom communication.
- They should provide necessary encouragement as well as help in removing the communication difficulties and deficiencies by showing necessary sympathy and affection towards the students. Their responses should also be effectively managed and they should be provided with adequate remedial care and look after based on the feedback given by them in the process of communication.

In this way all round efforts are needed on the part of teachers for taking the students with them for the effective classroom interaction and communication by doing all what is needed on their part in terms of improving their own performances as communicator along with bringing necessary improvement in the mains, media and environmental conditions for drawing maximum advantage through the ongoing classroom interaction and communication.

Communicative Skills for Teachers and Students

Teaching is generally considered as only fifty percent knowledge and fifty percent interpersonal or communication skills. For a teacher, it is not just important to give a quality lecture but it is more important for the presentation of a lesson or lecture in class. Communication skills for teachers are thus as important as their in-depth knowledge of the particular subject which they teach. Teachers should be aware of the importance of communication skills in teaching. They must also realize that all students have different levels of strengths and weaknesses. It is only through communication skills that a teacher can introduce creative and effective solutions to the problems of the students. Thus, a teacher can enhance the learning process. Following are some of the communication skills that a teacher must possess so that they interact properly with the students -

- **Positive Motivation**: This is one of the important things that a teacher must possess. In a class, students always have different kinds of taste and preferences over subjects. So it is the job of the teacher to create enthusiasm and interest in the minds of the students towards a subject. It is also a teacher's role to remove any fear and inhibitions that a student may have towards a subject.
- **Effective Body Language**: This is the most powerful communication skill that a teacher must possess. Good presentation skills include a powerful body language supported by verbal skills. This can create a long lasting impression in the minds of the students. Thus, a teachers lectures will inevitably become more interactive and

interesting for the students. Besides, a teacher should maintain the volume, tone and rhythm of their voice during a lecture.

- **Sense of Humor:** The importance of this factor has been regularly underestimated. A good sense of humor keeps the students active and interested in the teachers' class. A teacher who is dour and lacks humor doesn't contribute to the overall wellbeing of the students.
- **Understanding the Students:** Teachers should encourage students to communicate openly. There should be emphasis on cultivating a dialogue rather than a monologue. So, while solving any kind of problems in the classroom, it is always wise to hear the opinions of the students also.
- **Team Formation**: This is a good method where you can divide the classroom into small teams and ask them to solve different problems or complete assignments. This practice will increase not only the interaction among the students but also among the teacher and students.
- **Technical Skills**: It is also important that teachers should be up to date with all the latest teaching aids like computers, video conferencing and especially the use of internet. This will also help the students to keep up their interest in the learning process.

Students are the future of every nation. That is why the role of teachers is so important to the society. It is through a teacher that generations of youngsters are deeply influenced. Overall improvement in a student can be expected when communication skills for teachers is given due importance. Thus, it is important that communication skills become an important ingredient of a teacher's professional competency.

Check Your Progress - 2
Note:

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

(iii) What are the communication skills that a teacher must possess so that they interact properly with the students?

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(iv) List out different types of non-verbal communication.

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2.5. INDIVIDUALIZED INSTRUCTION

Fred S. Keller and his associate J.G Sherman R. Azzi and Carolina Bori devised Personalized System of Instruction (PSI) in 1963 to cater to the needs of a new psychology programme in a new University of Brazil. It is the pinion of serval educationists, which PSI functions as bridge between the theory and practice of individualized instruction. The components of PSI are essentially programmed instruction where the frame has been enlarged and personal social elements have been added in the teaching learning process. It is an approach to classroom instruction that is designed to change the role of a teacher from agent of information to the engineer or manager of students learning. The workability of PSI has been instruction. The research findings have shown its superiority as compared with other strategies of teaching learning.

Concept

Individualized Learning, or Individualized Instruction, is a method of teaching in which content, instructional technology, and pace of learning are based upon the abilities and interest of each learner. Individualized instruction is a teaching technique that involves teaching learners individually according to their mental and behavioral make up. Individualized Instruction is a teaching technique that every teacher that considers the interest of all his learners a priority should practice. The bottom line is that individualize instruction takes into consideration the individual differences of the learners and the teaching is according to the ability of the learners.

Individualized Instruction strategy refers to those classroom practices of teaching which recognize the uniqueness of each student learner and thus provide for adequate tutorial guidance, and other support services suited to bring about a wholesome development in the person (mind, body, and spirit). Individualized Instruction is about using teaching strategies that connect with individual student's learning strategies. The ultimate goal is to provide a learning environment that will maximize the potential for student success.

Need for Individualized Instruction

Since most of the teaching is done through lecturing, the work of the students is to listen and if felt necessary take note of them. The learning of the leaners greatly dependent on their listening habit and sense of hearing, thus helping them in enhancing their listening habit.

- Enables the teachers to explain a lesson or demonstrate a technique to small groups of students at a time. Here the smaller the number of students are the greater is the advantage of the teachers in teaching or explaining a lesson or to demonstrate a technique to their students. In short smaller the number of students, more efficient the teaching or demonstration will be.
- Individualizing instruction allows each student to progress through the curriculum at his or her own pace.
- It aims at how much the learner learn and pace at which they learn. Less important is given to covering the topics in the curriculum. Vital importance is given to the progress the learner are making in the field of learner at his or her own pace (the rate and speed at which they learn).
- Long term retention as they note down what they usually understand. While the teacher is teaching in the class, students are actively engage in taking note of what they really understand instead of what the teacher explain. They usually note down what they understand and are usually listed in their own words. So, this help them to retain the information for a longer period of time.
- Importance is given to a child as a individual not as group, class and so on: The strategy is more concern about how much a single child is able to learn, retain and his or her progress not as a group, class and team. As the current phase of children education says 'no child is left behind'. So, the focus is on a child as an individual.

Principles of Individualized Instruction

- Make the students clear about the key points and generalization to make sure that all learners gain a powerful and strong understanding so that they can have a good foundation for their future learning. Teachers are encouraged to identify essential concepts and instructional focuses to ensure all learners understand.
- Use assessment as a teaching tool to extend versus merely measure instruction. Assessment should occur before, during, and following the instructional episode. The assessment carried out before and during can be incorporated into classroom practice; it provides information needed to adjust teaching and learning while they are happening. E.g. Observation, questioning strategies, self and peer assessment, student's record keeping. The assessment carried out before and during instructional episode is called formative assessment. And the assessment evaluated after instruction is called summative assessment. It is carried out every few weeks, months, or chapter tests. E.g. End of unit or chapter tests, end of term or semester exams.
- Emphasize and stress more on critical and creative thinking while designing a lesson. Whatever task and activities that we provide to the students should be up to the student's level and understanding, so that they can understand easily and will apply meaning. Instruction may require supports, additional motivation, varied tasks, materials, or equipment for different students in the classroom.
- Engaging all learners is essential. We should engage and make the students participate in class activities. For that teachers should develop their lesson to engage and motivate the students.
- Provide a balance between teacher-assigned and student-selected tasks. If there is a balance between the task and activities that are assigned by the teachers and the tasks selected by the students, the learning will be most favorable and desirable.

Techniques of Individualized Instruction

Individualized instruction is a technique not a teaching method, just like the teaching techniques of moving from simple to complex, known to unknown and tangible to abstract. Therefore, for effective teaching to take place, it must be used efficiently and effectively in a classroom setting. The prerequisites for effective and efficient use of individualized instruction are:

- Identifying the individual differences of the pupils or children.
- Tailoring your teaching to suit the differences.

A skilled teacher should identify the individual differences of his children not only through child psychology but by studying the children and applying his book knowledge to group his children. Though the purpose of his write-up is not child study or child psychology but mention would have to be made of this branch of education to enhance effective identification of individual differences in children. Children show differences in physique such as height, weight, completion, color of hair, eyes, shape of head, ear etc. These differences, unimportant as they seem should be given much consideration in psychomotor domain training. Therefore, physical development should be given appropriate consideration when children go to the field for physical education. Jumping, running, footballing and other sporting activities depend solely on the strength of the child and his/her manipulative skills. In classroom management children should be arranged according to their height so as to ensure adequate viewing of the chalkboard, screen and teaching aids. The visual and hearing ability of pupils must be considered in the use of audio-visual instruments or aids, the physical handicap such short sightedness, long sightedness, hearing impediment speech impediments etc. A teacher should move closer to a pupil with hearing and speech impediments when asking questions a pupil with severe speech impediment should not be asked verbal questions as this will expose his weakness and makes him an object of ridicule.

Advantages of the Individualized Instruction

Individualised Instruction is a recent innovation in the field of education. A large number of research studies have been designed and conducted on this system to examine, its workability in instructional process in other countries but very few studies have been conducted in our country of the Individualised Instruction. It has tried out in all areas of education and obtained very successful results.

- The Individualised Instruction is a method or strategy of instruction. Several studies have been designed to develop efficient learning methods which may cater the individual variation of the learner.
- The Individualised Instruction help to build the students sense of competence in discipline. An important use of Individualised Instruction is that students select good study and develop good habits by continuous assignments.

- An appropriate motivation technique may be identified to involve the students in their Individualised Instruction studies have yielded that introvert learns through continuous reinforcement and extrovert through intermittent reinforcement.
- The Individualised Instruction is helpful for improving the retention power of the students. Some studies have examined the effectiveness of Individualised Instruction in terms of retention of the learnt material. These studies have found the Individualised Instruction promotes the retention. Thus, Individualised Instruction is useful in teaching factual information as well as meaningful concepts.
- The effectiveness of Individualised Instruction has been evaluated in terms of students' performance. Several studies have reported that the performance level through Individualised Instruction is found significantly higher than the lecture method. Thus, PSI is useful for raising the performance level in all disciplines. It is better method of teaching than traditional method with regard to the performance and attitude of the students.
- The method which facilitates better transfer of learning is considered to be effective. It is another criterion to examine the effectiveness of PSI. The reviews of studies have shown that PSI seems to have better transfer of learning than conventional methods of teaching. It is a method which can be used for improving the transfer of training which also results in higher performance.
- The PSI provides relationship between teacher and students. This situation helps in development desirable attitude in the learners. The development of attitudes is also one of the criterion to evaluate the effectiveness of PSI. The empirical studies have found that PSI develops the desirable attitude in the learners which also contribute in raising their level of performance.

Check Your Progress - 3
Note:

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

(v) What are the important characteristics of individualized instructional media?

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2.6. PROGRAMMED LEARNING: PRINCIPLES, TYPES, MODES OF PRESENTATION AND DEVELOPMENT

Application and Role of Teacher According to Edgar Dale, "Teaching is a broad, vague, ill-defined term and 'Instruction' is a purposeful orderly controlled sequencing of experiences to reach a specified goal." All instruction involves teaching, but not all teaching can be instruction. Programmed Instruction is a sub-head under instruction and represents a more rigorous attempt to develop a mastery over specified goals to secure "insured" learning. Programmed Instruction involves controlled, carefully specified and skillfully arranged learning experiences. They are self-instructional and self-corrective. The fundamental idea of programmed self-instructional materials was described in 1912 by Edward L. Thorndike in these words: "If by a miracle of mechanical ingenuity, a book could be so arranged that only to him who had done what was directed on page one, would page two become visible and so on, much that now requires personal instruction could be managed by print." Programmed instruction is a technique of self-instruction in which all of the instructional load is carried by teaching machines or programmed texts. Programmed Instruction is a new path towards automation and individualized instruction.

Definitions of Programmed Learning / Instruction

Smith and Moore (1962), "Programmed instruction is the process of arranging the material to be learned into a series of sequential steps, usually it moves the student from a familiar background into a complex and new set of concepts, principles and understanding."

Skinner (1954), "A Programmed Learning is the first application of laboratory technique utilized in the study of the learning process to the practical problems of education."

Gulati and Gulati (1976), "Programmed learning as popularly understood is a method of giving individualized instruction, in which the student is active and proceeds at his own pace and is provided with immediate knowledge of results. The teacher is not physically present. The programmer, while developing programmed material has to follow the laws of behaviour and validate his strategy in terms of student learning."

Principles of Programmed Learning

A good programmed learning material incorporates good principles of learning. The basic idea of programmed learning is that most efficient, pleasant and permanent learning must take place. The following are the principles on which programmed learning is based.

a) ***Principles of Small Steps*****:** A programme is made up of a large number of small, easy to take steps. A student can proceed from knowing very little about a topic to mastery of the subject by going through a programme.

b) ***Principle of Active Responding*****:** This principle rests on the assumption that a learner learns better by being active. Programming provides opportunity for learner to respond frequently. It not only presents materials to the learner but also induces sustained activity.

c) ***Principles of Immediate Confirmation*****:** The psychological phenomenon of reinforcement is the basis of this principle. Necessary of providing immediate confirmation is important from two points of view – i) the learner will not wildly guess ; ii) when the learner is not sure of the response he/she needs to be confirmed of the correctness of the response or provided with the right response.

d) ***Principle of Self-pacing:*** Programmed learning is a technique of individualised learning. It is based on another basic assumption that learning can take place better if an individual is allowed to learn at his own pace. The pupil is not forced to move with other members of the class. Some students naturally learn more rapidly or more slowly than others. In a normal classroom some students may be left behind as they are not able to keep pace with the teacher but here the learner is able to learn at his own pace. This principle controls individual difference in the process of learning.

e) ***Principle of Student Testing:*** Continuous evaluation of the learning process helps in maximising learning is another assumption on which programmed learning is based. The student leaves behind a record of his responses because he is required to write a response for each frame on a response sheet. This detailed record helps in revising the programme and also provides a feedback to the teacher about the students' progress.

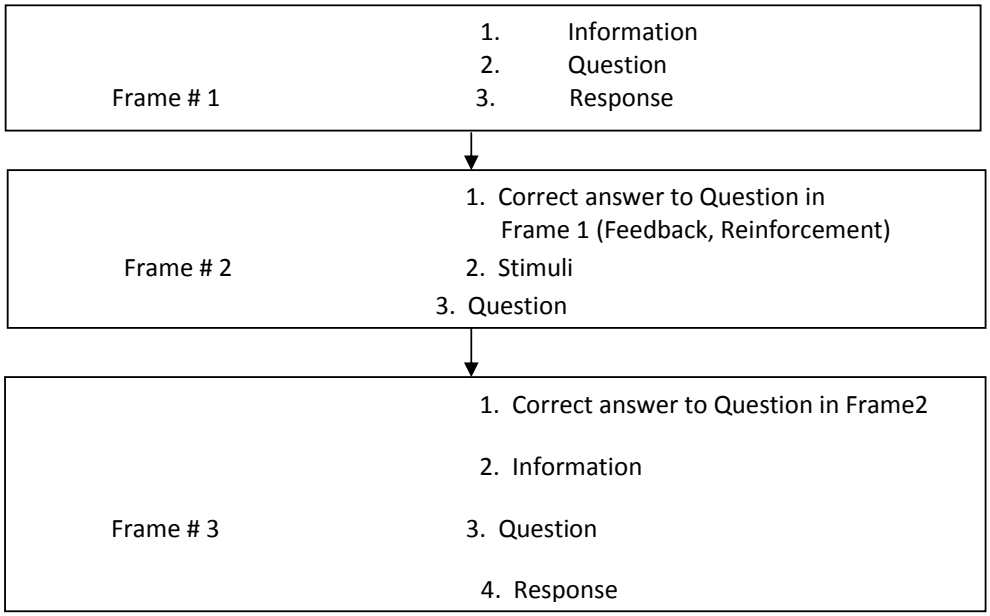
Types of Programming

In programmed learning, the presentation of the instructional material or subject matter to the learner in a suitable form is termed as programming. The three styles of programming are the following

- Linear Programming,
- Branching Programming and
- Mathetics.

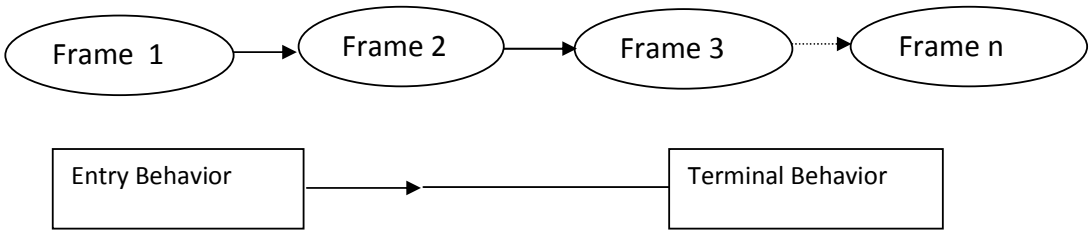
Linear or Extrinsic Programming: Skinner and his associates are the originators of the linear type of programme. This type of programming is directly related with his theory of operant conditioning and is based on the assumption that human behavior can be shaped or conditioned gradually, step by step with suitable reinforcement for each desired response. Here questions are asked directly and the leaner is required to think and write down his answer – thus the answers are referred to as 'constructed responses'. In this type of programme, every learner starts from the initial frame and ends at the terminal frame following the same sequence. Every student must go through each and every frame in a straight line fashion. Hence, it called a linear programme. But each student has the liberty to complete the programme at his own and ability.

Structure of Linear Programme



Subject matter is broken down into very small steps and each step is presented in proper sequence. The active responses of the learner are immediately reinforced in the succeeding frame. In some frames cues or prompts are provided to aid in getting correct response and to diminish errors.

Pictorial Representation of Linear Frame



Branching Programming

Branching Programme was developed by Norman. A. Crowder, hence it is also known as Crowderian Model. Crowder defines this style of programming as: "It is a programme which adapts to the needs of the students without the medium of extrinsic device as a Computer. It is called intrinsic because the learner within himself makes the decision, to adapt the instructions to his/her needs." In comparison to linear programming the frame size and amount of information give is more and is followed by multiple choice type of question. Out of the choices, only one answer is correct. If the learner chooses the correct answer, he is informed of the correctness of the answer and is motivated to proceed to the next frame along the main path of learning of the programme. If the answer is wrong the leaner is told why he/she is wrong and he /she either returns to the main line or he/she is routed back to the original frame to read along a remedial frame till he chooses the right answer.

Features of Branching Programme

- The instructional material is divided into frames. In each frame, information running into one/Two, paragraphs or even a page is provided.
- After going through the frame, the learner has to respond to a multiple-choice question. He has to discriminate among the choices provided and choose a correct response.
- The learner moves forward if he answers correctly but is diverted (branched) to remedial frames if he chooses the wrong answer.
- This cycle goes on till the learner passes through the entire material at his own pace.
- Branching programme can be produced in a teaching machine or in a book form. The book will be in the form of a scrambled text as the matter does not follow a normal sequence.

Structure of Branching Programme

Page 1	
Information	
Question	(a) …….. See page 1(a)
Responses	(b) …….See page 2

Page 2	
From Page 1	
Yes, your answer is correct. Very Good.	
Read the following Information.	
Question	(a)…… See page ….
Responses	(b) ……See page ….
	(c) ……See page …..

Page 1(a)

From Page 1

Your response is not correct.

Probably you thought like this ……

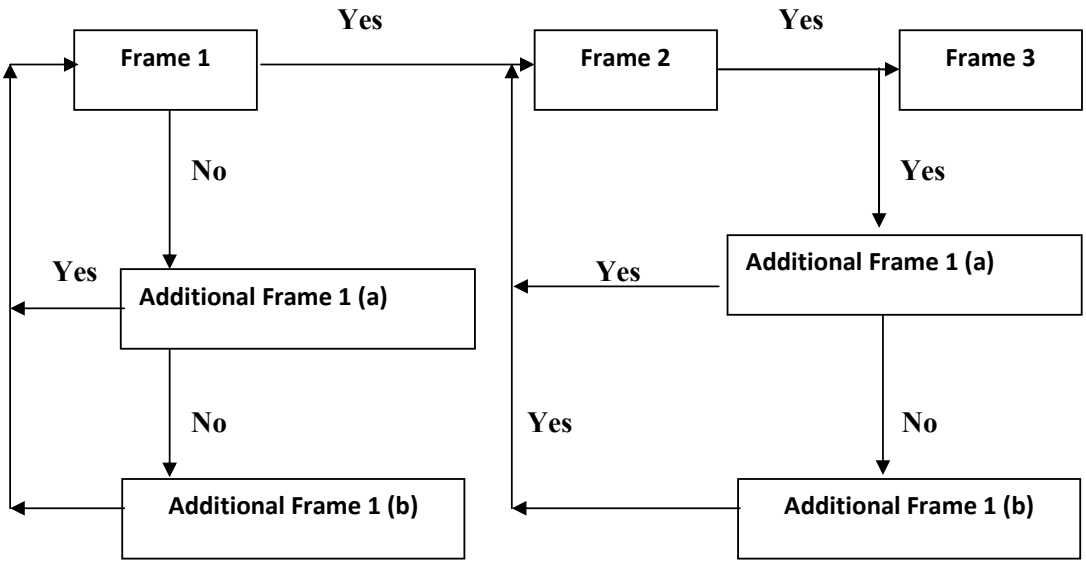
Now go back to page 1 and make another attempt to select the correct answer

Page 1 (b)

From Page 1
Did you give this answer because …….. (reason). Think again.
Go through this page and choose the answer again. You will do it right this time around.
Read the following Information.
Question Responses

(a) ……See page…
(b) ……See page….
(c) ……see page….

Pictorial Representation of Branching Programme



Mathetics Programming

Mathetics type of programming was formulated by Thomas. F. Gilbert and the term is derived from the Greek word "Mathein" means "to learn". A mathetics programme begins with an instructional plan and an analysis of what is to be taught. One of the basic concepts of mathetics is to start with the most motivating task and generally it is the last or final step in any task. Hence, the learner starts from the last task and goes backward to finally reach the introductory part.

Modes of Presentation

In the field of instructions, a computer plays a major role. In these computer assisted instructions, is interacts directly with the learners while presenting lessons. The computer delivers instructions directly to students and permits them to interact with the computer through the lessons programmed in the system. There are various instructional modes which can be facilitating by programmed instructions.

1. *Tutorial Mode:* In tutorial, information is presented in small units followed by a question. The pupils' response is analysed by the computer and appropriate feedback is given. A network of branches or pathways can be programmed to teach. The pupils are allowed to work on their own pace. The more alternative programmes available to the computers, the more adaptive the tutorial can be to individual differences.
2. *Drill or Practice:* In this mode, the programme leads the learner through a series of examples to develop dexterity and fluency in using the skill. All correct responses are reinforced. Only on achieving the mastery by the learner, the computer will proceed further.
3. *Discovery Mode:* Here, inductive approach is followed. The problems are presented and the pupil solves those problems through trial and error. It is just like laboratory learning. It aims at the deeper understanding of the results obtained from discovery. Hence, complex problems can be solved.
4. *Gaming Mode:* This mode may or may not be instructional, but it is recreational. Sometimes learning takes place through games. This mode is especially meant for young children.
5. *Simulation Mode:* Here the pupil faces scaled down approximation of real life situations. Hence, realistic practice takes place without involving any risk.
6. *Problem Solving Mode:* Problem solving can be readily achieved provided the typical computational capability of the computer is available and there is a typewriter and display response device with remote control of two-way communication. The students need to know how to communicate with computer and how to solve his problem.

Development, Application and Role of teacher in Programmed Learning

The following steps is too involved in developing programmed learning and implementing programmed learning instruction in the classroom.

- **Topic Selection:** The programmes should select the most familiar topic; otherwise he has to take the help of a subject expert.
- **Content Outline:** After topic selection, its outline may be prepared which cover all the materials, one plans, to teach. For this programme one has to refer to examine relevant books and materials.
- **Instructional Objectives:** Instructional Objectives must be formulated which involve both task description and task analysis. The former is the description of terminal behaviours which the learner is expected to achieve and the latter is the series of component behaviours that he is required to acquire in the process of achieving terminal behaviour.
- **Entry Skill:** The learner should have some pre-requisite ability and skill to understand properly the new programme. This background experience is called the entry skill and a suitable programme cannot ne prepared without proper assessment of the entry skill.
- **Presentation of the Material:** Suitable format is to be decided for presenting the material from the educational point of view. Then the programmed material should be presented in a sequence of frames arranged as steps towards terminal behaviour.
- **Student Participation:** On analysis of the terminal behaviour one will find the critical responses of the students.
- **Terminal Behaviour Test:** The effect of programme can be ascertained by administering the terminal behaviour test. It is also known as performance assessment. This provides feedback to the programme and shows the effectiveness of the instructional materials.
- **Revision:** Lastly the programme may be revised on the basis of feedback. The instructional materials may be edited and modified according to the needs and requirements of the target audience.

Programmed Learning is a self-instructional device. A rapid learner can cover the material quickly and slow learner may proceed on his own pace. It helps the learner to teach himself at any place and pace according to his convenience. The analytical thinking and self-direction of learners are also promoted through the use of programmed learning materials.

Advantages of Programmed Instruction

1. The Student is continually active when he/she is using a programme, in other methods of teaching he is active only sometimes and practically nil in a lecture.

2. Programmed instructions are individual instruction. Every student proceeds at his/her own pace. In a conventional class, the teacher attends to only children of average abilities with the consequence that the intelligent get bored and the dull have no extra help. But programme instruction helps the dull with information where it is needed and no stigma is attached to the making of mistakes. At the same time, it does not hold up the progress of a fast learner as he goes along and completes the task at his own pace of learning.
3. Immediate reinforcement helps a child to know whether his answer is right or wrong. In normal class feedback takes a long time.
4. A programme is planned and prepared much more carefully than a teacher would do for a conventional teaching programme.
5. Each programme has to prove itself it to be effective during the process of validation and must be rewritten as many times as is necessary.
6. A programme is not a human being and hence can be used at any time of the day. Programmed materials or teaching machines are never tired and never lose their temper or patience. Hence programmed materials are very useful in the field of non-formal education.

Limitations of Programmed Instruction

1. Programmed learning does not eliminate competition or grades as often claimed.
2. Later reinforcements often do not accelerate learning.
3. Programmed instruction restricted the learner's freedom of choice resulting in cramping of his imagination and initiative.
4. Operant conditioning is found successful only with some pupils, in some cases and not in all. Programmed instruction ignores or makes inadequate provisions for variables like cognitive variables, personality variables and motivational variables.
5. The teacher – pupil contract which is so vital for development of human personality and relationship is completely lost.
6. In language learning, speech is equally important as development of reading and comprehension skills. But there is no scope for proving this experience.

Check Your Progress - 4

Note:

c) Tick mark the right answer in case of question (i) (ii), and (iii)

d) Compare your answers with those given at the end of the units.

(vi) Which of the following does not serve the purpose of self-learning method?

a. To encourage students to learn on their own

b. To make instructional activity more individualized.

c. To discourage teachers from teaching in class.

d. To develop in the learner, analytical thinking self-dependence.

(vii) Which of the following is absent in programmed learning material?

E. Individualized instruction

F. Self-feedback

G. Classroom teaching

H. Small steps

(viii) Who developed the Branching Programme?

a. Skinner

b. Norman. A. Crowder

c. Piaget

d. Spearman

2.7. CHANGING ROLES OF THE LEARNER AND THE TEACHER IN ICT

There is an ongoing debate as to whether teachers are becoming redundant as a consequence of the use of ICT in education or whether a teacher-less classroom is just a myth. In fact, new education technologies do not curb the need for teachers but the call for definition of their profession. The role of teachers has changed and continues to change from being an instructor to become a constructor, facilitator, coach and creator of learning environment. By the use of ICT in the learning process, teachers are no longer following the traditional way of teaching and that is reasons why the role of teacher must change, and here are some of key reasons why this must happen:

- ICT will cause certain teaching resources to become obsolete. Localized resources such as overhead projectors and chalkboards may no longer be necessary if all learners have access to the same network resources on which the teacher is presenting information, especially if the students are not physically at the same place.

- ICT may make some assessment methods redundant. Online tests, for example provide the teacher with considerably more information than traditional.
- ICT will improve/change the education leadership, management and governance. By enhancing educational content development and supporting administrative processes in schools and other educational establishments. By supporting management and reforming administrative procedures more effectively, ICT would serve as an incentive for leaders and staff at all levels to institutionalize its use.
- In the ICT era, it is no longer sufficient for a teacher to impact content knowledge, but to encourage higher levels of cognitive skills, promote information literacy, and nurture collaborative working practices. All these are greatly facilitated by the use of ICT in teaching. However, a genuine and sophisticated integration is necessary, thus teacher training in this regard become crucial.

Teacher's Requirements in the ICT Era

Today's teachers are required to be;

- Facilitators helping learners to make judgments about the quality and validity of new source and knowledge;
- Open-minded and critical independent professionals;
- Active cooperators and collaborators; and
- Mediators between learners and what they need to know.

New Competencies

For teachers to be able to integrate the use of ICTs in teaching various skills, they need to be developed in vast array of competence such as:

- Operating computers and using basic software for word processing, spreadsheets, e-mail, etc;
- Evaluation and using computers and related ICT tools for instruction;
- Appling current instructional principles, research, and appropriate assessment practices to the use of ICTs;
- Evaluating educational software;
- Creating effective computer based presentations;
- Searching the internet for resources;
- Integrating the ICT tools into student learning activities across the curriculum;

- Creating multimedia documents to support instruction;
- Creating hypertext documents to support instruction;
- Demonstrating knowledge of ethics and equity issues related to technology; and
- Keeping up-to-date far as educational technology is concerned.

In assuming their new roles, teachers are expected to upgrade their knowledge and acquire new skill in the following areas:

Pedagogy: Teachers need new pedagogical skills so that they can take full advantage of the potential of technology to enhance student learning. The use of questioning strategies is an essential component of developing an inquiry based classroom where a structured discussion raises basic issues, probes beneath the surface of things and pursues problematic area of thought. Curriculum development Teacher need coaching on how to develop an appropriate, effective curriculum that enables students to conduct meaning, develop new knowledge, and communicate understanding.

Full integration of technology into curriculum: Teachers need strategies to meaningfully integrated technology into the curriculum. Technology must be considered as a learning tool and not merely treated as subject area in itself. In particular, teachers need long-term skills and strategies for using technology to support their curriculum, student outcomes, and student learning goals.

Staff Development: Activities that simply provide skills in using particular software applications, for instance, have shown little impact on students' classroom learning. Ultimate student success depends on teachers using technology to support sophisticated, hands-on/ minds-on multidisciplinary learning projects. These projects must be tightly linked to overall strategic goals and to contents and standards.

Therefore, teachers need a system of support at various level for integrating technolvb cogy and overcoming their isolation as they struggle with new and unfamiliar approaches to teaching and tools for learning. They also need real-time technical support in resolving problems related to hardware, software, and computer networks; problems that often interfere with or even derail the learning of both teachers and students.

Check Your Progress - 5

Note:

a) Write your answer in the space given below

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

(ix) What are the ICT requirements of the teachers in the digital era?

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2.8. INTEGRATION OF ICT IN TEACHING AND LEARNING

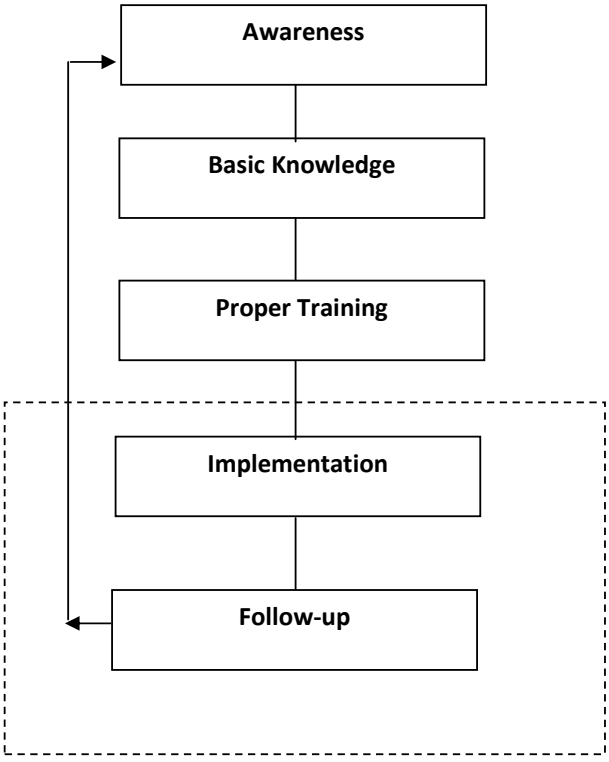
World over, educational institutions are under pressure to integrate Information and Communication Technology (ICT) with teaching, learning, evaluation, research, administrations and professional development. This increased emphasis is justified considering the knowledge, skills, and competencies required by the young generation to survive in an increasingly sophisticated technological world. Undoubtedly, ICT has brought about many challenges and opportunities for education. The educational system needs to come to terms with these new challenges and take full advantage of the opportunities. If educational institutions have to ensure that their students leave the institutions as confident individuals capable of using new technology creatively and productively then their teachers should have the competence to integrate the emerging technologies and the digital content with all their operations.

Steps to Integrate ICT

In school level, Integrating Information and Communication Technology in Teaching – Learning Process involves in the following steps:

1. *Awareness:* To instruct and creating awareness of Information and communication technology among teachers.
2. *Fundamental Knowledge:* To create and insert the basic knowledge of the modern technology those are involved in teaching and learning towards teachers. The basic knowledges are (a) Nature of Media, (b) Use of Media in teaching learning process and (c) implementing the media in teaching.

3. *Proper Training:* It is needed to give proper training to teachers about the equipment and instrument, which are utilized and involved in teaching.
4. *Implementation / Put into Practice:* After receiving the training, the teachers should implement their training in their teaching and evaluation.
5. *Follow–up Activities:* While implementing new technology, there may so many difficulties and experiments arise. These may be eradicated through sharing and consulting the expert.



Integrating ICT in School Education

ICT has been developed as a new subject in the field of education during the last few years. The term 'Education' includes teaching, learning, instruction and training. In schools, ICT has its application in the following general working areas:

- *Curriculum Construction*: In the present technological and psychological age, the application of scientific and technological knowledge is much essential for the curriculum construction. The curriculum construction has become a very tedious job in the field of education. It can be simplified with the help of educational technology.
- *Selection of Teaching* – Learning Strategies: The selection of teaching – learning strategies turns easy with the help of educational technology.

- *Selection of Audio-Visual Material*: Another important working area of educational technology is that the teacher can select easily the audio-visual aids with its assistance.
- *Determination of Educational Objectives*: The software aspect of educational technology contributes in the formulation of teaching objectives.
- *Teachers Training*: The new innovations in educational technology can be used successfully in teachers' training and it is actually being done, such as micro-teaching, stimulated teaching, system approach, classroom interaction and teaching models etc.
- *Feedback*: In the field of education, educational technology has emphasizes on feedback for evaluation. Many experiments have been carried out in the area.
- *Hardware*: One form of educational technology also occurs as hardware devices such as teaching machines, tape-recorder, television, computer and satellite. The learning in the classroom can be made effective with their use.

Opportunities of Integrating ICTs in Education

Modern universities and institutes have a mission to make teaching learning process effective and interesting. Study of use of ICTs in education, reveals the following opportunities:

A. Improved Teaching Learning Process: The traditional way of teaching learning process can be made more effective and interesting by using information and communication technologies. For example, when a teacher uses audio, video, or power point presentations in his/her lecture, the whole class becomes more attentive about the lecture. Such activities also help students to understand the things easily.

B. Increased Availability of Study Material: In traditional learning system, students and teachers are limited to get knowledge on a particular topic through printed materials only. But use of ICT facilitates them to get variety of study materials on a particular topic using internet from anywhere and anytime.

C. Support for Distance Education and E-Learning: The use of ICT supports distance education and e-learning. Each of the different ICTs - prints, audio/video cassettes, radio and TV broadcasts, computers or the Internet may be used for this purpose. There is a minor

difference between distance education and e-learning. The use of ICTs is higher in e-learning than distance learning.

D. Improved Admission and Examination Process: Using ICTs universities and institutes can improve the admission process by putting admission form online and receiving completed form online. They can also generate admit cards for entrance examination online. Even they can conduct entrance and semester/ annual examination online. This will speed up admission and examination process. It also helps in faster result declaration.

E. Help in Research Activities: Application of ICT in education enriches the research activities. Researchers can get information about recent developments in different segments, collect variety of information on a particular topic, and can generate innovative ideas and new findings. Using appropriate software we can easily calculate complex calculations and generate variety of graphs.

Challenges in Integrating ICTs in Education

While considering the opportunities associated with ICT enhanced education it can be said that ICT-enhanced education is better than a simple education, but there are many challenges, which hamper the exploration and exploitation of its opportunities. In view of integrating ICTs in education have following key challenges:

A. ICT Infrastructure: The main challenge for ICT-enhanced education, is the availability of information and communication technologies infrastructure. Before any ICT-based program is launched, policymakers and planners must ensure the availability of the followings: appropriate rooms or buildings to house the technology, computers as well as affordable Internet service for on line learning, and availability of electricity and telephony. In developing countries large areas are still without a reliable supply of electricity and the nearest telephones are miles away.

B. Language and Content: English is the dominant language of the Internet. An estimated 80 percent of online content is in English. A large proportion of the educational software produced in the world market is in English. For developing countries in the Asia-Pacific where English language proficiency is not high, especially outside metropolitan areas, this represents a serious barrier in maximizing the educational benefits of the World Wide Web. Even in countries such as Philippines, Malaysia, Singapore, and India where English is

a second language; it is desirable that teaching and learning materials, preferably be developed in the local languages.

C. Teachers with ICT Skills: Lack of teachers equipped with ICT skills is another problem for the use of ICT in education. The institutes where ICT is going to be integrated in education, first of all their teachers must be well trained about ICT tools in education. Before going to teach to students, teachers must know about how and when to use ICT tools to achieve particular purposes.

D. Change Management: Managing the change is one of the biggest problems, as teachers don't want to accept change easily. Change management issues must be addressed as new work practices, new ways of processing and performing tasks are introduced. In general a large number of teachers in educational institutes are non ICT proficient, and resistance to change. Research has shown that the strategy of adding technology to the already existing activities in institutes and in the classroom, without changing habitual teaching practices, does not produce good results in student learning. The reason for this is due to the fact that the vast majority of teachers are not proficient users of technology, especially computer technology. A number of studies have shown that most teachers consider the two main obstacles to using technology in pedagogical practices to be a lack of resources and training.

E. Leadership: Integrating ICT in education is not an easy task, as it requires a wide range of support including higher management, and teachers. Therefore it is necessary to properly convince them for their support, and for this task a leader is required. Leadership is necessary before, during and after project implementation. Before the project is initiated, leadership is needed in order to explain the model, the concept and create awareness; during the project, leadership is needed to manage change and support the project; and after the project, it is needed to pledge the required adaptability and flexibility of the initiative.

The rapid growth in ICT has brought remarkable changes in the twenty-first century, as well as affected its adoption and integration by teachers in teaching-learning process. The effective integration of technology into classroom practices poses a challenge to teachers and administrators. For successful integration of ICT into teaching-learning process, it can be concluded that the factors that positively influenced teachers and administrators, use of ICT in education include teachers attitudes, ICT competence, computer self-efficacy, teaching experience, education level, professional development, accessibility, technical support,

leadership support, pressure to use technology, government policy on ICT literacy, and technological characteristics. However, the presence of all factors increases the probability of excellent integration of ICT in teaching-learning process. Therefore, the training of teachers in the pedagogical issues should be increased if teachers are to be convinced of the value of using ICT in their teaching-learning process.

Check Your Progress - 6

Note:

a) Write your answer in the space given below

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

(x) List out the key challenges of integrating ICTs in education.

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(xi) How to integrate ICT in School education system?

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2.9. LET US SUM UP

In this unit, our main focus was on learner-centered instruction, programmed instruction and ICT in Education. In individualized instruction, instructional activity is

controlled more by the students than the teacher. In other words, the student depends more on himself for learning than on the teacher. There are various forms of self-learning, such as programmed instruction and personalized instruction. Apart from these, the student can learn the concept of knowledge acquisition, communication skill and integrating ICT in Education in this chapter. To conclude, it may be said, this unit provides you an overview of methods/techniques through which you can develop the habit of self-learning among your students.

2.10. UNIT END ACTIVITIES

1. Discuss some of the ways to develop communication skills among the students.
2. Choose a topic of your interest from the subject area you are teaching in the school. Develop programmed learning material of about 30 frames on it using linear style. Evaluate the material in terms of students' learning and students' reactions.
3. Discuss some of the practical problems do you faced when you are using ICT tools in your classroom.

2.11. CHECK YOUR PROGRESS: ANSWERS

(i) a

(ii) Eyes, Ears, Nose, Skin, Tongue

(iii) Communication skills for teachers

- Positive Motivation
- Effective Body Language
- Sense of Humor
- Encourage students
- Team Formation
- Technical Skills

(iv) Different types of non-verbal communication:

- Body Movements (*Kinesics*), for example, hand gestures or nodding or shaking the head;
- Posture, or how you stand or sit, whether your arms are crossed, and so on;
- Eye Contact, where the amount of eye contact often determines the level of trust and trustworthiness;

- Para-language, or aspects of the voice apart from speech, such as pitch, tone, and speed of speaking;
- Closeness or Personal Space (*Proxemics*), which determines the level of intimacy;
- Facial Expressions, including smiling, frowning and even blinking; and
- Physiological Changes, for example, sweating or blinking more when nervous.

(v) Characteristics of individualized instructional media:

- Individual learner interacts with the materials at his own pace
- The learner is made aware about the objectives
- The learning material is presented in small steps
- The learner is expected to be actively engaged in the process of learning
- At every step, feedback is provided to the learner about his progress.

(vi) c

(vii) c

(viii) b

(ix) Teacher's requirements to be in the ICT era

- Facilitators helping leaners to make judgments about the quality and validity of new source and knowledge;
- Open-minded and critical independent professionals;
- Active cooperators and collaborators; and
- Mediators between learners and what they need to know.

(x) Key challenges of integrating ICTs in education

- ICT Infrastructure
- Language and Content
- Teachers with ICT Skills
- Change Management
- Leadership

(xi) Integrating ICT in School education system

- Integrating ICT in Curriculum Con

- 3struction
- Integrating ICT in Teaching Learning Strategies
- Determination of Educational Objectives based on ICT integration
- ICT based training to the Teachers
- Feedback mechanism through ICT

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Unit: III - Computer Fundamentals and Applications

STRUCTURE

3.1. INTRODUCTION

Computer education forms a part of the school and college curriculum, as it is important for every individual today, to have the basic knowledge of computers. The advantages of computers in education include an efficient storage quick information processing and very importantly the dissemination of information.

Computers in education can be beneficial in several ways. They can increase the productivity of students by making tasks such as composing papers and research easier. They can make it easier for teachers to collect papers, grade them and send them back to students. Computers can also reduce the amount of paper necessary for education, since materials can be sent and viewed digitally. One of the primary roles of computers in education is to facilitate communication between students, teachers, administrators and parents.

In this unit you will study about the computer fundamentals and its educational applications. This unit creates a platform for the student teachers to know about the features and applications of MS Word, MS PowerPoint and MS Excel.

3.2. OBJECTIVES

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

- describe the characteristics and types of computers
- explain the components of Computers
- analyse the difference between hardware and software,
- express the meaning of operating systems and it types
- describe the concept of word processing
- explain the uses and application of MS Power Point
- describe various features of MS Excel and its applications.

3.3. INTRODUCTION TO COMPUTERS

Computer system is a connection of electro-mechanical devices that link together forming a system in order to perform automatic electronic data processing (EDP) using software. It can manipulate and store data for the user's retrieval. It has the capacity to manipulate data to meaningful information. This data can also be stored for later use or further manipulation. It is different from other processing machines such as punched cards, calculators etc, because it can also store instructions that will direct the machine to carry out the steps accordingly. Computer is a fast operating electronic device which automatically accepts and store input data, processes them and produces results under the direction of a detailed step by step program. Computer is an automatic electronic apparatus for making calculator or controlling operations that are expressible in numerical or logical terms.

Computer is an electronic device that computes or calculates numbers. In other words, a computer is an electronic device with the ability to

i) Accept data supplied by the user
ii) Input, store and execute instructions
iii) Perform mathematical and logical operation
iv) Give results in accordance with user's requirement

Characteristic Features of Computers

Now-a-days computer is playing a key role in everyday life and it has become the need of people just like television, telephone or other electronic devices at home. It solves the human problems very quickly as well as accurately. The important characteristics of a computer are described below:

High Speed: Computers are really very fast in their working. In a fraction of second, they can do millions of arithmetical operations. The computers present in the modern world have the speed of nano and pico second.

Accuracy: In addition to speed, computers are also accurate in their output. If the data are fed correctly to the computer, the output result will be accurate and free from errors. They are reliable and robust and they never make mistakes. If error occurs, most probably it occurs due to the user rather than the computer. There may be certain hardware mistake but with the advanced technique in hand they are overcome.

Storage Capacity: Computer has the facility to store large volume of data and other instructions and the data can also be retrieved whenever we need them. This storage capacity or computer memory is expressed in a unit called “Kilobyte”, and 1Kb equals 1024 bytes.

Repetitiveness: A computer has the ability to perform a task given to it as many times as one desires. For example, if we wish to do arithmetic computation for ten million times, the computer will do that task without any hesitation. Moreover, even the last computation will be done with the same accuracy and speed as the first one.

Versatility: Versatile means multi-skilled. Modern computer can perform different kinds of tasks one by one or simultaneously. It is the most important feature of computer. At one moment, you can play a game on computer and at the same time you can compose and send e-mails etc.

Automatism: The computer will perform the required tasks until it gets the “stop” instruction in the programme, which means that once the computer has started the process of executing a program, it will continue to work, until the programme is terminated. A computer can automatically perform operations without interfering the user during the operations. It controls automatically different devices attached with the computer. It executes automatically the program instructions one by one.

Endurance: This denotes that the computers never get tired as the humans do. If there are surplus amount of executions to be made, then each and every execution will be executed at the same time. They can perform their assigned task without taking any refreshment.

Adaptabilty: They can be used as personal computers, for home uses, for business oriented tasks, weather forecasting, space explorations, institutions, railways, banking, medicine etc.

Cost Efficiency: Computers are a short term investment in order to achieve a long term gain. Though the investment is high, they reduce the cost of each and every transaction. They reduce man power and leads to an elegant and efficient way for computing various tasks.

Communications: Today computer is mostly used to exchange messages or data through computer networks all over the world. For example the information can be received or sent through the internet with the help of computer. It is another important feature of the modern information technology.

No Feelings: Computer is an electronic machine. It has no feelings. It detects objects on the basis of instructions given to it. Computer cannot make such judgments on their own. Their judgments are totally based on instructions given to them. However, researches are being conducted on Artificial Intelligence.

Types / Classification of Computers

Computers are categorized on the basis of size, sort and performance. Generally, the larger the system, the greater is its processing speed, storage capacity, cost and ability to handle large number of devices. The various types of computers are:

- **Microcomputers:** Systems on the lower end of the size and size scale are microcomputers. They may be tiny, special purpose devices dedicated to carrying out a single task such as one inside a camera.
- **Personal Computers**: The most popular form of computer in use today is the Personal Computer, generally known as the PC. The PC can be used for various applications. It can be defined as a single user oriented and general purpose microcomputer. It can perform a diverse range of functions, from keeping track of household accounts to keeping records of the stores of a large manufacturing company.
- **Lap Top Computer:** Lately, the Palmtops and Laptops have become very popular with their power and portability.
- **Mini Computers**: Mini computers are small, general-purpose computers. They can vary in size from a small desktop model to the size of a small filing cabinet. A typical

mini system is more expensive than a PC and surpasses of PC in storage capacity and speed. While most PCs are oriented towards single users, mini systems are designed to handle the needs of multiple users, i.e., more than one person can work on a mini at the same time.

- **Mainframe Computers:** A mainframe is another form of a computer system that is generally more powerful than a typical mini. Mainframes themselves may vary widely in cost and capability. They are used in large organizations for large scale jobs. However, there is an overlap between the expensive minis and small mainframe models in terms of cost and capability.
- **Super computers**: These systems are the largest, fastest and most expensive computers in the world. These computers are owned by large organizations. They are used for complex scientific applications.

Components of Computers

Any computer has the following essential components:

i) Input Devices

ii) Central Processing Unit (CPU)

a) Arithmetic and Logic Unit
b) Control Unit
c) Memory Unit and
d) Registers

iii) Output Devices.

The following block diagram shows the fundamental components of a digital computer.

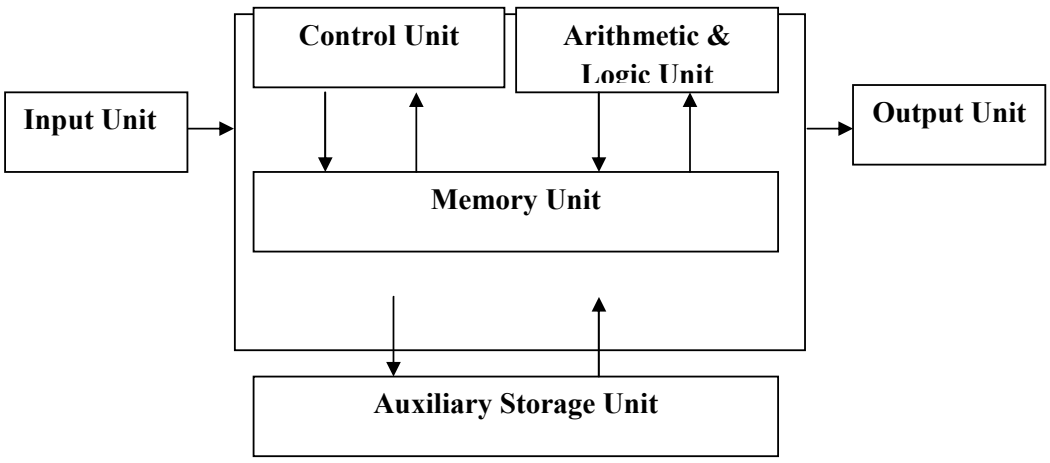

Fig 3.1: Block diagram of the Essential Components of a Computer

Input devices:

They are the tools through which one can feed the data into the computer. In other words, an input device will be the medium through which one can communicate with the computer. There are so many input devices available for a computer. The most common input devices are as follows: Keyboard; Mouse; Light Pen; Track Ball; Track Pad; Joy Stick; Touch Screen. Alternate Input Devices are as follows: Optical Mark Reading and Recognition (OMR); Optical Character Recognition (OCR); Magnetic Ink Character Recognition (MICR), Bar coding, Scanner (Flatbed Scanner, Overhead Scanner, Hand Held Scanner); Speech Input Unit and Graphics Tablet.

Central Processing Unit (CPU):

It is considered to be the heart of the computer system, which consists of a) Arithmetic and Logic Unit, b) Control Unit, c) Memory unit and d) Registers. The CPU executes the instructions as soon as the computer gets instructions from an input device.

- **Arithmetic and Logic Unit (ALU):** This unit performs a number of arithmetic operations such as, addition, subtraction etc. and also performs the logical operations.
- **Control Unit:** The Control unit controls the entire operations of all the units of a computer. It brings one instruction at a time from the memory, interprets it and obeys it by coordinating the working of all the others units. In other words, this unit is considered to be the nervous system of a computer. All the commands are regulated and controlled by this unit.
- **Memory Unit:** This unit consists of locations or cells on which the data can be stored. This unit consists of two types of memories viz., Permanent memory and secondary or auxiliary memory. A permanent memory is nothing but the semiconductor memory device available within the computer. Hard disk is an example of permanent memory device. The secondary memory is the memory which is movable and can be taken away from the computer and can be kept safely.
- **Registers:** They are used to store data and information for future application and uses.

Output Devices:

The output devices are the devices through which a computer gives the results, which can be in the form of graphs, or tables, or printed reports. The commonly available output units are i) a monitor or TV screen, also called a Visual Display Unit (VDU), (ii) a printer iii) a plotter and iv) speaker.

Check Your Progress – 1

Note:

c) Tick mark the right answer in case of question (i) (ii) and write your answer in the space given below in the question (iii)

d) Compare your answers with those given at the end of the units.

(i) In the following which is not an input device?

e. Keyboard

f. Monitor

g. Mouse

h. Touch Screen

(ii) What is the expansion of CPU?

I. Central Pass Unit

J. Centralized Permission Unit

K. Central Processing Unit

L. Country Processing Unit

(iii) Write any five characteristics of computers.

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3.4. HARDWARE

Hardware is the equipment involved in the function of a computer. Computer hardware consists of the components that can physically handle. The function s in these categories of these components is typically divided into three main categories; input, output and storage. Components in these categories connect to central processing unit (CPU), the electronic circuitry that provides the computational ability and control of the computer, via wires or circuitry called a bus. The main difference between software and hardware can be assumed of their physical appearance as hardware are tangible whereas software are intangible.

- **Input and Output Devices:** Input devices are the hardware that are used for providing information to the computer like mouse and keyboard and output devices are the hardware that are used for receiving information from computer like monitor, printer or the sound system.

- **Storage Devices:** Storage capacity is the total amount of information a computer's memory or disk can hold at any one time. A personal computer system has three basic types of memory storage devices: RAM (random access memory), disks, and magnetic tape. Capacity can be upgraded, or increased, as the user's needs grow.
- **CPU** is an electronic circuit that executes computer programs. It is responsible for carrying out arithmetic and logic functions as well as executing instructions to other components. The components of a CPU work together, and depending on how they are made, determine exactly how fast these operations can be carried out along with how complex the operations can be.
- **Computer Peripherals:** Any device that is attached to the computer is considered a peripheral. Examples include the printer, monitor, and mouse.

Software

These are the set of instructions or more generally a collection of computer programs which tell the hardware how to work and perform different tasks on a computer system. At the lowest level software is in a form of an assembly language, a set of instructions in a machine-understandable form. At the highest level, software is in a form of high-level languages, which are compiled or interpreted into machine language code. They can be further enumerated by the type of work done by programs. The three basic types are:

- **Operating System (System Software):** It controls the working of a computer system and performs essential tasks like Disk maintenance and managing screen etc.
- **Programming Software**: These are basically tools use to create, debug, maintain, or otherwise support other programs and applications.
- **Application Software**: It performs productive tasks for user such as word processing and database management etc.

Apart from these three basic types of software, there are some other well-known forms of computer software are

- **Inventory Management Software**: This type of software helps an organization in tracking its goods and materials on the basis of quality as well as quantity.
- **Utility Software**: Also known as service routine, utility software helps in the management of computer hardware and application software. It performs a small range of tasks. Disk defragmenters, systems utilities and virus scanners are some of the typical examples of utility software.

- **Data Backup and Recovery Software**: Ideal data backup and recovery software provides functionalities beyond simple copying of data files. This software often supports user needs of specifying what is to be backed up and when. Backup and recovery software preserve the original organization of files and allow an easy retrieval of the backed up data.

Generally, most of the software on computer comes in the form of programs. A program consists of instructions that tell the computer what to do, how to behave.

Computer Memory

Memory is major part of computers that categories into several types. Memory is best storage part to the computer users to save information, programs and etc, The computer memory offer several kinds of storage media some of them can store data temporarily and some them can store permanently. Memory consists of instructions and the data saved into computer through Central Processing Unit (CPU). Memory is the best essential element of a computer because computer can't perform simple tasks. The performance of computer mainly based on memory and CPU. Memory is internal storage media of computer that has several names such as majorly categorized into two types,

1. Primary Memory / Volatile Memory
2. Secondary Memory / Non Volatile Memory

Primary Memory / Volatile Memory: Primary Memory also called as volatile memory because the memory can't store the data permanently. Primary memory select any part of memory when user want to save the data in memory but that may not be store permanently on that location. It also has another name i.e. RAM.

Random Access Memory (RAM): The primary storage is referred to as random access memory (RAM) due to the random selection of memory locations. It performs both read and write operations on memory. If power failures happened in systems during memory access then you will lose your data permanently. So, RAM is volatile memory. RAM categorized into following types. DRAM, SRAM & DRDRAM.

Secondary Memory / Non Volatile Memory: Secondary memory is external and permanent memory that is useful to store the external storage media such as floppy disk, magnetic disks, magnetic tapes and etc cache devices. Secondary memory deals with following types of components.

Read Only Memory (ROM): ROM is permanent memory location that offer huge types of standards to save data. But it work with read only operation. No data lose happen whenever power failure occur during the ROM memory work in computers. ROM memory has several models such names are following.

- **PROM:** Programmable Read Only Memory (PROM) maintains large storage media but can't offer the erase features in ROM. This type of RO maintains PROM chips to write data once and read many. The programs or instructions designed in PROM can't be erased by other programs.
- **EPROM :** Erasable Programmable Read Only Memory designed for recover the problems of PROM and ROM. Users can delete the data of EPROM thorough pass on ultraviolet light and it erases chip is reprogrammed.
- **EEPROM:** Electrically Erasable Programmable Read Only Memory similar to the EPROM but it uses electrical beam for erase the data of ROM.

Maintenance of Computer / Laptop

The following are some of the computer / laptop maintenance tips:

- **Carry your laptop in a protective case or bag, free from any potentially harmful substances:** Computers should be carried in a bag with lots of padding and protection. Don't place food, drink, or other potentially hardful substances nearby or in a bag with our computer, as liquid spills on laptops are all too common and often come with a heavy price tag.
- **Always power down your laptop before moving it around, and at night:** The hard drive, where our data is stored is a series of spinning discs with a read/write head (analogous to a record player). Shutting down your computer (or putting it into Sleep or Hibernate) will also extend the life of the hardware.
- **Take care with the screen and keyboard:** The laptop's compact design means sensitive components must be stored directly below the keyboard. Avoid slamming or punching down on keys with excessive force, as this may damage the components underneath.
- **Keep the laptop on a flat surface when in use and avoid blocking air vents:** Blocking air vents will cause the computer to operate above the normal operating temperature range, which over time will decrease the lifespan of our computer. Avoid using our computer in a particularly dusty area.

- **Back up our data regularly and backup important files to multiple locations:** Hard drive failure is difficult to predict and may even occur within the first few months of computer ownership
- **Install antivirus software, keep it updated, and perform scans regularly:** Be sure to install antivirus software.
- **Set strong passwords:** Be sure to set a strong password for your username, using numbers, letters, and capitals. In Windows XP, be sure to set a strong password for the Administrator account too.
- **Update Windows/OS X regularly:** To have the best patches and security updates available, be sure to regularly update your computer.
- **Keep track of your software CD/DVDs and license keys:** Never discard the Windows, Office, or other discs that come with our computer; these can be invaluable in getting your computer running fast. Keep all official documents, receipts, and license keys for your software, which are needed if the software must be reinstalled.

Operating System

An operating system or OS is a software program that enables the computer hardware to communicate and operate with the computer software. Without a computer operating system, a computer and software programs would be useless. An operating system is the most important software that runs on a computer. It manages the computer's memory and processes, as well as all of its software and hardware. When computers were first introduced, the user interacted with them using a command line interface, which required commands. Today, almost every computer is using a Graphical User Interface (GUI) operating system that is much easier to use and operate.

Examples of computer operating systems

- Microsoft Windows 7: PC and IBM compatible operating system. Microsoft Windows is the most common and used operating system.
- Apple MacOS: Apple Mac operating system. The only Apple computer operating system is MacOS.
- Ubuntu Linux - A popular variant of Linux used with PC and IBM compatible computers.
- Google Android: An operating system used with Android compatible phones.

- iOS: Operating system used with the Apple iPhone.

DOS

MS-DOS is the most well-known operating system, the most commercialized version is that of Microsoft, christened "MS-DOS". MS-DOS was created in 1981 when it was used on an IBM PC. DOS, as with any operating system, controls computer activity. It manages operations such as data flow, display, data entry amongst other various elements that make up a system. The role of DOS is to interpret commands that the user enters via the keyboard. These commands allow the following tasks to be executed:

- file and folder management
- disk upgrades
- hardware configuration
- memory optimization
- program execution

These commands are typed after the prompt, in the case of MS-DOS (Microsoft DOS, the most well-known): the drive letter followed by a backslash, for example: A:\ or C:\.

Windows

Windows is the operating system sold by the Seattle-based company Microsoft. Microsoft, originally christened "Traf-O-Data" in 1972, was renamed "Micro-soft" in November 1975, then "Microsoft" on November 26, 1976. Microsoft entered the marketplace in August 1981 by releasing version 1.0 of the operating system Microsoft DOS (MS-DOS), a 16-bit command-line operating system. Windows has been a mainstay in the computer market for so long that it's nearly impossible to imagine life without it. As the world's most popular operating system, it enjoys huge success, but that success wasn't easily attained. Bumps along the way are what helped Windows move from an obscure operating system to the dominating power in computers it is today. Check out some of the past versions and features that paved the road to Windows 8.

Windows 1.0: The very first version of Windows, Windows 1.0 was a basic interface that used "gadgets," like the calendar and calculator, but it gained little popularity. Released in 1985, the system had basic functionality and introduced the first version of MS Paint and a primitive word processor.

Windows 2.0: Released in 1987, the next version of Windows wasn't much better than the first. While it did introduce two current staples – Excel and Word – to users, this

version came under fire when Macintosh sued Microsoft for mimicking the look and feel of their current operating system. The lawsuit was eventually dropped.

Windows 3.0: Windows' third release with virtual memory, improved graphics, and the ability to multitask helped propel Windows to sell 10 million copies. In fact, while it was released in 1990, Windows 3.0 wasn't discontinued until 2001.

Windows 3.1: A pseudo-release for Microsoft, Windows 3.1 contained necessary fixes and improved font functionality. Meanwhile, Microsoft continued to develop a new release, Windows NT, hoping it could be released as a continuation of Windows 3.0 and 3.1. Unfortunately, issues with driver support and software meant that it was time for a new version altogether.

Windows 95: Marking the change from 16-bit to 32-bit, Windows 95 was designed for increased compatibility and ultimate user-friendliness. As it became clear that consumer computers would become the future, Windows 95 was offered on newer computers only because it lacked some backwards compatibility at first. Newer releases and patches later made the version easier to use on older machines, but by 1995, Microsoft had achieved a more widespread interest in home computers.

Windows 4.0: The follow-up to Windows 3.0, Windows 4.0 was released in 1996 with minor improvements and is not considered a major Windows release.

Windows 98: As consumer computers became more widespread, Windows 98 included improved hardware and hardware drivers, Internet Explorer, and eventually, Internet connection sharing. Released in 1998, with a new release in 1999, Microsoft 98 was the first release designed specifically for consumers, as opposed to the business or technology set.

Windows 2000: Windows 2000 made everyone's lives easier by increasing the number of plug and play devices compatible with the operating system. Windows ME (Millennial Edition) was also released, offering the system recovery tool to help return a crashed computer to its last known operating settings.

Windows XP: The system designed for ease and stability, Windows XP was released in 2001, offering plenty of ease and functionality for laptop and desktop users. The operating system was designed to offer users help through a comprehensive help center, and it gave users the ability to consume a number of different types of media.

Windows Vista: Widely considered a flop in technology circles, Windows Vista was released in 2006. It had high system requirements and suffered issues with performance and security. The operating system also tended to drain laptop batteries. The version lasted only

for three years, during which some users downgraded back to XP to avoid the pitfalls of Vista.

Windows 7: For this current release of Windows, Microsoft learned its mistakes with Vista and created an operating system with speed, stability and minimal system requirements. Microsoft ditched the gadget bar from Vista, replacing it with a cleaner feel. This version was released in 2009.

Windows 8: With its redesigned metro-style user interface and Windows Store, this version is, once again, redefining what Windows is. It also comes with integrated antivirus protection, a virtual hard disk and a new platform based on HTML5 and JavaScript. It promises faster boot time, touchscreen compatibility and the ability to create a bootable USB flash drive. It may not be enough to get people to switch from Windows 7, but at least it's a glimpse into the future of the Windows operating system.

Mobile Apps for Teaching

Mobile devices integrate a series of features used in various learning environments. In some mobile learning applications currently available, mobile features are being utilized for various educational practices include the use of Short Message Services (SMS), GPS, camera, browsing, downloading, bluetooth, Wi-Fi, voice calls and gaming. Like that lot of mobile apps are using for teaching and learning process. The following are some of mobile apps are using for teaching to the teachers.

- ***ClassDojo:*** *ClassDojo is a virtual classroom app. Unlike others, ClassDojo doesn't replace the entire classroom experience but does replace the non-learning parts. Teachers can use this app to replace things like gold star charts so that parents and students can track the child's good behavior from home or on the go. There is also a messaging feature built in so everyone can stay in communication and kids can do things like create their own accounts and customize their avatars.*
- ***Edmodo:*** *Edmodo is another virtual classroom app but this one goes the whole nine yards. Using it, you can create a virtual classroom where students can post and turn in assignments, collaborate with teachers (and parents can be included too), track progress, and everyone can upload files, photos, and videos. There is also an integrated grade book so teachers can post grades and students can see them immediately. It's a great addition to the classroom experience and very powerful.*
- ***Google Classroom:*** *Google Classroom is another great alternative if you're looking for a virtual classroom on Android. Google Classroom is actually a web platform that*

recently got an Android app so teachers, students, and everyone else can access it via the web or through the app. The app lets students stay organized with what's due in class, turn in assignments, upload files, images, and video, and more. There are also communication options and Google Drive integration. The only caveat is that you will need to set up a Google Apps for Education account.

- ***Google Drive:*** *Google Drive is a great cloud-based application. As a teacher you can upload assignments and issue download links to your students so they can download course materials as their leisure. There is also the possibility of collaboration on documents, spreadsheets, and presentations so students can work together and teachers can oversee. The biggest advantage is that the app is totally free to start with. The only time it will cost you money is if you need additional storage and it's not very expensive.*
- ***Microsoft Office:*** *Microsoft Office is literally the only office suite that can compete with Google Drive on this level. Much like Google Drive, Microsoft Office consists of a cloud storage service (OneDrive) along with Word, Spreadsheet, and PowerPoint. The big draw here is that many universities, schools, and such not only use Microsoft Office on PC, but also give it away to students at the university level (Microsoft Office for Students). This allows for a consistent experience across all platforms and offers most of the benefits of Google Drive.*
- ***PBS Kids Video:*** *PBS Kids Video offers over 1000 videos from PBS that are perfectly suited for young minds learning new things. There are even some educational features build in like education goals so you can teach, they can watch, and everyone has fun. It also comes with Chromecast support so teachers who have access to HD TVs can stream it without much difficulty.*
- ***Quizlet:*** *Quizlet is a flash card app that is wildly useful for helping people learn. Teachers can create their own sets of flashcards for students or students can make their own. There are also thousands upon thousands of flash card sets made by other people that you can use. It's true that flash cards are a bit old school but they're still an effective way to learn things such as foreign languages or math.*
- ***Remind101:*** *Remind101 is a messaging service designed for teachers and students to communicate. As the name implies the main functionality of this app is to help remind students that upcoming assignments are due so students don't forget. However, it can also be used for motivational messages, hints, tips on homework, and even engage*

with parents. There are also features built in to help get a hold of people without smartphones, such as built in SMS support.

- ***TED:*** *TED is almost the same as PBS Kids Video; but it is more oriented at a more scholastically mature audience. The app features talks and lectures that cover a plethora of topics and created by experts and visionaries in that field. There are subtitles in over 90 languages and you can download talks to watch offline if you need to.*

Check Your Progress – 2

Note:

a) Tick mark the right answer in case of question (i) (ii) and write your answer in the space given below in the question (iii)

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

(iv)Which of the following is not a Primary storage Memory?

A. RAM

B. DRAM

C. ROM

D. SRAM

(v) What is the expansion of RAM?

A. Random Access Memory

B. Repeated Access Memory

C. Random Ascending Memory

D. Recruit Access Memory

(vi) What are Operating Systems?

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3.5. MS Word: Introduction

There are many software packages to do the job of word processing. Some of them work in DOS environment. Example are WordStar, Word Perfect and Professional Write. But

in these days working in WINDOWS is becoming more and more popular. So let us consider software for word processing which works in WINDOWS. Our choice is MS-WORD because it is the most popular software in these days. MS-WORD is a part of the bigger package called MS OFFICE, which can do much more than word processing. In fact when you open up MS OFFICE you will find four main components in it. They are MS-WORD (for word processing), MS EXCEL (for spreadsheet), MS ACCESS (for database management) and MS POWERPOINT (for presentation purposes). However, we will limit ourselves to MS-WORD only in this section.

MS Word is the most popular word processing software used today. A word processor is essentially a computerized version of the standard typewriter. However, the computer adds features typewriters never dreamed of having like spell check, the ability to save and store documents, copy and paste functions, the ability to add images and shapes to documents, and many more. When attached to an email, electronic documents, created by MS Word can be delivered in seconds. Another benefit is that it helps the user to type faster and more accurate.

Word Processing

Word Processor is a software package that enables you to create, edit, print and save documents for future retrieval and reference. Creating a document involves typing by using a keyboard and saving it. Editing a document involves correcting the spelling mistakes, if any, deleting or moving words sentences or paragraphs. Word processor (more formally known as document preparation system) is a computer application used for the production (including composition, editing, formatting, and possibly printing) of any sort of printable material. Word processor may also refer to a type of stand-alone office machine, popular in the 1970s and 1980s, combining the keyboard text-entry and printing functions of an electric typewriter with a dedicated processor (like a computer processor) for the editing of text. Although features and design varied between manufacturers and models, with new features added as technology advanced, word processors for several years usually featured a monochrome display and the ability to save documents on memory cards or diskettes. Later models introduced innovations such as spell-checking programs, increased formatting options, and dot-matrix printing. As the more versatile combination of a personal computer and separate printer became commonplace, most business-machine companies stopped manufacturing the word processor as a stand-alone office machine. Word processors are descended from early text formatting tools (sometimes called text justification tools, from their only real

capability). Word processing was one of the earliest applications for the personal computer in office productivity.

Features of Word Processing

Most Word Processor available today allows more than just creating and editing documents. They have wide range of other tools and functions, which are used in formatting the documents. The following are the main features of a Word Processor

- Text is typing into the computer, which allows alterations to be made easily.
- Words and sentences can be inserted, amended or deleted.
- Paragraphs or text can be copied /moved throughout the document.
- Margins and page length can be adjusted as desired.
- Spelling can be checked and modified through the spell check facility.
- Multiple document/files can be merged.
- Multiple copies of letters can be generated with different addresses through the mail-merge facility.

Parts of the MS Word Screen

Microsoft Word is a word processing program that allows for the creation of both simple and sophisticated documents. The program is equipped with templates and wizards to help you create useful documents such as resumes, letters and fax cover sheets. The following are the parts of MS word Screen

Parts	Function
Title Bar	It displays the program name, and the name of current document displayed or being edited.
Menu Bar	It contains the names of the command menus currently available.
Standard Toolbar	It contains buttons that provide shortcuts for the most commonly used Word Features, such as opening and printing document.
Formatting Toolbar	It contains buttons and drop-down lists that you use to modify the appearance of selected text.
Ruler	It shows the width of your text, as well as any indents or tabs.
Document Window	It displays the documents you create and edit.
Insertion Point	It is a blinking vertical line at the upper left corner of a new document.
End mark	It indicates the end of the document.
Scroll Bars	It is one of the main ways to navigate through a document. Appear along the right side and bottom edges of the document window. Each scroll bar contains two scroll arrows and scroll box, which you can use to move vertically and

	horizontally through a document.
Status Bar	It displays the necessary information about the active document such as page.
Minimize Button	It is used to temporary hide word (to shrink it to an icon on the taskbar).
Maximize Button	It is used to enlarge MS-Word to full screen.
Close Button	It is used to exit or quit MS-Word.

Working with a Document / Using a Document

MS-Word is used by people with widely varying levels of skill and experience, and there are often several different ways to do some tasks. Most commands are available through the Menu and sub menus. For frequently used commands, there are often iconic shortcut buttons on the Tool bars that can be selected with the mouse. For people with better keyboard skills or experience, there are keyboard shortcuts, often using the Control (CTRL), Shift (SHFT) or Alternate (ALT) keys on the PC and Command or Option keys of the Macintosh.

Creating a New Document

- Choose File and then New from the menu bar
  (This may ask you to select which document template to use for the new document.)
- Click the New Blank Document button of the tool bar
- Press CTRL + N on the keyboard. (Depress and hold CTRL, Press and release 'N')

Opening an Existing Document

- Choose File and then Open from the menu bar.
- Click the Open button on the toolbar.
- Press CTRL + O on the keyboard.

Each method will show the Open dialog box. Select the drive the file was saved on, choose the file, and click the Open button.

Saving a Document

- Select File Save from the menu bar.
- Click the Save button on the toolbar.
- Press CTRL + S on the keyboard.

Navigate to the location where you would like to save the document. Make a note of the drive where the document is saved for future reference. To save an existing open document under a different name, select 'File Save As'.

Renaming a Document

To rename an existing, but not open, Word document while using the program:

- Select File Open (or press CTRL + O on the keyboard) and find the file you want to rename.
- Right-click on the document name with the mouse and select Rename form the shortcut menu.
- Type the new name for the file and press the ENTER key.

Closing a Document

- Selecting File Close from the menu bar
- Click the close window icon if it's visible on the menu bar
- Press CTRL + W or CTRL + F4 on the keyboard.

Exiting Word

- Choose the File Exit on the menu bar.
- Click the Close button align with the title bar.
- Press ALT + F4 on the Keyboard.

Check Your Progress - 3

Note:

a) Write your answer in the space given below

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

(vii) Write any five features of Word Processing

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(viii) How to create a New MS Word Document?

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3.6. MS POWERPOINT

MS PowerPoint is the presentation software used to create slides, handouts and speaker notes. PowerPoint helps the user to prepare, update and order slide-based

presentation material quickly. Slide means one page of power point presentation. The slide size can be set to the size of transparent sheet, a 35 mm film or the actual computer screen. The slides prepared can be printed on plain paper or on transparent sheet and displayed on computer screen, multimedia projector or through film projector. PowerPoint presentation has a sequence of slides and each slide may contain objects such as text, picture, chart, table and other types of multimedia elements. Slides can have title text and body text. The title text provides title for each slide and body text consists of a series of main and sub-points referred by bullets.

Features of Power Point Presentation

PowerPoint incorporates the following features which make its superior to the other presentation methods.

Slider Transition: A transition is how PowerPoint gets from one slide to the next slide during presentation. The usual method of removing the previous slide and putting the next one is very boring. Power-Point enables the user to assign 45 different special effects to each slide transition. For example by mouse click or automatic time setting, the slides can be displayed one by one. Moreover, if any part of the slide is to be hidden temporarily, provisions are available to perform such things.

Color Schemes and Fonts: PowerPoint supports colour schemes and fonts. User can select a pre-designed color or form a new color scheme as he desires by picking from among the 16 million colors. In addition, different colors can be set for each object like Title Text, Body Text, and Background etc. PowerPoint enables the user to project individual characters in different ways. It supports all the MS Word font styles and font sizes. Using them, the user can dress up his presentation materials and make the text appear in different styles.

Auto Layout and Masters: PowerPoint has a number of Auto Layout choices of common slide making tasks. These layouts have text boxes, places to insert pictures, bullet list, formatting and so on. Auto Layout takes care of things like margin, line spacing etc. Auto Layout helps the user to design each slide effectively in an easier manner. Masters specify common design elements that the user wishes to include throughout his presentation. PowerPoint comes with a variety of predefined masters and they contain elements like backgrounds, font choices, color schemes, logos etc.

Adding Pictures: PowerPoint is well equipped to add all sorts of pictures like clip art, drawings, graphs, and charts. Power point comes with more than 1000 clip art pictures that the user can take directly add into his presentation. Common graphics operations like

moving, sizing, shading, boxing and stretching can be applied on these pictures. Other photo images and scanned images can also be included into slides if the user wants.

Adding Charts: Power point enables the user to illustrate a point with a chart (e.g. . Bar Chart, Pie Chart etc.,). The graph, which works within Power Point, helps the user to create and edit a Chart. These charts can be added into a slide by choosing the appropriate slide layouts. There are 14 basic types of chart. The chart type can be changed at any time without changing the chart data.

Drawing on Slides: Drawing is a tedious work and it consumes a lot of time. Power Point has powerful tools for drawing basic shapes such as line, circle, arc, square etc.

Equation, Word Art and other Add-ons: For mathematical work, Power point comes with an equation editor. The Word Art program of MS Word can be used from PowerPoint, which transforms an ordinary text into text arts. In addition tree like charts (hierarchical chart) and Microsoft Excel worksheets can be easily added into PowerPoint slides to make more efficient presentation.

Adding Multimedia Effects: Multimedia effects like sound, animated picture and video clips can be inserted into PowerPoint slides.

Other Common Windows Features: PowerPoint is a window application software and supports all common Windows Features like; Graphical User Interface, Keyboard and Mouse Operation, Special Character, MS Word Editing features like cut, paste, etc and Dialog Boxers and Message Boxes

Thus, PowerPoint is user friendly presentation software which helps to design presentation material beautifully even if the user is not an art designer.

Creating a Presentation

Microsoft PowerPoint is a powerful tool to create professional looking presentations and slide shows. PowerPoint allows you to construct presentations from scratch or by using the easy to use wizard.

Starting Microsoft PowerPoint

- Two Ways
    1. Double click on the Microsoft PowerPoint icon on the desktop.
    2. Click on Start --> Programs --> Microsoft PowerPoint

Creating & Opening a Presentation

After you open up Microsoft PowerPoint, a screen pops up asking if you would like to create a New Presentation or Open an Existing Presentation.

- **AutoContent Wizard**

- Creates a new presentation by prompting you for information about content, purpose, style, handouts, and output. The new presentation contains sample text that you can replace with your own information. Simply follow the directions and prompts that are given by Microsoft PowerPoint.

- **Design Template**
  - Creates a new presentation based on one of the PowerPoint design templates supplied by Microsoft. Use what is already supplied by Microsoft PowerPoint and change the information to your own.
- **Blank Presentation**
  - Creates a new, blank presentation using the default settings for text and colors.

Opening an Existing Presentation

1. Select **Open An Existing Presentation**.
2. Click on your presentation in the white box below step 1
   - If you do not see your presentation in the white box, select **More Files** and hit OK.
   - Locate you existing Presentation and hit the **Open** button

Manipulation and Presentation of Slides

- Inserting a new slide
  1. Click **Insert** at top of screen
  2. Select New Slide
- Formatting a slide background:
  1. Click **Format** at the top of the screen
  2. Select Apply Design Template
  3. Select Design you wish to apply
  4. Click Apply Button
- Inserting Clipart & Pictures

  Display the slide you want to add a picture to.
  1. Click **Insert** at the top of the screen
  2. Select **Picture**
  3. Select **Clip Art**
  4. Click the category you want
  5. Click the picture you want
  6. Click Insert Clip on the shortcut men

7. When you are finished using the Clip Gallery, click the Close button on the Clip Gallery title bar
8. Steps 1-4 are very similar when inserting other Pictures, Objects, Movies, Sounds, and Charts

Power Point Presentation as a Method of Teaching

Teacher can use the Power point Presentation is a tool, as an audio/visual aid and as a technique for promoting learning in the classroom. While planning for teaching with MS PowerPoint, should be kept in the mind the following:

(i) Selection: A Teacher can select the power point slide in the following manner

- The slide should be attractive to the students.
- The slide should be made according to the teacher and the student's interaction.
- The slide should be explaining the concept of lesson in clearly.

(ii) Preview:

- The teacher should see the slides before the presentation.
- The teacher should to know whether the students able to understand the slides.
- If the teacher has a workbook for the lesson, then he/she should read the explanation about the topic before going to the presentation.
- The teacher should see the slides before the presentation and must prepare for motivating the students.
- The teacher should give the related assignment tasks to the student before presenting the lesson.

(iii) Preparation:

- The teacher should know the audience, equipment, and presentation room.
- The teacher should give the small introduction about lesson and then start the presentation

(iv) Presentation:

- The teacher should correct the equipment (like LCD, computer) and display the picture presentation clearly.
- The teacher should interact with the student in the middle of the Presentation.
- The teacher should display the slides in the sequential order.
- If it is necessary to take the notes. The teacher should allow the students to take the notes, during presentation.

- The teacher should not simply read from the slides.

Advantages of Power point Presentation:

Power point is best suited for

- Organizing and reorganizing information efficiently so that students see the structure of a classroom teaching session.
- Providing more time for listening and comprehending so that class time is used effectively
- Illustrating concepts with pictures and other multimedia
- Merging text, graphics, sound, multimedia, offering control and visual dynamics
- Allowing the teacher easily to modify/enhance slides and lecture notes
- Allowing the teacher to face the students (rather than facing the blackboard)
- Presenting outlines of information in a sequential manner

Check Your Progress - 4

Note:

a) Write your answer in the space given below

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

(ix) Write some of the educational advantages of PowerPoint Presentation.

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(x) List out the features of MS PowerPoint

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3.7. MICROSOFT EXCEL

Microsoft had been developing Excel on the Macintosh platform for several years at this point, where it had developed into a fairly powerful system. A port of Excel to Windows 2.0 resulted in a fully functional Windows spreadsheet. The more robust Windows 3.x platforms of the early 1990s made it possible for Excel to take market share from Lotus.

Starting in the mid 1990s continuing through the present, Microsoft Excel has dominated the commercial electronic spreadsheet market.

Worksheet/ Spread Sheet

A spreadsheet is a sheet of paper that shows accounting or other data in rows and columns; a spreadsheet is also a computer application program that simulates a physical spreadsheet by capturing, displaying, and manipulating data arranged in rows and columns. The spreadsheet is one of the most popular uses of the personal computer. In a spreadsheet, spaces that hold items of data are called cells. Each cell is labeled according to its placement (for example, A1, A2, A3...) and may have an absolute or relative reference to the cells around it. A spreadsheet is generally designed to hold numerical data and short text strings. Spreadsheets usually provide the ability to portray data relationships graphically. Spreadsheets generally do not offer the ability to structure and label data items as fully as a database and usually do not offer the ability to query the database. In general, a spreadsheet is a much simpler program than a database program.

Daniel Bricklin and Bob Frankston created the first spreadsheet application, VisiCalc (for "visible calculator"). Lotus 1-2-3 came next, followed by Microsoft Excel. While Lotus 1-2-3 was the first to introduce cell names and macros, Microsoft Excel implemented a graphical user interface and the ability to point and click using a mouse. There are many other spreadsheet applications on the market today; however, Lotus 1-2-3 and Microsoft Excel continue to be the most popular.

Features of spread sheet

The following are some of the features of spread sheet

Cells: A "cell" can be thought of as a box for holding a datum. A single cell is usually referenced by its column and row. Usually rows are referenced in decimal notation starting from 1, while columns use 26-adic bijective numeration using the letters A-Z as numerals. Its physical size can usually be tailored for its content by dragging its height or width at box intersections (or for entire columns or rows by dragging the column or rows headers). An array of cells is called a "sheet" or "worksheet".

Values: A value can be entered from the computer keyboard by directly typing into the cell itself. Alternatively, a value can be based on a formula (see below), which might perform a calculation, display the current date or time, or retrieve external data such as a stock quote or a database value. The Spreadsheet Value Rule Computer scientist Alan Kay used the term value rule to summarize a spreadsheet's operation: a cell's value relies solely on the formula the user has typed into the cell.

Automatic recalculation: A standard of spreadsheets since the middle 80s, this optional feature eliminates the need to manually request the spreadsheet program to recalculate values (nowadays typically the default option unless specifically 'switched off' for large spreadsheets, usually to improve performance). Some earlier spreadsheets required a manual request to recalculate, since recalculation of large or complex spreadsheets often reduced data entry speed. Many modern spreadsheets still retain this option.

Real-time update: This feature refers to updating a cell's contents periodically when its value is derived from an external source - such as a cell in another "remote" spreadsheet. For shared, web-based spreadsheets, it applies to "immediately" updating cells that have been altered by another user. All dependent cells have to be updated also.

Locked cell: Once entered, selected cells (or the entire spreadsheet) can optionally be "locked" to prevent accidental overwriting. Typically this would apply to cells containing formulas but might be applicable to cells containing "constants" such as a kilogram/pounds conversion factor (2.20462262 to eight decimal places). Even though individual cells are marked as locked, the spreadsheet data is not protected until the feature is activated in the file preferences.

Data format: A cell or range can optionally be defined to specify how the value is displayed. The default display format is usually set by its initial content if not specifically previously set, so that for example "31/12/2007" or "31 Jan 2007" would default to the cell format of "date". Similarly adding a % sign after a numeric value would tag the cell as a percentage cell format. The cell contents are not changed by this format, only the displayed value.

Cell formatting: Depending on the capability of the spreadsheet application, each cell (like its counterpart the "style" in a word processor) can be separately formatted using the attributes of either the content (font size, color, bold or italic) or the cell (border thickness, background shading, and color). To aid the readability of a spreadsheet, cell formatting may be conditionally applied to data - for example, a negative number may be displayed in red.

Cell reference: In place of a named cell, an alternative approach is to use a cell (or grid) reference. Most cell references indicate another cell in the same spreadsheet, but a cell reference can also refer to a cell in a different sheet within the same spreadsheet, or (depending on the implementation) to a cell in another spreadsheet entirely, or to a value from a remote application. A typical cell reference in "A1" style consists of one or two case-insensitive letters to identify the column (if there are up to 256 columns: A-Z and AA-IV) followed by a row number (e.g. in the range 1-65536).

Cell ranges: Likewise, instead of using a named range of cells, a range reference can be used. Reference to a range of cells is typically of the form (A1:A6) which specifies all the cells in the range A1 through to A6. A formula such as "=SUM (A1:A6)" would add all the cells specified and put the result in the cell containing the formula itself.

Sheets: In the earliest spreadsheets, cells were a simple two-dimensional grid. Over time, the model has been expanded to include a third dimension, and in some cases a series of named grids, called sheets. The most advanced examples allow inversion and rotation operations which can slice and project the data set in various ways.

Formulas: A formula identifies the calculation needed to place the result in the cell it is contained within. A cell containing a formula therefore has two display components; the formula itself and the resulting value. The formula is normally only shown when the cell is selected by "clicking" the mouse over a particular cell; otherwise it contains the result of the calculation.

Remote spreadsheet: Whenever a reference is made to a cell or group of cells that are not located within the current physical spreadsheet file, it is considered as accessing a "remote" spreadsheet. The contents of the referenced cell may be accessed either on first reference with a manual update or more recently in the case of web based spreadsheets, as a near real time value with a specified automatic refresh interval.

Charts: Many spreadsheet applications permit charts, graphs or histograms to be generated from specified groups of cells which are dynamically re-built as cell contents change. The generated graphic component can either be embedded within the current sheet or added as a separate object.

Applications of Spread Sheet

Spreadsheets are typically used by teachers to keep track of students' performance. The most well-known spreadsheets are Microsoft's Excel, Lotus 1-2-3 and WordPerfect's Quattro. Their use goes far beyond creating simple mark sheets as spreadsheets are complex programs offering a range of powerful features, including game programming, text effects, graphing and graphics capabilities.

Budget Planning: A spreadsheet is an excellent budget planning tool, with calculation features that make keeping track of expenses and income easy, and calculating end-of-year data a breeze. Every year the administrator should plan the budget through spreadsheet. Budget planning consists of staff's salary, expenses in building construction and purchasing library books.

Charts: Spreadsheets include graphic capabilities that allow you to calculate and compile information into visual representations. This is a great way to keep track of an students passing record or any other information that needs to be tracked and calculated on a regular basis. Teacher can identify the student's level through chart application in spread sheet.

Database and Address Books: A spreadsheet can be a versatile database, keeping track of important web pages and names, numbers and addresses of students and staff contacts. It can even be used as a reference database for staffs. All the students' information is stored in spread sheet. It is very useful for communication purpose. Student's personal record also entered in to spreadsheet.

Surveys: One can use a spreadsheet to take surveys. The survey results can be easily entered and the calculation features can be used to analyze and sort the information.

Check Your Progress - 5

Note:

a. Tick mark the right answer in case of questions (i) and write your answer in the space given below in the question (ii)
b. Compare your answers with those given at the end of the units.

(xi) Who created the first spreadsheet application?

A. Daniel Bricklin and Bob Frankston
B. Charles Babbage
C. Charles Dickson
D. Vint Cerf

(xii) Write any five features of MS Excel.

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3.8. LET US SUM UP

Computers in the classroom include any digital technology used to enhance, supplement, or replace a traditional educational curriculum. As computers have become more accessible, inexpensive, and powerful, the demand for this technology has increased, leading

to more frequent use of computer resources within classes, and a decrease in the student-to-computer ratio within schools. Computers are being used actively in educational institutes to improve the learning process. Teachers can use audio video aids through computer to prepare lesson plans. They can use Microsoft Power Point to prepare electronic presentations about their lectures. These electronic presentations will be displayed on multimedia projectors in class rooms. This will be interesting and easy to learn for students. Multimedia presentations are easy to deliver for teachers too. So, as a student teacher you must know the various computer application uses in education.

3.9. UNIT-END ACTIVITIES

7. Develop two PowerPoint Presentations on topics from your subject.
8. Create bio data of staff and student of the school in which the student teacher is attached for practice teaching.
9. Prepare student progress record using MS Excel
10. Create MS Excel file for school budget and accounting.
11. Describe the features of computer and its educational uses.

3.10. ANSWERS AS CHECK YOUR PROGRESS

1. (i) B

   (ii) C

   (iii) **Characteristics of Computers**

   - *High Speed*
   - *Accuracy*
   - *Storage capacity*
   - *Repetitiveness*
   - *Versatility*
   - *Automatism*

2. (iv) C

   (v) A

   (vi) **Operating System**

   An operating system or OS is a software program that enables the computer hardware to communicate and operate with the computer software. Without a computer operating system, a computer and software programs

would be useless. An operating system is the most important software that runs on a computer. It manages the computer's memory and processes, as well as all of its software and hardware.

3. (vii) **Features of Word Processing**

- Text can be typing into the computer, which allows alterations to be made easily.
- Words and sentences can be inserted, amended or deleted.
- Paragraphs or text can be copied /moved throughout the document.
- Margins and page length can be adjusted as desired.
- Spelling can be checked and modified through the spell check facility.
- Multiple document/files can be merged.
- Multiple copies of letters can be generated with different addresses through the mail-merge facility.

(viii) **Create a New Document**

- Choose File New from the menu bar.
- (This may ask you to select which document template to use for the new document.)
- Click the New Blank Document button of the tool bar.
- Press CTRL + N on the keyboard. (Depress and hold CTRL, Press and release 'N')

4. (ix) **Advantages of Power point Presentation**

- Organizing and reorganizing information efficiently so that students see the structure of a classroom teaching session.
- Providing more time for listening and comprehending so that class time is used effectively
- Illustrating concepts with pictures and other multimedia
- Merging text, graphics, sound, multimedia, offering control and visual dynamics
- Allowing the teacher easily to modify/enhance slides and lecture notes
- Allowing the teacher to face the students (rather than facing the blackboard)

(x) **Features of Power Point Presentation**

- Slide Transition
- Color Schemes and Fonts
- Auto Layout and Masters
- Adding Pictures / Adding Charts
- Equation, Word Art and other Ornaments
- Adding Multimedia Effects

5. (xi) A

(xii) **Features of MS Excel**

- Cell formatting
- Apply formulas
- Data Format
- Creating Charts
- Cell ranges

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Unit: IV - Internet and Educational Resources

STRUCTURE

4.1. INTRODUCTION

Internet is not only an access to websites, these days there is knowledge and information on every aspect of the educational world over the Internet. The resources provided on various web pages are indeed very informative and useful for professionals and students related to every field of work. The only pre-requisite is the research over the Internet for a specific educational topic, and then this information just needs to be filtered to gain the basic knowledge of what you are looking for. Therefore, these are true internet resources which deal with every individual's educational needs. Internet has also provided the opportunity to study online in the context of e-learning, m-learning and virtual learning. There are virtual universities set up, in which the students can take classes siting on the computer seat opening the university's website video section according the topic, and then study at home. This unit creates an opportunity to the learners to learn the concept of Internet and its educational uses.

In this unit, we will discuss Internet, E-mail, Search Engines, Info-Savvy Skills, Digital Age Skills, Safe Surfing Mode and Internet resources for different disciplines like natural sciences, social sciences, Humanities, and Mathematics. And also this unit describes the concept of E-learning, Mobile-learning, On-line learning, Virtual classroom, Smart Classroom, Wikipedia, Massive Open Online Courses (MOOCs) and Social networking.

4.2. LEARNING OUTCOMES

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

- explain the basics of Internet, E-mail and Search Engines
- discuss the concept of Info-Savvy Skills, Digital Age Skills and Safe Surfing
- identify and use the Internet resources for different disciplines
- describe the concept of e-learning: Mobile-learning and On-line learning
- explain the meaning of Virtual classroom and Smart Classroom,
- identify the uses of Wikipedia in education
- recognize the importance of Massive Open Online Courses (MOOCs)
- describe the educational uses of Social networking sites

4.3. INTRODUCTION TO INTERNET

Internet is the world's largest computer network, the network of networks, scattered all over the world. It was created nearly twenty-five years ago as a project for the U.S Department of Defense. The Internet is a global network of computers that allows many millions of computer users to share and exchange information. Internet is a rich source of information. Many thousands of computers are linked to the Internet, hold vast quantities of data that you can access from your personal computers whenever you want. Teachers, students, businessmen, doctors, engineers, scientist etc. can get recent data from internet which makes their knowledge up-to-date. Accessing the information through internet is much faster. Information can be downloaded into the computer and print out can be taken.

Origin and Development of the Internet

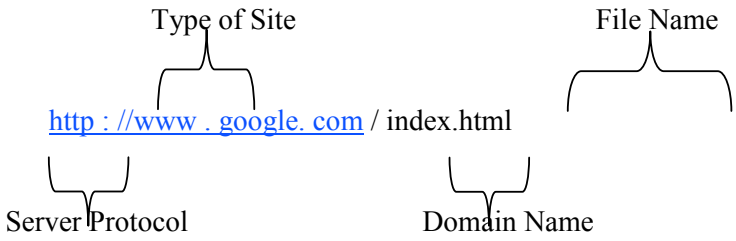
1957	ARPA was formed
1969	ARPANET was commissioned for research into computer networking.
1971	E- mail and e-mail utility became available
1973	First international connections to ARPANET. University College of London and Royal Radar Establishment, Norway.
1974	Telnet
1975	Operational management of the internet transferred to DCA (DISA).
1979	USENET; ARPA established the internet Configuration Control Board (ICCB).
1982	TCP/IP suite declared as standard of Department of Defense.
1983	MILNET separated from ARPANET.
1984	Domain Name System introduced; number of hosts exceeds 1000.

1985	Domain name registration system introduced
1986	NSFNET was established; IETF and IRTF came into existence under the IAB.
1988	Internet Relay Chat developed.
1989	Number of hosts exceeds 100,000.
1990	ARPANET ceases to exist; Dial up internet connections by ILSPs
1991	WAIS, Gopher and World Wide Web.
1992	Internet Society is chartered; Number of hosts breaks 1,000,000 Veronica released.
1993	Business and media take note of the internet; Mosaic takes the internet by storm.
1994	ARPANET /internet celebrates 25th anniversary; shopping malls on the internet.
1995	NEFNET reverts back to research network Main US back bone traffic re-routed through interconnected network providers. Search engines developed.
1996	Government restrictions on the internet use around world.

World Wide Web (WWW)

Many people believe that both internet and World Wide Web (WWW) are same. But, actually it is not true. WWW is a type of service in the internet. i.e., Internet is the backbone of communication systems whereas WWW is a type of service that uses communication systems. A Web is a collection of Web sites and the Internet is a network of networks. WWW is nothing but the collection of Web sites on the Internet and the sites are all linked together somewhat like the strands of a spider web. The World Wide Web is often abbreviated as the Web or WWW of W3. WWW was created in 1989 by the Tim Berneis Lee at the European laboratory for particle physics (CERN) in GENEVA, Switzerland to enable the document communication between the physics researches and to create a network between them, physics researches created hypertext documents as their documentation standards. The WWW contains huge amount of information which a user can access using a browser such as Internet explorer or Netscape Navigator. The documents accessed are in the form of web pages. Web pages may contain text, graphics, icons animation, sounds and video – multimedia capabilities and are usually user – friendly.

- **Website:** A Web site is a collection of interconnected Web pages. Usually there is a main or home page which provides link to the other pages and vice versa. Each page (document) has its unique URL.
- **Uniform Resource Locator (URL):** The originator Berners-Lee invented a coding system that uses a string of characters called a Universal Resource Locator (URL) that identities the name and address of each document on the Web. The URL consists of four major parts: For example:



  - ✓ Server Protocol: Web documents use the Hypertext Transfer Protocol (HTTP)
  - ✓ Type of site: For example, WWW for World Wide Web, FTP for file Transfer Protocol.
  - ✓ Domain address: The address of the host computer consisting of the name of the main server or site, the sub domain (organisation, network etc.), and the domain name (a two – or three – letter) designation indicating the type of organisation etc. (see below for more clarification)).
  - ✓ Folder or Filename: The folder (subfolders etc.) or/and the name of the file or document accessed.
- **Web Language:** HTML (Hyper Text Markup Language) has become as the standard Markup Language or information publishing.
- **Web pages:** A webpage is a HTML document that is stored in a web server and that has an URL so that it can be accessed via the web. It is a single unit of information often called a document. It consists of text, images, background and colour effects, links, java applets, vbscripts etc.
- **Home Page:** A home page is the front door of the web site. When the web user is typing a website name in the browser, the homepage will be displayed first.
- **Web Browsers:** A Web Browser is a software tool that computers use to communicate with web servers on the internet. Web browsers enable to download and display the web pages that user requests. A Web Browser should be capable of understate HTML and display text. Now Web Browser supports pictures, video, sound and even 3D

images. In the address bar of the browser, type the URL and it will display the web pages. The famous browsers available are

- ✓ **Microsoft Internet Explorer (IE):** This browser is shipped freely with almost all products of Microsoft and is tightly coupled with the operating system. It comes with outlook express, an e-mail client for downloading the e-mail messages from the server to the local machine.
- ✓ **Netscape Navigator:** Netscape offers a close competition to Microsoft and it offers a better support to display java applets than IE. Netscape also offers the email client besides other functionalities like HTML editor and calendar.
- ✓ **Others:** Opera, Konqueror and Mosaic are some of the other popular browsers in the market.

E-mail

Electronic mail (also known as email or e-mail) is one of the most commonly used services on the Internet, allowing people to send messages to one or more recipients. Email was invented by Ray Tomlinson in 1972. Email (electronic mail) is a way to send and receive messages across the Internet. Email (electronic mail) is one of the great inventions of our times. It has changed the way we communicate. Millions of people all over the world uses this method of communication every day, and the number keeps growing. Communicating by email is cheap (costs next to nothing) and fast (in a matter of seconds or minutes), compared with conventional mail (letters) that needs stamps (can cost a substantial sum), and takes days or weeks to reach. E -mail is flexible in that it does not depend very much on the type of computer or program you use. We can send and receive text, document files, image files, audio files- in fact, any file at all. One big advantage is, unlike using the telephone, the recipient does not have to be present when a message is sent to them. They can read incoming mail and reply (if necessary) at their own time.

Parts of an Email Address

The following are three major parts of an e-mail address:

- **Username:** The first part of an email address is the username. This is the unique name that you or your ISP select. This can be your real name or a nickname. The username must be unique. No two people or organizations can have the same username with the same provider.
- **@Symbol:** An "at" or "@" symbol is the second part of an email address. This fits in between the username and the domain of your email address. When you insert the

symbol, your email program recognizes the character and sends the email to the domain name that follows it.

- **Domain:** The last part of an email address is the domain, which can be broken down into two portions: the mail server and the top-level domain. The mail server is the server hosting the email account. For example, Gmail email accounts use “gmail” as the server name. The top-level domain is the extension such as .com, .net or .info. Emails from educational institutions often have the .edu extension, while employees of a government agency use a .gov extension.

Parts of an email message

An email message consists of the following general components:

- **Headers:** The message headers contain information concerning the sender and recipients. The exact content of mail headers can vary depending on the email system that generated the message. Generally, headers contain the following information:
- **Subject:** Subject is a description of the topic of the message and displays in most email systems that list email messages individually. A subject line could be something like "2010 company mission statement" or, if your spam filtering application is too lenient, "Lose weight fast!!! Ask me how."
- **Sender (From):** This is the sender's Internet email address. It is usually presumed to be the same as the Reply-to address, unless a different one is provided.
- **Date and time received (On)**: The date and time the message was received.
- **Reply-to:** This is the Internet email address that will become the recipient of your reply if you click the Reply button.
- **Recipient (To):** First/last name of email recipient, as configured by the sender.
- **Recipient email address:** The Internet mail address of the recipient, or where the message was actually sent.
- **Attachments:** Files that are attached to the message.

Body: The body of a message contains text that is the actual content. The message body also may include signatures or automatically generated text that is inserted by the sender's email system.

Email advantages:

The following are some of the advantages of electronic mail:

- **Productivity tools**: Email is usually packaged with a calendar, address book, instant messaging and more for convenience and productivity.
- **Access to web services:** If you want to sign up for account like Facebook, or order products from services like Amazon, you will need an email address so you can be safely identified and contacted.
- **Easy mail management:** Email service providers have tools that allow you to file, label, prioritize, find, group, and filter your emails for easy management. You can even easily control spam, or junk email.
- **Private:** Your email is delivered to your own personal and private account with a password required to access and view emails.
- **Communicate with multiple people:** You can send an email to multiple people at once, giving you the option to include as few as or as many people as you want in a conversation.
- **Access anywhere at any time:** You don't have to be at home to get your mail. You can access it from any computer or mobile device that has an Internet connection.

Search Engines

Search engine is a web software program or web based script available over the Internet that searches documents and files for keywords and returns the list of results containing those keywords. Search engines are programs that search documents for specified keywords and returns a list of the documents where the keywords were found. A search engine is really a general class of programs, however, the term is often used to specifically describe systems like Google, Bing and Yahoo Search that enable users to search for documents on the World Wide Web. Today, there are numbers of different search engines available on the Internet, each with their own techniques and specialties. Search Engine Optimization is a technique to improve visibility of a website in search engine.

Typically, Web search engines work by sending out a spider to fetch as many documents as possible. Another program, called an indexer, then reads these documents and creates an index based on the words contained in each document. Each search engine uses a proprietary algorithm to create its indices such that, ideally, only meaningful results are returned for each query.

Classification of Search Engines:

Search Engines are divided into following types:

- **Full Text Search Engine:** Full Text Search Engine retrieves information from internet, establish database and retrieve the records according to user's query. It can be divided into two parts: first one has its own crawler. Another one is to hire other search engine's database.
- **Directory Search Engine:** We cannot call it a true search engine. It retrieves all the entries of directory listing.
- **META Search Engine:** It provides search results from multiple search engines simultaneously according to user's query.
- **Vertical Search Engine:** Vertical Search Engine focuses on specific search field and search demand.

Search Engine is really useful tool in present era of web. There are many of search engines available in market, but most popular search engine is Google. So for getting topmost results in web, we have to use search engine optimization technique. Both on page and off page search engine optimization techniques are important for better search result.

Check Your Progress - 1

Note:

e) Tick mark the right answer in case of question (i) (ii), and (iii)

f) Compare your answers with those given at the end of the units.

(i) In Internet terminology IP means

i. Internet Provider
j. Internet Protocol
k. Internet Procedure
l. Internet Processor

(ii) What is the full form of WWW in Web address?

M. World Wide Web
N. World Wide Word
O. World Wide Wood
P. None of these

(iii) Which of the following is not a Search Engine?

e. Bing
f. Google
g. Yahoo
h. Windows

4.4. INFO-SAVVY SKILLS

Information literacy or Info-savvy is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information." Information literacy also is increasingly important in the contemporary environment of rapid technological change and proliferating information resources. Because of the escalating complexity of this environment, individuals are faced with diverse, abundant information choices in their academic studies, in the workplace, and in their personal lives. Information is available through libraries, community resources, special interest organizations, media, and the Internet and increasingly, information comes to individuals in unfiltered formats, raising questions about its authenticity, validity, and reliability. In addition, information is available through multiple media, including graphical, aural, and textual, and these pose new challenges for individuals in evaluating and understanding it. The uncertain quality and expanding quantity of information pose large challenges for society. The sheer abundance of information will not in itself create a more informed citizenry without a complementary cluster of abilities necessary to use information effectively.

Information literacy forms the basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning. An information literate individual is able to:

- Determine the extent of information needed
- Access the needed information effectively and efficiently
- Evaluate information and its sources critically
- Incorporate selected information into one's knowledge base
- Use information effectively to accomplish a specific purpose
- Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally

The purpose of Info-Savvy is to help teacher systematically provide information literacy experiences for students at all grade levels and in all subject areas. The key process that Info-Savvy uses for any information-processing task is known as the five aspects (5A's) of Information Literacy, and this is at the heart of how to become Info-Savvy. There are five basic steps that can be used to solve any information need:

- Asking (Key questions to be answered)
- Accessing (relevant information)
- Analyzing (the acquired information)
- Applying (the information to a task)
- Assessing (the end result and the process)

The 5As of the Info-Savvy model are as follows:

- **Asking:** Asking required the ability to clearly define the problem and its context in terms of questions. Crucial asking skills include: understanding the problem to be solved, identifying key words and forming questions around them, brain storming, thinking laterally, understanding ethical issues, listening deeply, filtering information, sharing personal knowledge and experience.
- **Accessing:** Accessing is the wild card of the information cycle because at this stage, the path ways to be followed are totally speculative. One thing tends to lead to another, which means that just about anything can happen. Crucial accessing skills include: determining where the information is, determine what skills are needs to find it, using a variety of paper and electronic sources, prioritizing searching strategies, skimming, scanning and scouring resources for pertinent data.
- **Analyzing:** The analyzing stage is not a linear process as it may require him to repeatedly revisit his original questions and to access additional data to address the information need more precisely. Crucial analyzing skills include; organizing and summarizing data from a variety of sources, checking data for relevance, listing and distinguisng between good, bad, differentially fact from opinion, revisiting the asking or accessing stages to fill in the blanks, using probability, trends and best guesses to seek out additional data as needed.
- **Applying:** At the application stage, uses the data that have been accessed, analyzed and turned into knowledge to take action. In the info-savvy context, this knowledge would be used to solve a problem, write an essay, develop a report, create a graph, complete an argument, make a presentation or do whatever else needed to be done. In this stage where products are created, actions are taken, problems are solved, or information needs are satisfied. Crucial applying skills include: identifying an appropriate format for presenting the information and applying the format to present the information or solution to the problem.

- **Assessing:** The assessing stage is the reflective, soul-searching part of the process. Crucial assessing skills include: asking questions about the process used and the information obtained, reflecting critically on the process, acting on these reflections, internalizing net learning and transferring the learning to other situations.

Digital Age Skills

The digital age, also called the information age, is defined as the time period starting in the 1970s with the introduction of the personal computer with subsequent technology introduced providing the ability to transfer information freely and quickly. The Information Age (also known as the Computer Age, Digital Age, or New Media Age) is a period in human history characterized by the shift from traditional industry that the Industrial Revolution brought through industrialization, to an economy based on information computerization. The Information Age formed by capitalizing on computer microminiaturization advances. This evolution of technology in daily life and social organization has led to the fact that the modernization of information and communication processes has become the driving force of social evolution.

The skills required in a digital age / knowledge society include the following:

- **Communications skills:** as well as the traditional communication skills of reading, speaking and writing coherently and clearly, we need to add social media communication skills. These might include the ability to create a short YouTube video to capture the demonstration of a process or to make a sales pitch, the ability to reach out through the Internet to a wide community of people with one's ideas, to receive and incorporate feedback, to share information appropriately, and to identify trends and ideas from elsewhere;
- **The ability to learn independently:** this means taking responsibility for working out what you need to know, and where to find that knowledge. This is an ongoing process in knowledge-based work, because the knowledge base is constantly changing.
- **Ethics and responsibility:** this is required to build trust (particularly important in informal social networks), but also because generally it is good business in a world where there are many different players, and a greater degree of reliance on others to accomplish one's own goals;
- **Teamwork and flexibility:** although many knowledge workers work independently or in very small companies, they depend heavily on collaboration and the sharing of knowledge with others in related but independent organizations. The 'pooling' of

collective knowledge, problem-solving and implementation requires good teamwork and flexibility in taking on tasks or solving problems that may be outside a narrow job definition but necessary for success;

- **Thinking skills (critical thinking, problem-solving, creativity, originality, strategizing):** of all the skills needed in a knowledge-based society, these are some of the most important. Universities in particular have always prided themselves on teaching such intellectual skills, but the move to larger classes and more information transmission, especially at the undergraduate level, challenges this assumption. Also, it is not just in the higher management positions that these skills are required.
- **Digital skills:** most knowledge-based activities depend heavily on the use of technology. However the key issue is that these skills need to be embedded within the knowledge domain in which the activity takes place. Thus the use of digital technology needs to be integrated with and evaluated through the knowledge-base of the subject area;
- **Knowledge management:** this is perhaps the most over-arching of all the skills. Knowledge is not only rapidly changing with new research, new developments, and rapid dissemination of ideas and practices over the Internet, but the sources of information are increasing, with a great deal of variability in the reliability or validity of the information. The key skill in a knowledge-based society is knowledge management: how to find, evaluate, analyze, apply and disseminate information, within a particular context. This is a skill that graduates will need to employ long after graduation.

Safe Surfing

Every day people lose millions of files, programs, and documents because of weak and inadequate Internet security practices. The Web is full of malicious programs and software that can wreak havoc on your computer's file systems. Viruses and malware can result in everything from annoying pop-up ads to threats that can wipe out your entire operating system. Some malicious software programs can even get a hold of sensitive information like credit card numbers, passwords, and other personal information. The Internet can be a confusing and dangerous place. Without a safety net, many people can fall into the danger zones of pornography, predators, online scams, Internet viruses, and spyware. With such free access to the Internet around the world, many have abused it as an opportunity to take advantage of others.

Safe Browsing Practices

- Visit only trusted sites with valid security certificates.
- Avoid pornographic websites. Pornographic sites on the Internet are hotspots for dangerous malware, such as pop-up ads and security threats.
- Be very careful when asked to supply personal information, such as credit card account numbers. You may be the next victim of Internet scams and cyber-theft if you oblige.
- Clear your browser cache every now and then to free up precious hard drive space.
- Be mindful when using download managers. They may seem to make downloading files easier and faster, but they can also download malware in the background.
- Peer-to-peer downloaders are convenient ways to exchange files over the Internet, especially music and audio files. Aside from the legal implications of using peer-to-peer file sharing (like piracy and copyright infringement), some shared files may contain dangerous viruses.

Safe Browsing on Public or Shared Computers

- Never disclose your password to anyone for important or private Internet accounts.
- Always remember to log out of important accounts such as e-mail, forums, personal blogs, or social networking sites. Remaining logged on to your computer could allow other users access to your accounts, the ability to alter your passwords or transact business without your permission.
- Be vigilant when using a USB-powered thumb drive, flash drive, or other removable writable media. Viruses and malware may copy themselves into the drive. Other computers with which you use these types of media may also become compromised. A good, although not foolproof way to prevent viruses and malware from copying themselves onto your USB removable media, is to lock the read-write option.
- If you are unsure of the level of security of a public computer, do not use or insert any removable writable media on the computer.

Check Your Progress - 2

Note:

a) Write your answer in the space given below

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

(iv) What are the skills required for a digital age learners in the technological era?

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(v) List out the five aspects (5As) of Info-Savvy model.

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4.5. INTERNET RESOURCES FOR DIFFERENT DISCIPLINES

The use of Internet in schools is being increasingly promoted through initiatives to improve technology infrastructure and access and an emphasis on integrating internet resources into the curriculum. The internet is one of the most powerful resources available to the classroom teaching. The following are some of the excellent free internet resources of teacher and students in teaching and learning practice.

Natural Sciences

The following are some of the internet resources for the Science Subjects.

- **Learning Science:** Learning Science is a free and open community for sharing newer and emerging tools to teach science.
- **Science Fair Central:** This is a good science resource from Discovery Education and it offers free links, interactives, presentations, projects and many more.
- **National Science Teacher Association (NSTA):** This is a platform designed by science teachers where they provide free science resources such as PDFs, freebies, news, activities, and more. You can also browse resources by age category.
- **National Science Digital Library (NSDL):** NSDL is the nation's online portal for education and research on learning in Science, Technology, Engineering, and Mathematics.

- **Science Printables:** This web portal has a bucketful of science printable that teachers and students can have free access to. These printable are organized under different headings and titles.
- **The Case Files:** This one here highlights individuals from the history of science and technology. Each thematic group of Files presented at left begins with commentary from a distinguished historian of the discipline.
- **Understanding Science:** Understanding Science offers everything one needs to know about the nature and process of science. It is packed full with free resources.
- **42 Explore:** 42 Explore is a great search engine specifically honed to provide search results pertaining to Science, Maths, Health, etc. Just click on the category you want to search and there you go.
- **The Field Book Project:** The Field Book Project's overall mission is to create one online location for scholars and others to visit when searching for field books and other field research materials.
- **Periodic Videos:** These are short videos annexed to the tables charting the chemical elements. These videos are created by video journalist Brady Haran, featuring real working chemists from University of Nottingham.
- **24/7 Science:** 24/7 Science provides great projects, activities, games and many other science resources.
- **Science Daily:** Science Daily provides the recent and latest research news in the field of Science.

Social Science

The following are some of the excellent free social science resources of teacher and students.

- **National Council for the Social Studies:** This is a great website for teachers and students. It provides free resources relating to everything about social studies.
- **World History:** World History is a powerful, innovative model curriculum for teaching world history in middle and high schools.
- **PBS Teachers Social Studies:** This is a web page that has great links to social studies resources organized into grade-subject categories.
- **Social Studies Theme Units:** This is a section provided by Edhelper and which offers great activities and projects all geared towards a better understanding of this subject area.

- **EDSITEment:** Here, one can explore the library of humanities lesson plans by subject, theme, and grade level. Find Art and Culture lessons on anthropology, art history, folklore, mythology, religion, and more.
- **Smithsonian Education:** Smithsonian offers great resources on Art and culture, history and travel, science. From interactive Idealabs to homework help and many more.
- **Lesson Plans for Social Studies:** Marty Levine has gathered lesson plans and resources from the Internet which social studies teachers will find useful.
- **Outreach World:** Outreach World is an online community of educators dedicated to showcasing the achievements of its members and strengthening vital links across the education spectrum, and between the United States and the world.
- **Documentary Websites for Teachers:** This is a collection of free websites that provides documentaries on a variety of different topics.
- **Timelines:** This is a set of free tools for teachers to create awesome timelines.

Mathematics

The following are some of the internet resources for the Mathematics Subject.

- **Aplus Math:** Aplus Math provides Interactive math resources for teachers, parents, and students featuring free math worksheets, math games, math flashcards, and more. **Math TV:** Math TV is a platform that features a wide range of math videos covering a plethora of mathematical concepts. These videos are browsable via topic or by textbook.
- **AAA Math:** AAA Math offers thousands of arithmetic lessons from kindergarten to eighth grade. Unlimited practice is also available on each topic which allows thorough mastery of the concepts.
- **Math's Fun:** This philosophy behind this website is to make math learning fun and enjoyable. It features a myriad of lessons and activities provided by teachers and math community from all around the world.
- **Math Central:** Math Central is an Internet service for mathematics students and teachers. This site is maintained by faculty and students in Mathematics and Statistics and Mathematics Education at the University of Regina in Canada.
- **Ten Marks:** TenMarks provides students with access to hints and video lessons on every problem, so if they can't recall something, or didn't quite get the topic when it was covered in class, they can quickly review the content, and move forward.

- **Maths Frame:** Mathsframe has more than 170 free interactive maths games. All resources are designed, by an experienced KS2 teacher, to help children to visualise numbers, patterns and numerical relationships and to develop their mathematical thinking. New games are added most weeks.
- **The Math Forum:** This is a community of teachers, mathematicians, researchers, students, and parents using the power of the Web to learn math and improve math education. The forum offers a wealth of problems and puzzles; online mentoring; research; team problem solving; collaborations; and professional development. Students have fun and learn a lot. Educators share ideas and acquire new skills.
- **Simpsons math:** The Simpsons math contains over a hundred instances of mathematics ranging from arithmetic to geometry to calculus, many designed to expose and poke fun at innumeracy.
- **Math Words:** This is an interactive math dictionary with enough math words, math terms, math formulas, pictures, diagrams, tables, and examples to satisfy your inner math geek.
- **Math Guide:** MATH guide offers a variety of mathematics lessons. Numerous lessons in algebra, geometry, and pre-calculus are available. One can also utilize an assessment resource, called quizmasters.
- **Math League:** Mathleague.org offers a number of services focused on enhancing the quality and quantity of competitive mathematical opportunities available to students everywhere. We offer a variety of programs for students in grades 3-12.
- **Math Drills:** Math-Drills has thousands of Free Math Worksheets for teachers and parents on a variety of math topics.
- **Math Goodies:** Math Goodies is your free math help portal featuring interactive lessons, worksheets, and homework help.
- **Math Aids:** Math-Aids is a free resource for teachers, parents, students, and home schoolers. The math worksheets are randomly and dynamically generated by our math worksheet generators. This allows you to make an unlimited number of printable math worksheets to your specifications instantly.

Humanities

The Internet is teeming with scholarly information about the humanities but we're bringing the best to you in this easy directory. The following are some of excellent resources of humanities subject area.

Literature:

- **Bartleby**: Based upon the Herman Melville classic Bartleby, the Scrivener, Bartleby publishes free classics of literature, non-fiction, and reference.
- **Luminarium**: A great starting point for students and English literary enthusiasts, Luminarium is a great source and directory of English literature from the Medieval period to the Restoration.
- **Oxford Literary Review**: Based on Britainâ€™s longest-running journal of literary theory, Oxford Literary Review Online is concerned with innovative contemporary thinking and criticism of old and new works.

Politics & Political Science:

- **International Crisis Group:** Politically activist and aware, International Crisis Group is teeming with current news and issues concerning politics around the globe.
- **Political Resources on the Net:** With the fun, colorful interactive map, Political Resources on the Net organizes political sites from the continent to specific countries and states.

Anthropology:

- **The American Folk life Center**: Search the collection of archives of over three million photographs, recordings, and moving images of traditional culture around the world.
- **Anthro.Net Research Engine**: From general inquiries into anthropology to an advanced search engine for top websites and works of literature, Anthro.net will answer all your questions on anthropology.

Cultural Studies:

- **Culture Machine**: An open-access journal founded in 1999, Cultural Machine is open-ended, peer-reviewed, experimental, and perfect for the postmodern cultural studies academic.
- **Cultural Studies Central**: With its original interactive commentary, international voices, and links to the top cultural studies resources, Cultural Studies Central is an older but still tremendously useful site for web and e-book articles.
- **Other Voices**: An e-journal of cultural criticism published at the University of Pennsylvania, Other Voices is dedicated to publishing innovative and provocative essays, discourses, lectures and reviews.

Check Your Progress - 3

Note:

c) Write your answer in the space given below

d) Compare your answers with those given at the end of the units.

(vi) Suggest any five internet resources for Mathematics teachers.

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(vii) Write any five internet resources for Science Teaching.

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4.6. E-LEARNING

E-learning is a computer based educational tool or system that enables us to learn anywhere and at any time. Today e-learning is mostly delivered though the internet, although in the past it was delivered using a blend of computer-based methods like CD-ROM. Quite simply, e-learning is electronic learning, and typically this means using a computer to deliver part, or all of a course. E-Learning can be defined as 'learning facilitated and supported through the use of Information and Communication Technologies (ICTs)'. The term 'e-learning' therefore essentially covers the use of computers and technology as a vehicle for knowledge exchange within teaching and learning. E-learning refers to the use of information and communications technology (ICT) to enhance and/or support learning in tertiary education. E-learning is commonly referred to the intentional use of networked information and communications technology in teaching and learning. A number of other terms are also used to describe this mode of teaching and learning. They include online learning, virtual learning, distributed learning, network and web based learning. Fundamentally, they all refer to educational processes that utilize information and communications technology to mediate asynchronous as well as synchronous learning and teaching activities. On closer scrutiny, however, it will be clear that these labels refer to slightly different educational processes and as such they cannot be used synonymously with the term e-learning.

Types of E- Learning

There are a few of the most common types of e-Learning. They are as given below;

a) **Technology-Based Learning (TBL):** The phrase, interchangeable with e-learning, technology-based learning includes deployment of methods that use recent technological developments such as computer-mediated communication, videoconferencing, multimedia, groupware, video on demand, desktop publishing, intelligent tutoring system, virtual reality just to name a few.

b) **Web-Based Training (WBT):** Generally as web-based learning, e-learning uses streaming media, text, and graphics to develop exciting learning environment that is deployed right on the user via the internet. It is a great way to learning for the large group of people scattered across the globe, but it can present the same deployment challenge that the audience encounters in dial-up connecting.

c) **Computer-Based Training (CBT):** This is great alternative to WBT for graphic or audio rich e-learning, deployed via CD-ROM, which elements the streaming issues that can be associated with WBT.

d) **Synchronous and Asynchronous e-learning:** With synchronous e-learning, learning and teaching takes place at the same time while the trainer and learners are physically separated from each other. Examples of synchronous learning are as follows: Internet telephony, Web conferencing, online lectures, Distance learning via-interactive satellite and Audio/video conferencing. Asynchronous e-learning means that the user can take the training indent of any schedule. At Resource Bridge it refers to this as "wherever they are whenever they need it," asynchronous e-learning does not need a facilitator or instructor, and is one of the more popular e learning deployment methods. Examples of asynchronous e learning are the following: Self-paced courses taken via internet on CD-ROM and Stored audio/video level presentations or seminars.

Advantages of e-learning

There are a number of benefits that are unique to the medium. Some of which are extracted here:

- Any time: A participant can access the learning programed at any time that is convenient - not just during the specific 1-3-hour period that is set for a conventional course. The episodes can be quick snatches at odd times or long late-night sessions. Cross-time-zone communication, difficult to arrange in real time, is as easy as talking to someone across town when using the Internet.

- Any place: The participants do not have to meet. That means they can be anywhere. International sharing is feasible. Individuals can log on at work, home, the library, in a community learning center or from their hotel when traveling.
- Asynchronous interaction: Unlike face-to-face or telephone conversations, electronic mail does not require participants to respond immediately. As a result, interactions can be more succinct and to-the-point, discussion can stay more on-track, and people can get a chance to craft their responses. This can lead to more thoughtful and creative conversations.
- Group collaboration: Electronic messaging creates new opportunities for groups to work together; creating shared electronic conversations that can be thoughtful and more permanent than voice conversations. Sometimes aided by on-line moderators, these net seminars can be powerful for learning and problem solving.
- New educational approaches: Many new options and learning strategies become economically feasible through online courses. For instance, the technology makes it feasible to utilize faculty anywhere in the world and to put together faculty teams that include master teachers, researchers, scientists, and experienced professional developers. Online courses also can provide unique opportunities for teachers to share innovations in their own work with the immediate support of electronic groups and expert faculty.
- Integration of computers: The online learner has access to a computer, so computer applications can be used without excluding some participants. This means, for instance, that a mathematical model implemented in a spreadsheet can easily be incorporated into a lesson and downloaded so all participants can run, explore, and refine the model and then share their findings and improvements

Mobile-Learning

M-learning is a natural extension to conventional e-learning practice through which mobile technology allows a greater degree of access to learning resources. Currently, most e-learning experiences are based on learners accessing resources through fixed nodes such as desktop PCs, to which access is generally restricted by either location, time of day or both. Mobile learning is defined as "the provision of education and training on mobile devices: Personal Digital Assistants (PDAs), palmtops and handhelds and on smart phones and mobile phones." This definition reflects the tension in the field of mobile learning between functionality and mobility. The devices available may be assembled on a continuum running

from the most functional to the most mobile. Because the focus in mobile learning is on mobility this presentation limits the range of mobile learning limits the range of the field to the devices listed, to the exclusion of laptop computers.

The term M-Learning or "Mobile Learning", has different meanings for different communities: that refer to a subset of E-Learning, educational technology and distance education that focuses on learning across contexts and learning with mobile devices. Mobile learning has many different definitions and is known by many different names, like M-Learning, U-Learning, personalized learning, learning while mobile, ubiquitous learning, anytime / anywhere learning, and handheld learning. One definition of mobile learning is, "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies".

Benefits of Mobile Learning

The proliferation of portable computing and mobile communicating devices, which are connected to wireless networks, facilitate mobility and mobile learning. Mobility allows teaching and learning to go beyond the traditional classroom, this provides a wide range of opportunities. Some advantages and benefits of mobile learning include:

- Mobile learning can occur at anyplace and anytime, and learning content can be accessed anywhere.
- A mobile learning process is not limited to one particular place.
- Mobile learning enhances interaction between instructors and learners/students.
- Mobile learning is a great opportunity for students and instructors to continue to learn while on the move.
- Students in mobile learning practice and undergo self-centered learning with focus.
- Mobile learning is a great opportunity for just in time training or review of content.
- Mobile learning facilitates collaboration among students and instructors through both asynchronous and synchronous communication techniques.

Disadvantages of Mobile Learning

Given the advancements in mobile technologies, and the personal nature of mobile devices, the establishment of a usable and accessible mobile learning system needs to be inclusive for all users. For example, individuals who are either physically impaired or disabled may find it difficult to integrate themselves within mainstream mobile education. Mobile learning is accompanied with a lot of pedagogical issues which may have negative

impacts on some instructors and learners alike. Notable disadvantages of mobile learning include:

- Mobile learning may give opportunities for students to cheat if there is no monitoring system in place to check cheating.
- Mobile learning can also give technically savvy students an advantage in terms of system and device usage over non-technically inclined students, such as arts students.
- Mobile learning can create an isolation or a feeling of being out-of-the-loop for both instructors and students who may not always have mobile connectivity.
- Depending on the network resources and platform, some contents in mobile learning may be rendered outdated because of rapid upgrades from one session to the next.
- Mobile learning may also require an additional learning curve for non-technical faculty and students which might introduce a burden in adoption.
- Mobile learning cannot augment practical hands-on lessons, such as laboratory experiments for chemistry students.

On-line Learning

Online learning is a method of delivering educational information via the internet instead of in a physical classroom. Online learning is education that takes place over the Internet. It is often referred to as "e-Learning" among other terms. However, online learning is just one type of "distance learning". The umbrella term for any learning that takes place across distance and not in a traditional classroom. Distance learning has a long history and there are several types available today, including:

- Correspondence Courses: conducted through regular mail with little interaction.
- Telecourses: where content is delivered via radio or television broadcast.
- CD-ROM Courses: where the student interacts with static computer content.
- Online Learning: Internet-based courses offered synchronously and/or asynchronously.
- Mobile Learning: by means of devices such as cellular phones, PDAs and digital audio players (iPods, MP3 players).

Some of main advantages of online learning include:

- **Convenience:** 24/7 access from any online computer; accommodates busy schedules; no commuting, no searching for parking.
- **Enhanced Learning:** Research shows increased depth of understanding and retention of course content; more meaningful discussions; emphasis on writing skills,

technology skills, and life skills like time management, independence, and self-discipline.

- **Leveling of the Playing Field:** Students can take more time to think and reflect before communicating; shy students tend to thrive online; anonymity of the online environment.
- **Interaction:** Increased student-to-teacher and student-to-student interaction and discussion; a more student-centered learning environment; less passive listening and more active learning; a greater sense of connectedness, synergy.
- **Innovative Teaching:** Student-centered approaches; increased variety and creativity of learning activities; address different learning styles; changes and improvements can translate to on-ground courses as well.
- **Improved Administration:** Time to examine student work more thoroughly; ability to document and record online interactions; ability to manage grading online.
- **Savings:** Accommodate more students; increased student satisfaction = higher retention and fewer repeats.
- **Maximize Physical Resources:** Lessen demand on limited campus infrastructure; decrease congestion on campus and parking lots.
- **Outreach:** Give students options; reach new student markets; appeal to current students thus increasing enrollments.

Virtual Classroom

A virtual classroom is an online classroom that allows participants to communicate with one another, view presentations or videos, interact with other participants, and engage with resources in work groups. A virtual classroom is an online learning environment. The environment can be web-based and accessed through a portal or software-based and require a downloadable executable file. Just like in a real-world classroom, a student in a virtual classroom participates in synchronous instruction, which means that the teacher and students are logged into the virtual learning environment at the same time. Many schools and businesses have rolled out virtual classrooms to provide synchronous distance education. Virtual classroom software applications often employ multiple synchronous technologies, such as web conferencing, video conferencing, livestreaming, and web-based VoIP to provide remote students with the ability to collaborate in real time. To enhance the educational process, applications may also provide students with asynchronous communication tools,

such as message boards and chat capabilities. The following are some of the characteristics of virtual classroom.

- Non-Restricting: A virtual classroom is an online classroom that allows participants to communicate with one another, view presentations or videos, interact with other participants, and engage with resources in work groups.
- Affordable: The low costs of virtual classrooms are considered to be a major advantage. Learners can save money. Participants also save time since all that is needed is an internet connection
- Flexible Learning: Online classes also allow for the ability to record class as it happens, including any presentation audio and visuals. This means that the content is accessible even after being delivered, an added benefit for those who want a quick refresher, or perhaps did not fully understand the first time.
- Practical and Proven: Synchronous learning is a learning environment where everyone takes part in the learning at the same time. A traditional lecture is an example of this type of learning, and has been used for hundreds of years. Online learning enables this same type of experience, but with far more conveniences and tools
- Accessible: Virtual classrooms can be used to deliver lectures, or even tutorials online. They are also great options for impromptu meetings and group projects where members need to check-in on progress and bounce ideas of one-another. With the virtual environment, ideas and collaborators are never far away.

Smart Classroom

Technology benefited us in every aspect of our life right from communication to education. In ancient days students were taught in a gurukul where they were taught by the gurus. But this system was replaced by modernized culture. New methods of teaching have been introduced which is known as smart class. It uses instructional material, 3D animated modules and videos, and all the renowned schools are using this concept. Now the students are thrilled at this concept of innovation and interactive learning process. The concept of digitized classroom has not only made education interesting but a chance to students to enhance their performance. A smart classroom is a classroom that has an instructor equipped with computer and audio-visual equipment, allowing the instructor to teach using a wide variety of media. These include smart interactive white board, DVD's, PPT's and more, all displayed through a data projector. Smart class is a digital initiative of EDUCOMP, which is rapidly transforming the way teachers teach and students learn. With the help of school

curriculum, smart classes bring in technology right next to the blackboard for teachers in the classroom. This makes learning an enjoyable experience for the students while improving their overall academic performance in school.

Northwestern University defines smart classrooms as “Technology enhanced classrooms that foster opportunities for teaching and learning by integrating learning technology, such as computers, specialized software, audience response technology, assistive listening devices, networking, and audio/visual capabilities.”

Smart class has a unique delivery model for schools. A knowledge center is created inside the school equipped with the entire library and smart class digital content. The knowledge center is connected to the classroom through internet. Teachers get relevant digital resources such as animations and videos, interactive virtual labs tool etc and use them as a part of their lesson plans in every classroom period. The classrooms are equipped with custom designed electronic interactive whiteboards, projection systems, PC's. The smart class program is implemented in schools by educomp completely on a turnkey basis, per student basis, and per month basis. Smart class is powered by a vast repository of digital instruction materials exactly mapped to meet the specific objectives laid out by different state learning standards. This is continuously populated through the development of Educomp's digital products and solution group. The content repository consists of thousands of highly animated, lesson specific, 3D and 2D multimedia modules. These are built with an instructor-led designs that allow the teacher to effectively transact the lesson in a classroom, the modules help the students to understand the concepts easily, interact with other students. Teaching learning process becomes joyful and useful. Educomp has also entered into partnerships with discovery education, design mate Eureka and crocodile clips adding world class digital content resources 3D educational videos and perhaps the world's interactive virtual lab software to its repository of content for teachers to use in the classroom. The modules are embedded in a template that allows the teacher to teach a chosen lesson in a class, frame by frame, with engaging and instructionally sound animated set of visuals while retaining complete control on the pace of delivery. The curriculum reach unfolds from kindergarten to twelve grade covering subjects like mathematics, science, english, environmental studies, social science, physics, chemistry, biology, history, geographer, economics and business studies.

The following are some of the benefits of smart boards in teaching and learning process:

- Introduction of concept in a thrilling and exciting manner.
- A student's better engagement with the content on a smart board is dynamic and visually more appealing.
- Storage of teachers written notes.
- Voice recording is possible.
- Teaching skills can be enhanced by showing various videos to the students.
- Scope for the integration of different types of technology and other novel ways to the teachers to present lesson.
- Smart class brings about a complete transformation in classrooms. This results in faster and accurate understanding of the concepts in class and helps improve the overall academic performance of students.
- Teachers are able to keep students engaged in the learning process and also get an instant and accurate assessment of learning outcomes achieved at the end of the class.

Check Your Progress - 4

Note:

a) Tick mark the right answer in case of questions (i), (ii) and write your answer in the space given below in the question (iii)

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

(viii) What is the full form of TBL?

A. Technology Based Learning
B. Technology Binned Learning
C. Television Based Learning
D. Telnet Binned Learning

(ix) What is the expansion of PDA?

A. Personal Digital Attendance
B. Personal Digital Assistants
C. Personal Digital Academic
D. Postal Digital Assistants

(x) List out the advantages of online learning

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4.7. WIKIPEDIA

Wikipedia is a free, open content online encyclopedia created through the collaborative effort of a community of users known as Wikipedians. Anyone registered on the site can create an article for publication; registration is not required to edit articles. The site's name comes from wiki, a server program that enables anyone to edit Web site content through their Web browser. Jimmy Wales and Larry Sanger co-founded Wikipedia as an offshoot of an earlier encyclopedia project, Nupedia, in January 2001. Originally, Wikipedia was created to provide content for Nupedia. However, as the wiki site became established it soon grew beyond the scope of the earlier project. The website provides millions of articles in English and more than that number in all other languages combined. When using Wikipedia in education, student motivations and learning outcomes can vary widely. However, most students are more engaged in a Wikipedia assignment than a traditional assignment. They also learn many skills.

Student engagement: **These are some of the reasons that using Wikipedia in the classroom is so engaging, according to students:**

- **The global audience**: students appreciate that their work could be viewed by thousands of people.
- **The usefulness of the assignment**: students like that their work serves a purpose; it isn't just graded and forgotten.
- **The resume builder**: students add a new skill to their professional portfolio.
- **The "cool" factor**: students like showing their work to family and friends.
- **The feedback**: students like getting input from the broader world.
- **The different experience**: students appreciate an alternative assignment format and learning new things.

Student learning: **Students learn a variety of skills by using Wikipedia in the classroom. Some of the main ones are:**

- **Reading**: students get better at reading by reading more, and while working on Wikipedia, they read a lot!
- **Writing**: students practice writing in an expository, encyclopedic, summary style.
- **Critical thinking**: in contrast to many class assignments which require an argumentative or persuasive paper, Wikipedia's neutrality policy helps students think about class content in a new way.
- **Information literacy**: students identify bias and partisanship; students recognize whether an article is credible or not.
- **Literature review**: students practice finding and summarizing appropriate sources for their topic.
- **Collaboration**: students work with other people to develop high quality encyclopedia articles.

Wikipedia assignments are rewarding, but are in several respects more challenging than traditional assignments.

- **Demanding of students**: Students typically find Wikipedia assignments more challenging than similar traditional assignments. They must not only research and write as they would normally, but also learn how Wikipedia works and how to follow its rules and norms. Also, the stakes feel much higher when students are writing in public.
- **Planning ahead**: Instructors must plan Wikipedia assignments well ahead of time, since it takes a bit of extra time to coordinate with the Wikipedia community. For instructors who are new to using Wikipedia in the classroom, this is essential to a successful project.
- **Pacing**: Students have less flexibility in pacing their work, since some critical elements involving feedback from the Wikipedia community will not be effective if rushed or put off until the last minute.
- **Grading**: Especially for instructors who are new to Wikipedia, there is a modest learning curve to devising an efficient grading rubric, and assessment of student work may take more time than it would for a traditional assignment.

Massive Open Online Courses (MOOCs)

A Massive Open Online Course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as filmed lectures, readings, and problem sets, many MOOCs provide interactive user forums to support community interactions among students and professors. MOOCs are a recent and widely researched development in distance education which were first introduced in 2008 and emerged as a popular mode of learning in 2012. Early MOOCs often emphasized open-access features, such as open licensing of content, structure and learning goals, to promote the reuse and remixing of resources. Some later MOOCs use closed licenses for their course materials while maintaining free access for students.

MOOCs (Massive Open Online Courses) can be seen as a term or word related to the scalability of open and online education. Some even argue that it is a political instrument and as such a concept that should be broadly defined. This document (re-)defines MOOCs so that it becomes clear what the differences are to other implementations of open and online courses. It is already observed that every letter in MOOC is negotiable and as such there are many different definitions of MOOCs. MOOCs are courses designed for large numbers of participants that can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free.

Social Networking

Social networking is the use of internet-based social media programs to make connections with friends, family, classmates, customers and clients. Social networking can occur for social purposes, business purposes or both through sites such as Facebook, Twitter, LinkedIn, Classmates.com and Yelp. A social networking service (also social networking site, SNS or social media) is a platform to build social networks or social relations among people who share similar personal and career interests, activities, backgrounds or real-life connections. The variety of stand-alone and built-in social networking services currently available in the online space introduces challenges of definition, but there are some common features:

- *Social networking services are Web 2.0 internet-based applications,*
- *User-generated content (UGC) is the lifeblood of SNS organisms,*
- *Users create service-specific profiles for the site or app that are designed and maintained by the SNS organization, and*

- *Social networking services facilitate the development of online social networks by connecting a user's profile with those of other individuals and/or groups.*

Mersits of using Social Networking Sites in the classroom

- ***Increase Student Collaboration:*** *Social media sites provide an avenue for students to easily contact one another regarding school projects, group assignments or for help on homework assignments.*
- ***Encourage More Participation:*** *Students who do not participate regularly in class may feel they can express their thoughts through social media. Although this should not completely replace in class participation it can help build the students' confidence and encourage them to find their voice and be able to participate in class.*
- ***Homework Help:*** *When students have questions about a class assignment they can easily post a message asking if anyone can help. They can also write a specific question to the teacher on a wall that other students can see. This allows the whole class to have access to the feedback from the teacher.*
- ***Share Resources Quickly:*** *If the teacher needs to direct students to a particular online resource they can easily share the site through social media sites like twitter. If the teacher wants the class to visit a particular site all they have to do is tweet the website and the entire class can view it with one click.*
- ***Keep Parents, Teachers and Students All on the Same Page:*** *It is very useful for teachers to be able to post on social media sites about class activities, homework assignments and even school events. This helps the teachers, parents and students all stay on the same page about what is going on at school. Sites like facebook also allow teachers to easily communicate through private messages to parents and students without having to leave phone messages and wait for a call back.*

Demerits of using Social Networking Sites in the classroom

- ***Distraction in Class:*** *The first concern that comes to mind when using social media in the classroom is how it will be a major distraction to the students during lessons. Students could easily be sidetracked from an assignment and it could be difficult for teachers to tell who is paying attention or not.*
- ***Improper Use:*** *Students might take advantage of being able to access social media in the classroom and use it for personal interactions instead of for school related*

activities. If students are not closely monitored it will be hard to know how if they are using social media properly during class time.

- ***Detract From Human Interaction:*** *If students are encouraged to participate in class discussions through social media websites this could impact their ability to interact in face to face situations. Students still need to learn how to have conversations with people even in this modern technology based world.*
- ***Cyber Bullying:*** *Some students have experienced cyber bullying through social media websites. If social media is allowed in schools this could increase cyber bullying where students write hurtful messages targeting other students.*
- ***Posting Inappropriate Content:*** *One of the reasons social media sites are not allowed in schools is because it is difficult to monitor how students use social media sites. A student may post inappropriate content such as pornography or foul language which would be both distracting and damaging to students.*

Check Your Progress - 5

Note:

c. Tick mark the right answer in case of question (i) and write your answer in the space given below for the question (ii)

d. Compare your answers with those given at the end of the units.

(xi) What is the expansion of MOOC?

a) Mass Open Online Course
b) Massive Open Online Course
c) Mass Online Open Course
d) Massive Online Open Course

(xii) Write any five names of the Social Networking Sites.

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4.8. LET US SUM UP

Information and Communication Technology (ICT) can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development and more efficient education management, governance and administration. The Internet offers a world of information in one place. It is a helpful tool in communicating and researching all different subjects. It is also a great way for students to use computers with proper supervision. Yet using the Internet in an educational system can be controversial. Some of the disadvantages include students giving out too much information about themselves, sites too commercialized with little educational value, and access to material that parents might not want their children exposed to. However, teachers and students have seen many benefits.

Thus through your study of this unit, you have learnt about the basics of internet, email and search engines. And also you have opportunity to learn about e-learning, m-learning, virtual learning and online learning. You have also understood certain advanced educational technology concepts like e-leaning, m-learning, virtual learning, smart classroom, online learning, Wikipedia, MOOC and social networking.

4.9. UNIT-END ACTIVITIES

12. Identify and Categorize websites related school curriculum.
13. Evaluate any two web pages on a unit in subject relevant to school curriculum.
14. Discuss the pro and cons of technology integrated learning.
15. Write a short note on 'Virtual Classroom'
16. What are the advantages and disadvantages of Social Networking Sites in education?
17. Describe the parts of e-mail address and e-mail message.
18. Define the term search engines and list out some of the search engines.

4.10. ANSWERS AS CHECK YOUR PROGRESS

(i) b

(ii) a

(iii) d

(iv) **Digital age skills**

- Communications skills
- The ability to learn independently

- Ethics and responsibility
- Teamwork and flexibility
- Thinking skills
- Digital skills
- Knowledge management

(v) **(5As) of Info-Savvy model**

- Asking (Key questions to be answered)
- Accessing (relevant information)
- Analyzing (the acquired information)
- Applying (the information to a task)
- Assessing (the end result and the process)

(vi) **Internet resources for Mathematics teachers**

- Math TV
- Math's Fun
- Math Central
- Maths Frame
- The Math Forum etc.

(vii) **Internet resources for Science Teaching**

- Science Fair Central
- National Science Digital Library (NSDL)
- 42 Explore
- 24/7 Science
- Science Daily

(viii) a

(ix) b

(x) **Advantages of online learning**

- Convenience
- Enhanced Learning
- Leveling of the Playing Field
- Increased Interaction
- Innovative Teaching
- Improved Administration

- Maximize Physical Resources
- Outreach

(xi) b

(xii) **Social Networking sites**

- Facebook
- Twitter
- LinkedIn
- Classmates.com
- Google+

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Unit V: Techno-Pedagogic Skills

STRUCTURE

5.0 INTRODUCTION

Since you have already understood (through the inputs in the Unit-I) 'Communication' in terms of the concept, nature, types, process, elements, barriers etc, the first part of this module will expose you to the relationship between message and media in terms of certain key conceptsand the SMCR model of communication. The second part of the module will throw light on the different initiatives of the Government of India under the National Mission on Education through Information and Communication Technology (NME-ICT). The final part will expose you to the concept of Virtual Laboratories and the role of Haptics and Haptic Technologies in the same.

5.1 LEARNING OUTCOMES

After working through this unit, you will be able to:

- Understand the symbiotic relationship between message and media;
- Understand the SMCR Model of Communication;
- Be aware of concepts like media fidelity and message credibility;
- Know about the various initiatives of the Govt. of India under NME-ICT; and
- Understand the various aspects of Virtual Laboratories and the role of Haptics.

5.2 MEDIA MESSAGE COMPATIBILITY AND CONTIGUITY OF MESSAGE FORMS

Since the early days of communication, humanity has been captivated by the methods it uses to convey and preserve information. How we communicate with each other defines who we are and constitutes so much of what makes a culture and an individual unique. Over the centuries, we have seen media evolve across a wide array of channels, from print to radio to television to the Internet. Each one of these channels, or media, has its own unique characteristics, much like the people who use them.

When it comes to understanding these various media, one of the best to learn from is Marshall McLuhan (1911-1980). As an early educator and pioneer of the study of communication and its evolution over time, McLuhan introduced a lot of observations about the impact of new forms of expression and media. Most notably, McLuhan's expression "The medium is the message" has had a resounding impact not just on Web design but on mass media in general."The medium is the message" as a phrase sums up a much deeper communication theory, which is that the medium through which we choose to communicate holds as much, if not more, value than the message itself. The phrase was introduced in

McLuhan's most widely known book, *Understanding Media: The Extensions of Man*, published in 1964.McLuhan proposed that a medium itself, not the content it carries, should be the focus of study. He said that a medium affects the society in which it plays a role not only by the content delivered over the medium, but also by the characteristics of the medium itself. He held that the "content of any medium is always another medium" – thus, speech is the content of writing, writing is the content of print, and print itself is the content of the telegraph. Thus, one can understand the symbiotic relationship that exists between medium and message. This relationship necessitates a higher level of compatibility. The word 'compatibility' refers to the capacity of existing or performing in harmonious, agreeable, or congenial combination with another or others. As we know, message is of no use without a medium to communicate and a medium remains useless without a message to carry. Such is the nature of the bond between message and medium. This bond cannot serve its purpose without a perfect compatibility.

When it comes to message forms, there are many factors that go into it. As we know, communication is a process of exchanging information, ideas, thoughts, feelings and emotions through speech, signals, writing, or behavior. In communication process, a sender(encoder) encodes a message and then using a medium/channel sends it to the receiver (decoder) who decodes the message and after processing information, sends back appropriate feedback/reply using a medium/channel. People communicate with each other in a number of ways that depend upon the message and its context in which it is being sent. Choice of communication channel and the style of communicating also affect communication.

Types of communication based on the communication channel or medium used are: Verbal Communication and Nonverbal Communication. Verbal communication refers to the form of communication in which message is transmitted verbally; communication is done by word of mouth or a piece of writing. Nonverbal communication is the sending or receiving of wordless messages. Communication other than oral and written, such as gesture**,** body language**,** posture**,** tone of voice orfacial expressions**,** is called nonverbal communication. Nonverbal communication is all about the body language of speaker.

Verbal Communication is further divided into:Oral Communication and Written Communication. In oral communication, Spoken words are used. It includes face-to-face conversations, speech, telephonic conversation, video, radio, television, voice over internet. In oral communication, communication is influenced by pitch, volume, speed and clarity of speaking. In written communication, written signs or symbols are used to communicate. A written message may be printed or hand written. In written communication message can be

transmitted via email, letter, report, memo etc. Message, in written communication, is influenced by the vocabulary and grammar used, writing style, precision and clarity of the language used.

Nonverbal communication helps receiver in interpreting the message received. Often, nonverbal signals reflect the situation more accurately than verbal messages. Nonverbal communication have the following three elements:

- **Appearance**
  Speaker: clothing, hairstyle, neatness, use of cosmetics
  Surrounding: room size, lighting, decorations, furnishings
- **Body Language**
  Facial expressions, Gestures, Postures
- **Sounds**
  Voice Tone, Volume, Speech rate

Based on style and purpose, there are two main categories of communication and they both bears their own characteristics. Communication types based on style and purpose are:Formal Communication and Informal Communication**.**

In formal communication, certain rules, conventions and principles are followed while communicating message. Formal communication occurs in formal and official style. Usually professional discussions, corporate meetings, conferences adopt formal communication. Similarly, official communications, reports, memos, circulars etc., constitute the forms of formal communication in the written mode.

Informal communication is done using channels that are in contrast with formal communication channels. It's just a casual talk. It is established for societal affiliations of members in an organization and face-to-face discussions. It happens among friends and family. Informal communication is done orally and using gestures. However, personal letters, e-mails among friends and family, text messages on mobile phones etc. are the informal communication in written mode.

As clearly evident, in all the above discussed modes of communication, messages are carried in different forms.

Check your Progress-I
Note: a) Fill in the blanks with right answers for Qns, 1 to 3 and answer the Qn. 4 as instructed. b) Compare your answers with those given at the end of the unit. **1. Based on the medium used, communication is classified into two types as _____ and _____.**
2. The nature of relationship that exists between 'medium' and 'message' is _____.
3. The communication that goes on among friends and family members is mostly _____.
4. State whether true or false: a. **Different modes of communication carry messages in different forms.** b. **All media of communication carry messages in the same form.**

5.3 MESSAGE CREDIBILITYAND MEDIA FIDELITY

5.3.1 Message Credibility

All messages that we receive are not believable. If there is a message about an accident in a far-off place, we tend to verify the news by asking about it with someone in the place of accident. This process is in actuality ascertaining the message credibility. Credibility refers to the objective and subjective components of the believability of a source or message.It has two key components: trustworthiness and expertise, which both have objective and subjective components. Trustworthiness is based more on subjective factors, but can include objective measurements such as established reliability. Expertise can be similarly subjectively perceived, but also includes relatively objective characteristics of the source or message (e.g., credentials, certification or information quality).

Despite the efforts to conceptualize credibility as three separate concepts - source credibility, message credibility, and media credibility—there exists no scale that exclusively measures message credibility. Message credibility, specifically in the context of news and media, can be measured by asking to rate how well three adjectives describe content: *accurate, authentic*, and *believable (AAB)*. To determine the truth of any given claim, triangulation on the facts alone is insufficient. One must examine the credibility of the sources as well.

5.3.2 Media Fidelity

Every medium is an extension of our senses or body parts and can change the way we view the world (e.g. the effects of the internet). Media affects us differently, according to their fidelity (or *form*).

High fidelity media send messages that are complete, requiring little extra interpretation. They are clear and easy to understand. Their ease of interpretation allows listeners to easily fall into the encompassing environment that may be produced. On the other hand, the lack of effort required by the person involved may reduce their engagement. A high fidelity medium in which the person does become engaged, perhaps through interest in the subject-matter, is highly effective.A high fidelity medium is also known as a 'hot' medium. For example, movies are high-fidelity media, as they block out all other senses in human beings and include sound (often surround-sound). Thus they engage their audiences and can easily get them to suspend reality, as they are powerful combinations of audio and video.

Low fidelity media send messages that are incomplete, requiring the person involved to put noticeable effort into assimilating the message.Low fidelity need not be low value, but the composer does need to think more about how to engage the target audience. With care, the low fidelity may be turned to one's advantage, perhaps using it to suggest and tease.A low fidelity medium is also known as a 'cool' medium. For example, telephones are low fidelity media, as they do not give full-spectrum sound and do not include a visual element to communications. One needs to concentrate to fully hear the message.

5.4 SENDER, MESSAGE, MEDIUM, RECEIVER CORRESPONDENCE

In order to understand the concept of ‘Sender-Message-Medium-Receiver Correspondence’, it is better to explore the SMCR Model of Communication. In 1960, David Berlo expanded on Shannon and Weaver's (1949) linear model of communication and created the SMCR Model of Communication.The Sender-Message-Channel-Receiver Model of communication (Fig.5.1) separated the model into clear parts and has been expanded upon by other scholars.

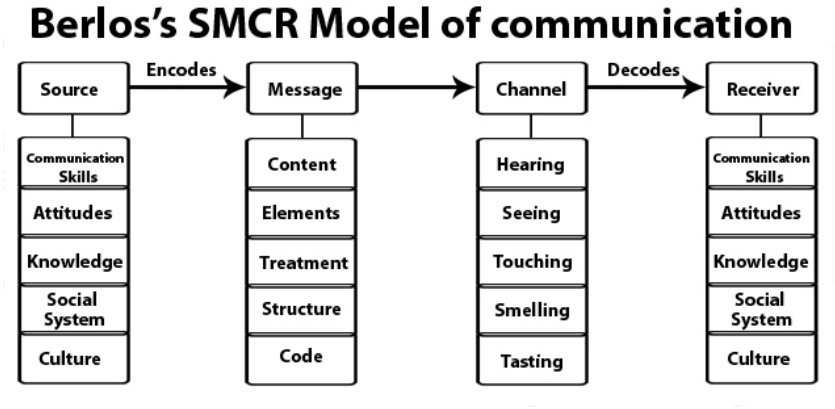

Fig. 5.1. The SMCR Model of Communication

This model is not specific to any particular communication. It presents a number of factors under each of the elements as detailed below:

Source: The source is where the message originates.

Communication skills – It is the individual's skill to communicate (ability to read, write, speak, listen etc.)

Attitudes– The attitude towards the audience, subject and towards one self for e.g. for the student the attitude is to learn more and for teachers wants to help teach.

Knowledge– The knowledge about the subject one is going to communicate for e.g. whatever the teacher communicates in the class about the subject so having knowledge in what you are communicating.

Social system – The Social system includes the various aspects in society like values, beliefs, culture, religion and general understanding of society. It is where the communication takes place.

For e.g. class room differs from country to country like behaviors, how we communicate etc.We can communicate only to the extent that the social system allows, when we take social system into account.

Culture: Culture of the particular society also comes under social system.

Encoder: The sender of the message (message originates) is referred as encoder, so the source is encoding the message here.

Message

Content – The beginning to the end of a message comprises its content for e.g. from beginning to end whatever the class teacher speaks in the class is the content of the message.

Elements – It includes various things like language, gestures, body language etc, so these are all the elements of the particular message. Content is accompanied by some elements.

Treatment– It refers to the packing of the message. The way in which the message is conveyed or the way in which the message is passed on or deliver it.

Structure– The structure of the message how it is arranged, the way you structure the message into various parts.

Code– The code of the message means how it is sent in what form it could be e.g. language, body language, gestures, music and even culture is a code. Through this you get/give the message or through which the communication takes place or being reached.

Channel (Medium) – It is nothing but the five senses through this only we do. The following are the five senses which we use

- Hearing
- Seeing
- Touching
- Smelling
- Tasting

Hearing: The use of ears to get the message for e.g. oral messages, interpersonal etc.

Seeing: Visual channels for e.g. TV can be seen and the message is delivered.

Touching: The sense of touch can be used as a channel to communicate for e.g. we touch and buy food, hugging etc.

Smelling: Smell also can be a channel to communicate for e.g. perfumes, food, charred smell communicates something is burning, we can find out about which food is being cooked etc.

Tasting : The tongue also can be used to decipher e.g. food can be tasted and communication can happen.

Decoder : Who receives the message and decodes it is referred to as decoder.

Receiver: The receiver needs to have all the things like the source.

This model believes that for an effective communication to take place the source and the receiver needs to be in the same level, only if the source and receiver are on the same level communication will happen or take place properly. So source and receiver should be similar.

Check your Progress-II
Note: a) Fill in the blanks with right answers for Qns, 5 to 7 and answer the Qn. 8 as instructed. b) Compare your answers with those given at the end of the units. **5. When we believe a message, just because it comes from a reliable person, it refers to _____.**
6. In the context of a communicating a message, 'AAB' stands for _____, _____and _____.
7. The 'Channel' in the SMCR model refers to the _____.
8. State whether true or false: a. Messages sent and received on high-fidelity media are clear and complete. b. Low-fidelity media carry messages of low value.

5.5 NATIONAL MISSION ON EDUCATION THROUGH INFORMATION AND COMMUNICATION TECHNOLOGY (NME-ICT)

The National Mission on Education through Information and Communication Technology (NME-ICT) has been envisaged as a Centrally Sponsored Scheme of the Government of India under its Ministry of Human Resource Development to leverage the potential of ICT, in teaching and learning process for the benefit of all the learners in Higher Education Institutions in any time anywhere mode. This was expected to be a major intervention in enhancing the Gross Enrolment Ratio (GER) in Higher Education by 5 percentage points during the XI Five Year Plan period.

The three cardinal principles of Education Policy viz., access, equity and quality could be served well by providing connectivity to all colleges and universities, providing low cost and affordable access-cum-computing devices to students and teachers and providing high quality e-content free of cost to all learners in the country. NME-ICT encompasses all the three elements. The Mission has two major components:

- providing connectivity, along with provision for access devices, to institutions and learners;
- Content generation.

It seeks to bridge the digital divide, i.e. the gap in the skills to use computing devices for the purpose of teaching and learning among urban and rural teachers/learners in Higher Education domain and empower those, who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. It plans to focus on appropriate pedagogy for e-learning, providing facility of performing experiments through virtual laboratories, on-line testing and certification, on-line availability of teachers to guide and mentor learners, utilization of available Education Satellite (EduSAT) and Direct to Home platforms, training and empowerment of teachers to effectively use the new method of teaching learning etc.

5.5.1 Objectives of NME-ICT

The content portion of this Mission would have an ambitious vision of catering to the learning needs of more than 50 crore Indians and of providing a one stop solution to all the requirements of the learning community.

In order to bolster our knowledge resources, to obtain and maintain the competitive edge in the world, we require a system of identification and nurturing of talent and lifelong learning.

Knowledge modules based on the personalized needs of the learner would need to be delivered to him /her at the right time with the right content interactively to take care of his / her aspirations. In due course of time there would be a need to develop and maintain the knowledge and capability profile of every individual learner / worker. Such a system would have to be developed in a cost effective manner over a period of time, integrating, inter-alia the following objectives:

1. Effective utilization of intellectual resources, minimizing wastage of time in scouting for opportunities or desired items of knowledge appropriate to the requirement,
2. Certification of attainments of any kind at any level acquired through formal or non-formal means in conventional or non-conventional fields,
3. Any-time availability of desired knowledge at appropriate levels of comprehension to all for self-paced learning,
4. Platform for sharing of ideas and techniques and pooling of knowledge resources.
5. Systematically building a huge database of the capabilities of every individual human resource over a period of time,
6. Scholarship / Talent management including identification, nurturing and disbursement electronically.
7. Nurturing of scholars and learners.
8. Support to all the learners / workers for any of their perceived learning needs,
9. Extensive leveraging of the advancements in the field of ICT for taking the knowledge resources to the door steps of the learner,
10. Capability to handle the user base which would ultimately be expected to cross 50 crore in the long term.
11. Use e-learning as an effort multiplier for providing access, quality and equality in the sphere of providing education to every learner in the country.
12. Provide for Connectivity & access devices, content generation, personalization & mentoring, testing & certification and encouragement of talent.
13. Bringing efforts of different interested agencies working in the field of e-learning under one umbrella and establishing logical linkages between various activities.
14. Capacity building in this sphere and utilizing dormant capacities of various

organizations. Creating infrastructural facilities for long term utilization and making sustained efforts for content generation & connectivity including access devices production.

15. Encouraging research in spheres covered by Mission activities. Creating a large number of networks of experts in various fields to carry forward the gigantic vision under this Mission.
16. Providing e-books & e-journals, utilizing the repository of contents generated so far and the automation of evaluation processes. Creating a high impact brand for e-Journals in leading disciplines with a provision for good incentive-based payment to the researchers publishing their high quality papers in these e-Journals.
17. Spreading Digital Literacy for teacher empowerment and encouraging teachers to be available on the net to guide the learners.
18. Multi-lingual content development for the learners more comfortable in those languages.
19. Voice support for educational material delivery and interactivity for the content on the portal.
20. Development of interfaces for other cognitive faculties which would also help physically challenged learners. These efforts may cut across all the content generation activities.
21. Conversion of existing educational tapes into indexed formats compliant with the internationally accepted standards such as SCORM (Sharable Content Object Reference Model)
22. Launching a national movement for content and question generation.
23. Development of GIS (Geographical Information System) based resource inventory as a knowledge base (for subjects and skills where ever possible / feasible) for educational and planning purposes.
24. Improving teachers' training and course curriculum.
25. Providing Digital/Information Literacy for teacher empowerment.
26. Creating a clearinghouse cum rating agency for various web based learning contents for guiding Indian learners.
27. Establishing a credible rating institution for knowledge content available on the Internet utilizing the large expert base, which would get collaboratively networked through one of the sub Missions of this National Mission.
28. Preparation of metadata and timed index preparation for educational video / audio

content on tape or other media.

29. Credit based flexible module formulation for openness to qualifications and easy transfer of credits from one programme / course to another.
30. ERP (Enterprise Resource Package) and e-Governance for education.
31. Development of pedagogical techniques based on edu-entertainment.
32. Customisation of Open Source Tools etc.
33. Development of robust models of networking to encourage community
34. Participation at local levels.
35. Content delivery through EduSAT and narrowcasting of TV signals. Providing 1000 DTH (Direct to Home)channels on 40 transponders [to be availed through the Department. of Space] so that a separate DTH channel is available for every subject for every class in various languages to the extent possible.
36. Development of DTH platform for EduSAT and cheaper equipment for two way connectivity through satellites.
37. Providing e-Learning support to every higher education institution for technology assisted learning.
38. Setting up virtual labs and lab centers and finishing schools for quality enhancement.
39. Development of cheap access devices to make them affordable for every individual.
40. Making broadband affordable for every learner.
41. Developing reliable identification systems for learners and examiners and also developing model testing centers to test the learners under controlled environment.
42. Developing very low cost, low power consuming wireless mesh [Institution of Electrical and Electronics Engineering (IEEE) 802.11 standard or better] or point to point long range communication [IEEE 802.16 standard or better] capable robust video servers to act as communication and computational hubs at educational institutions.
43. Development of devices for achieving convergence among connectivity technologies.
44. Standardization& Quality Assurance of e-Content.
45. Facilitating development and deployment of ultra-low cost physical tool kits for engineering and science students to encourage project and design based learning complementary to the e-learning.
46. Deriving lessons from our ancient knowledge base.
47. Reducing ill-effects of internet / web based learning.
48. Guidance to learners through various psychological / personality tests.

49. Coordination and synergising of knowledge related activities of different Ministries and organizations.

The objectives of the National Mission on Education through ICT shall include (a) the development of knowledge modules having the right content to take care of the aspirations and to address to the personalized needs of the learners; (b) research in the field of pedagogy for development of efficient learning modules for disparate groups of learners; (c) standardization and quality assurance of contents to make them world class; (d) building connectivity and knowledge network among and within institutions of higher learning in the country with a view of achieving critical mass of researchers in any given field; (e) availability of e-knowledge contents, free of cost to Indians; (f) spreading digital literacy for teacher empowerment (g) experimentation and field trial in the area of performance optimization of low cost access/devices for use of ICT in education; (h) providing support for the creation of virtual technological universities; (i) identification and nurturing of talent; (j) certification of competencies of the human resources acquired either through formal or non-formal means and the evolution of a legal framework for it; and (k) developing and maintaining the database with the profiles of our human resources.

The Mission would also endeavor to blend soft skills with knowledge modules and inculcate a discipline of holistic thinking in the learners so as to make them job creators rather than job seekers.

5.5.2 Components of NME-ICT

The components of this Mission would include:

- The Sakshat Portal:
- Spreading Digital Literacy for Teacher Empowerment & bridging the Digital Divide in teaching learning community in Higher Education
- Provision of e-books and e-journals free to the learners
- Support for Generation of e-content and digitization and indexing of existing e-content
- Video Content Indexing & Chunking
- Evaluation of e-content
- Financial Assistance to Institutions of Higher Learning for Procurement of

Hardware / Replacement of Obsolete Hardware

- Financial Assistance to Research Projects
- National Testing Service
- Content Generation
- Standardization and quality assurance of contents & certification / automation of certification
- Developing Suitable Pedagogical Methods for Various Classes and intellectual calibers and research in e-learning
- Development of language converter tool kit
- Development and realization of Virtual Reality Laboratories and supporting facilities for e-learning
- Development of Certification & Testing Modules for Virtual Technological Universities & creation of VTU, multi media research and international Programmes
- Experimentation and development of ultra-low cost low power consuming access devices/ laptops for a wider coverage of learners & their field trials
- Talk to a teacher to provide a substitute for coaching for the economically poor students
- Development of software controlled hardware programming for robotics & other crucial areas
- Adaptation & deployment of open source simulation packages like ORCAD, Silab etc.
- Development of unified Enterprise Resource Package (ERP) system for Educational Institutions
- Publicity & training of motivators to ensure full utilisation of the systems by institutions & students
- Conversion of available content in various regional languages
- Development of Vocational Educational modules and use of haptic devices or education & training
- Addressing the Connectivity and Bandwidth Issues

Check your Progress-III
Note: a) Fill in the blanks with right answers for Qns, 9 to 11 and choose the right answer for the Qn. 12 .

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

9. The NME-ICT was launched during the _____ Five Year Plan.

10. SCORM stands for _____.

11. Orcad and Silab are _____.

12. NME-ICT strives to provide education through

a. Radio
b. Television
c. Computers
d. All the above

5.6 SPOKEN TUTORIALS, GYANVANI, GYANDARSHAN, SAKSHAT AND E-GYANKOSH

5.6.1 Spoken Tutorials

The Spoken Tutorial project is the initiative of the 'Talk to a Teacher' activity of the National Mission on Education through Information and Communication Technology (ICT), launched by the Ministry of Human Resources and Development, Government of India. The use of spoken tutorials to popularize software development and its use will be coordinated through its website (www.spoken-tutorial.org). The Spoken Tutorial project is being developed by IIT Bombay for MHRD, Government of India. The spoken Tutorial Project aims to make spoken tutorials on FOSS (Free and Open Source Software) available in several Indian languages, for the learner to be able to learn in the language he/she is comfortable in. The goal is to enable the use of spoken tutorials to teach in any Indian language, and to be taught to learners of all levels of expertise- Beginner, Intermediate or Advanced.

This project is for the community and by the community. Through the portal, the aim is to reach out to like-minded individuals to collaborate with IIT, Bombay and with each other to create Spoken Tutorials. The next step is to get each Spoken Tutorial dubbed into as many Indian languages as possible. This will help anyone anywhere to understand the contents of the Spoken Tutorials. Each of the Tutorials, whether original or dubbed, go through a strict review procedure, after which they are uploaded on the public domain. This is to ensure that the highest possible quality is attained.

The target group is the community at large, including school children, college students, working professionals, retired professionals, housewives, teachers, trainers, research scholars, software users and developers.

5.6.2 Gyan Vani

Gyan Vani is an educational FM radio station in several cities of India. It is an educational FM Radio network providing programmes covering different aspects and levels of education including Primary and Secondary Education, Adult Education, Technical and Vocational Education, Higher Education and Extension Education. Gyan Vani stations operate as a media cooperative with the day-to-day programmes being contributed by various educational institutions, NGOs, government and semi-government organizations, UN agencies, ministries such as Agriculture, Environment, Health, Women and Child Welfare, Science & Technology, etc. besides national level institutions such as NCERT, NIOS and state open universities. Each Gyan Vani station has a range of about60 km and covers an entire city including the adjoining rural areas. The medium of broadcast is English, Hindi or language of the region. Gyan Vani FM radio uses stereophonic FM transmitters, and professionals operate the radio stations. Each nodal centre is provided with media from Indira Gandhi National Open University's (IGNOU) Electronic Media Production Centre. The centre serves purposes of production, dissemination and transmission of educational material. The facilities available at the media production centre are shared with various educational and training institutions, state open universities, central and state government ministries or departments, non-governmental organizations, corporate bodies and other sectors. Gyanvani serves the purpose of information creation, storage and dissemination, by broadcasting educational programs covering all fields of study. It aims to promote and deliver educational content through radio to a large cross-section of the society. The educational programs are also contributed by other educational institutions, NGOs, government and semi government organizations, ministries such as MHRD, Agriculture, Environment, Health, Women and Child Welfare, Science and Technology etc. Gyanvani caters to the educational and information needs of various segments of society such as children, youth and adult population of both rural and urban areas.

5.6.3 Gyan Darshan

Gyan Darshan offers interesting and informative programmes for different categories of users such as pre-school kids, primary and secondary school children, college/university

students, and youth seeking career opportunities, housewives and adults. These programmes are contributed by major educational institutions including IGNOU, UGC-CEC, NCERT-CIET, Directorate of Adult Education, IITs, NITTTRs and other educational/developmental organisations. The time slots are convenient and the programmes are prepared with the help of experts in the field and experienced production teams. Programmes from abroad are also broadcast to offer the viewer a window to the world.

GyanDarshan transmissions, uplinked from the earth station of EMPC-IGNOU New Delhi, can be accessed all over the country throughout the year and round the clock without any break. GyanDarshan signals can be conveniently received without any special equipment.

GyanDarshan I is the main GyanDarshan channel. Its programmes include the 'countrywide classroom' (CWCR) produced by CEC-UGC, 'techno vision' produced by IITs and 'Bhasha Mandakini' produced by the Rashtriya Sanskrit Sansthan. Bhasha Mandakini was launched on September 5, 2003. Under BhashaMandakini, the 'Sanskrit Bhasha' language series of programmes are developed by the Rasthriya Sanskrit Sansthan in collaboration with other Sanskrit institutes of higher learning such as the Rashtriya Sanskrit Vidyapeeth (Tirupati), Shri Lal Bahadur Shastri Rashtriya Sanskrit Vidyapeeth (Delhi) and other Sanskrit institute and universities of repute. Bhashamandakini is planned to include all languages in the course of time.

Gyan Darshan-2 is an exclusive educational satellite channel to provide interactive distance education using DVB-RCS technology. It offers distance education through Virtual Class Room mode and provides access to digital repository of educational content hosted at IGNOU.

Gyan Darshan-2 and TDCC (Training & Development Communication Channel) are one-way video and two-way audio satellite-based interactive systems. Teleconference through Gyandarshan and TDCC essentially follow the same principle except that the former operates on C-band while the latter on extended C. The signals can be received across the country.

TDCC is conceived as a 'close user group' and was introduced in 1993 under the aegis of DECU (ISRO) who pioneered the system of one-way video and two-way audio

communication system for educational applications. TDCC has 6 up-linking facilities in the country and approximately 1000 downlinks established so far.

Live interaction or teleconference is yet another and the latest intervention in the distance education system. It provides a human face to the otherwise remote and distant learner. The viewers can directly access teachers/experts in the studio during an ongoing programme, express their views and clear their doubts regarding specific topics/issues as the programme goes on. IGNOU provides free interactive telephonic facility in 79 cities through its toll free number 1-600-1-12345 for teleconferencing on Gyan Darshan-2, TDCC and IRC(Delhi).

5.6.4 The Sakshat Portal

SAKSHAT: A One Stop Education Portal was launched on October 30, 2006 as a pilot project to facilitate lifelong learning for students, teachers and those in employment or in pursuit of knowledge free of cost to them. The content development task for 'SAKSHAT' was looked after by the Content Advisory Committee (CAC) for the respective subject, which consisted of representatives from educational institutions like IGNOU, Delhi University, Kendriya Vidyalaya Sangthan (KVS), Navodyaya Vidyalaya Sangthan (NVS), National Institute of Open Schooling (NIOS) and National Council for Educational Research and Training (NCERT) and prominent academicians in the field. In addition, some NGOs had also provided the contents developed by them free of cost for this portal.

The vision is to scale up this pilot project 'SAKSHAT' to cater to the learning needs of more than 50 crore people through a proposed scheme of 'National Mission in Education through Information and Communication Technology (ICT). The scheme is to provide connectivity to all institutions of higher learning to world of knowledge in the cyber space, to leverage the potential of ICT, in providing high quality knowledge modules with right e-contents, to address to the personalized needs of learners, in order to take care of their aspirations. These modules are to be delivered through 'SAKSHAT'. The scheme will also have a provision of certification of competencies of the human resources acquired through formal or non-formal means as also to develop and maintain the database of profile of human resources.

The efforts of Ministry of Human Resource Development (MHRD) have already been geared under NME-ICT towards creating an open house for knowledge. The approach would be to scrupulously avoid re-inventing the wheel. What would be attempted is harnessing a large number of knowledge resources in a manner that adds value to them by making them more personalized and useful to the lifelong learner / student. The effort would also involve content packaging and integration to suit specific needs of the students at various levels or with different kinds of talent / mental prowess. The portal would boldly seek to address many of the shortcomings in our education system by bringing together the best experts in the country in their respective fields and best available knowledge resources on the web in the public domain. It would seek to standardize the curriculum and learning materials across the country and keep them in tune with the latest trends world over so that Indian learners do not lag behind. Teacher- independent modules could work wonders in remote areas where the learner does not have access to good quality teachers or wants to study independently. Such a system could also enable a lot of community learning and formation of groups of learners of a given caliber from diverse fields to enable fusion of best practices of one field of knowledge with those of the other. It may also galvanize rural communities who may share their problems with each other and find solutions from the locally available knowledge and talent. In case, solutions to problems being faced by a community are not forthcoming within a geographic locale, the horizon could be expanded as the internet enables us to expand the boundaries to include even the entire world. Many educational services like scholarships, testing and certification, student / scholar / teacher / institution ratings, guiding demand and supply of talent through opportunity surveys and forecasting etc. are also expected to be delivered through this portal.

5.6.5. e-GyanKosh

eGyanKosh is a National Digital Repository to store, index, preserve, distribute and share the digital learning resources developed by the Open and Distance Learning Institutions in the country. It is basically a web portal that serves all study materials on electronic forms for free access to the students of India Gandhi National Open University. Others can also have access to the site's contents after registration.

5.7 VIRTUAL LABORATORY AND HAPTICS TECHNOLOGY

5.7.1. Virtual Laboratory

A virtual laboratory is one where the student interacts with an experiment or activity which is intrinsically remote from the student or which has no immediate physical reality. The Virtual Laboratory is an interactive environment for creating and conducting simulated experiments: a playground for experimentation. It consists of domain-dependent simulation programs, experimental units called objects that encompass data files, tools that operate on these objects. Current release is focused on graphical applications of L-systems, with an emphasis on the generation of fractals and the modeling of plants. The objects are organized, accessed and manipulated using domain-independent vlab system programs.

According to Harry & Edward, 2005, Virula Labs provide for "laboratory experiment without real laboratory with its walls and doors. It enables the learner to link between the theoretical aspect and the practical one, without papers and pens. It is electronically programmed in computer in order to simulate the real experiments inside the real laboratories."

The main components of the virtual labs are the following:

- The lab sets & equipments: The virtual lab is considered integral to the traditional lab but not an alternative to it. The existence of the traditional lab is very necessary, but in lower numbers and requirements, which help in the possibility of using it by several users outside the lab.
- Computer devices: They are represented in personal computers, which are linked to the local net or to the international net so that the student can work directly in the lab, or distantly at anywhere and anytime.
- Communication network & the related hardware: In case of performing experiments electronically, all the sets should be linked to the computer, because the link between the users with lab will be through digital communication.
- The Programs of the Virtual Lab: These programs are represented in the simulation programs, which are designed by professionals. It is necessary to design this program in an interesting and attractive form; as these programs were designed to attract students' attentions and urge them to complete the

experiment. This is maintained by the animation techniques, video, and the three dimensions pictures.

- Co-operation Programs & Management: These programs are concerned with the method of managing the lab and the ones who perform the experiment, including students and researchers. These special programs register students in the lab program and determine the kinds of access that should be provided to each user in the different experiments.

Virtual laboratory environments can be divided into following categories:

- *Simulations*

  Simulations are imitations of operating systems through time, via computers. These represent a process on the basis of a model that is cheaper, faster, less risky and more affordable than the real process.

- *Network applets*

  The applets are experimental devices in small virtual laboratories and are quite popular in science subjects. They are small in size and easily transported and they can be used regardless of the operating system type.

- *Virtual labs*

  Virtual labs (virtual laboratories) simulate a virtual operating system, the computer screen, Science laboratories, exploiting the potential offered by modern media technology key feature technical interaction and direct and plausible manipulation of objects and parameters.

- *Virtual Reality Laboratories (VRL)*

  VRLs are computer based and highly interactive. The user becomes a participant in a "virtually real" world, in an artificial three-dimensional optical environment. These workshops are essentially an interface high level including real time three-dimensional simulations through different sensory channels.

- *Laboratories Controlled by Distance (Remote Labs)*

  Workshops controlled remotely (remote labs, otherwise known as online labs or workbenches) include real experiments conducted from a distance with the use of telecommunications, while the user uses this technology from another location.

Virtual labs can be very useful in the teaching of Science, particularly in cases where:

- The experimental activities are to be done quickly and do not easily allow observation and safe measurement,
- the experimental process is very slow and / or complex and not compatible with the teaching time available,
- the experiments involve risks to the health and physical integrity of learners and/or
- the learning activities require modeling.

5.7.2. Haptics Technology

The word "Haptics" derives from the Greek *'haptein'* meaning "to fasten" and generally refers to the sense of touch.In the field of virtual reality, haptics is the science of applying touch sensation andcontrol to interaction with computer applications. The term "Haptics" was first introduced in 1931 and its origins can be traced back to the Greek words 'haptikos' meaning 'able to touch' and 'haptesthai' which translates to 'be able to lay hold of' (Revesz, 1950).Today, the term, in its broadest sense, encompasses the study of touch and the human interaction with the external environment via touch. By using special input/output devices (joysticks, data gloves, or other devices), users can receive feedback from computer applications in the form of felt sensations in the hand or other parts of the body. In combination with a visual display, haptics technology can be used to train people for tasks requiring hand-eye coordination, such as surgery and space ship maneuvers. It can also be used for games in which one can feel as well as see his or her interactions with images. For example, one might play tennis with another computer user somewhere else in the world. Both of them can see the moving ball and, using the haptic device, position and swing their tennis rackets and feel the impact of the ball. Haptics can be subdivided into three areas as follows:

1. Human Haptics : the study of human sensing and manipulation through touch.
2. Machine Haptics : the design, construction, and use of machines to replace or augment human touch.
3. Computer Haptics : algorithms and software associated with generating and rendering the touch and feel of virtual objects (analogous to computer graphics).

Haptics technology started in the late 50's early 60s, with scientists such as Ralph Mosher (1962-64) who used the technology as a component in his robotic systems and exoskeletons. Traditionally human interactions with computers have been predominantly visual, using text, data or imagery on screen. The keyboard or mouse is used to input and manipulate this data but there is no physical response relayed back to the user as a result of those actions. Haptics can provide both touch (tactile) and motion feedback and can simulate physical properties, such as the weight of an object, the user can feel friction, texture or resistance and the haptic hardware can communicate those properties and lets the users sense what is happening on the screen. Haptic interfaces come in many forms, such as touch mice, gloves, styluses and joysticks. A common arrangement uses an articulated stylus to link a person's fingers to a computer interface. Haptic technology is intuitive. Haptics is hoping to increase the human-computer interaction by enhancing the quality of communication between humans and their physical environment through touch. This takes advantage of the sense of touch by applying forces, vibrations, or emotions to the user. When tactile feedback, address things like devices such that they provide users with the sensations of heat, pressure, and texture, overall motion that support the already existing visual and audio aspects.

There are so many potential opportunities for haptics technology applications such as Entertainment, Robots, Wearable Haptics, and Touch screens etc. In the field of education, applications of haptics technologies are still at the beginning stages. The sense of touch and force-feedback can offer great improvements to the existing teaching methods, thus enhancing the quality of education procedures.Haptics can be so effective in enhancing the students' learning, as it involves active and intentional participation and multi-sensory experiences. For example, students are able to feel Nano-sized materials such as viruses that are imaged under an atomic force microscope. Further, combination of kinesthetics and sensory perception creates particularly strong neural pathways in the brain.

Check your Progress-IV
Note: a) Fill in the blanks with right answers for Qns, 13 to 15 and choose the right answer for the Qns. 16 to 18 . b) Compare your answers with those given at the end of the units. 13. FOSS stands for _____.
14. Programmes for Gyanvani are produced at IGNOU's _____.
15. CWCR stands for _____.
16. SAKSHAT will be an e-learning portal for a. Secondary Level Students b. Higher Secondary Level Students c. Under Graduate Level Students d. All the above
17. Which one of the following will give higher levels of interactivity? a. Virtual Labs b. Simulations c. Virtual Reality Labs d. Remote Labs
18. Haptics Technology can promote learning through a. Visual Experiences b. Auditory Experiences c. Multi-sensory Experiences d. Tactile Experiences

5.8. LET US SUM UP

In this unit, we have discussed the relationship between the media of communication and the message being communicated, different modes and forms of communication and messages, message credibility and media fidelity and the SMCR model of communication. Further, we have focused on the Government of India's initiative called NME-ICT in terms of its philosophy, objectives and components. Besides, we have also seen some of the initiatives and technologies for technology enhanced learning.

5.9. UNIT END ACTIVITIES

1. Explain with suitable examples the different types, modes and forms of Communication and Messages.

2. Explain in detail the different components of the SMCR model.

3. Discuss the principles, key-objectives and components of NME-ICT.

4. Write detailed notes on: Spoken Tutorials, GyanVani, GyanDarshan, Sakshat and e-GyanKosh.

5. Explain the role of Virtual Laboratories and Haptics Technology in enhancing science education.

5.10. Check your Progress: Answers

1. Based on the medium used, communication is classified into two types as **Verbal** and **Non-Verbal**.
2. The nature of relationship that exists between 'medium' and 'message' is **symbiotic**.
3. The communication that goes on among friends and family members is mostly **informal**.
4. State whether true or false: c. Different modes of communication carry messages in different forms. - **True** d. All media of communication carry messages in the same form. - **False**
5. When we believe a message, just because it comes from a reliable person, it refers to **message credibility**.
6. In the context of a communicating a message, 'AAB' stands for **accurate**, **authentic** and **believable**.
7. The 'Channel' in the SMCR model refers to the **medium**.
8. State whether true or false: a. Messages sent and received on high-fidelity media are clear and complete. - **True** b. Low-fidelity media carry messages of low value. - **False**
9. The NME-ICT was launched during the **Eleventh** Five Year Plan.
10. SCORM stands for **Sharable Content ObjectReference Model**.
11. Orcad and Silab are **Open Source Simulation Packages**.
12. NME-ICT strives to provide education through a. Radio b. Television

c. Computers **d. <u>All the above</u>**
13. FOSS stands for **<u>Free and Open Source Software</u>**.
14. Programmes for Gyanvani are produced at IGNOU's **<u>Electronic Media Production Centre</u>**.
15. CWCR stands for **<u>Countrywide Classroom</u>**.
16. SAKSHAT will be an e-learning portal for a. Secondary Level Students b. Higher Secondary Level Students c. Under Graduate Level Students **d. <u>All the above</u>**
17. Which one of the following will give higher levels of interactivity? a. Virtual Labs b. Simulations **c. <u>Virtual Reality Labs</u>** d. Remote Labs
18. Haptics Technology can promote learning through a. Visual Experiences b. Auditory Experiences c. Multi-sensory Experiences **d. <u>Tactile Experiences</u>**

5.11. SUGGESTED READINGS AND REFERENCES

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Unit VI: ICT in Teacher Education

STRUCTURE

6.0 INTRODUCTION

As you have been learning about Information and Communication Technologies and their roles in the teaching-learning and evaluation processes in the different units earlier, by now you must have developed a deeper understanding of the whole idea of ICT in Education in terms of what they can do to learners and teachers. In ICT-enabled educational environments, a teacher without ICT knowledge, skills and attitude will be misfit. In this context, the need for integrating ICT into Teacher Education becomes important and urgent. Hence, in this unit, we will discuss ICT Integration into Teacher Education in all its dimensions. In addition, we will also focus our attention on ICT for Educational Management.

6.1 LEARNING OUTCOMES

After working through this unit, you will be able to:

- Understand the need and significance of ICTs in the context of Teacher Education;
- Understand the barriers in ICT integration into Teacher Education;
- Appreciate the role of ICTs in quality enhancement of Teacher Education;
- Understand the role of ICTs in Educational Management; and
- Understand the different ICTs for professional development of teachers

6.2 INTEGRATING ICTS IN TEACHER TRAINING

In the Foreword to UNESCO's Planning Guide for ICT in Teacher Education, the John Daniel (2002) observed, "Educational systems around the world are under increasing pressure to use the new information and communication technologies (ICTs) to teach students the knowledge and skills they need in the 21st century. The 1998 UNESCO World Education Report, *Teachers and Teaching in a Changing World*, describes the radical implications ICTs have for conventional teaching and learning. It predicts the transformation of the teaching-learning process and the way teachers and learners gain access to knowledge and information. With the emerging new technologies, the teaching profession is evolving from an emphasis on teacher-centred, lecture-based instruction to student-centred, interactive learning environments. Designing and implementing successful ICT-enabled teacher education programmes is the key to fundamental, wide-ranging educational reforms. Teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change. For education to reap the full benefits of ICTs in learning, it is essential that pre- and in-service teachers are able to effectively use these new tools for learning. Teacher education institutions and programmes must provide the leadership for pre- and in-service teachers and model the new pedagogies and tools for learning."

The above observation is of great significance, as it elaborates on the systemic changes that ICTs are bringing into Education and the resultant need for ICT integration into pre-service and in-service teacher training systems. In line with the UNESCO's policies and priorities, the Government of India's National Council for Teacher Education (NCTE) has also put emphasis on ICT integration into Teacher Education in its National Curriculum Framework for Teacher Education (NCFTE, 2010).

6.2.1 UNESCO'S Framework for ICTs in Teacher Education

The UNESCO developed a a holistic framework to assist in designing the integration ofInformation and Communication Technologies (ICTs) into Teacher Education as given below (Fig. 6.1).

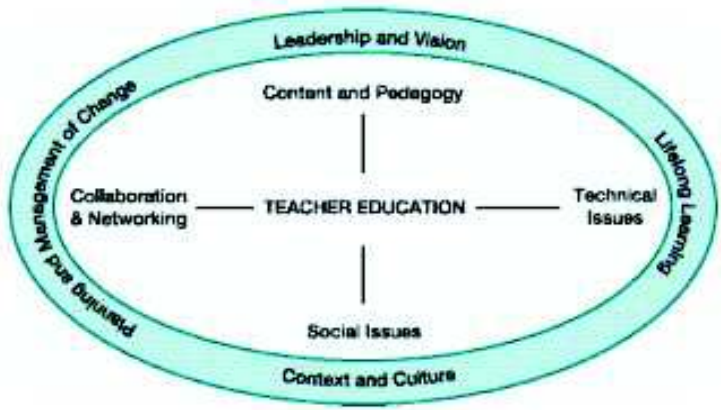

Fig 6.1. UNESCO's Framework for ICTs in Teacher Education

In the above given framework, the encompassing oval underscores that the framework should be interpreted as a whole.The curriculum framework is comprised of four clusters ofcompetencies encircled by four supportive themes. The curriculum frameworkalso suggests that each teacher is allowed to interpret the framework within hisor her context and personal approach to pedagogy, which is always related to thesubject discipline or content area, rather than to the technology itself.The fourthemes that bind the curriculum as a whole are described briefly below, followedby descriptions of the four core competencies.

Four Themes

Context and Culture identifies the culture and other contextual factors that mustbe considered in infusing technology into teacher education curriculum. Itincludes the use of technology in culturally appropriate ways and the developmentof respect for multiple cultures and contexts, which need to be taught andmodelled by teachers. *Leadership and Vision* are essential for the successful planningand implementation of technology into teacher education and require bothleadership and support from the administration of the teacher education institution.*Lifelong Learning* acknowledges that learning does not stop after school.In common with the other themes, it is important that teachers and teacherpreparation faculty model lifelong learning as a key part of implementation, andas an ongoing commitment to ICTs in teacher education. *Planning andManagement of Change* is the final theme, born of

today's context and accelerated by technology itself. It signifies the importance of careful planning and effective management of the change process. These themes may be understood as a strategic combination of approaches that help teacher educators develop the four core competencies. The core competencies may be seen as clusters of objectives that are critical for successful use of ICTs as tools for learning.

Four Competencies

The ICT competencies are organized into four groups. *Pedagogy* is focused on teachers' instructional practices and knowledge of the curriculum and requires that they develop applications within their disciplines that make effective use of ICTs to support and extend teaching and learning. *Collaboration and Networking* acknowledges that the communicative potential of ICTs to extend learning beyond the classroom walls and the implications for teachers development of new knowledge and skills. Technology brings with it new rights and responsibilities, including equitable access to technology resources, care for individual health, and respect for intellectual property included within the *Social Issues* aspect of ICT competence.

Finally, *Technical Issues* is an aspect of the Lifelong Learning theme through which teachers update skills with hardware and software as new generations of technology emerge.

Keeping the holistic nature of this curriculum in mind, the model illustrates the interdependence of the themes and competencies – all themes interacting with all competencies. The following is a description of the four competencies.

Pedagogy

The most important aspect of infusing technology in the curriculum is pedagogy. When implementing the pedagogical competencies for infusing technology, the local context and the individual approach of the teacher linked with that of their subject discipline must be paramount. Teachers move through stages as they adopt ICTs. Initially, the teacher adopting technology applies it simply as a substitute for current teaching practice where technology is not used (e.g., teacher lecture becomes electronic presentation supporting lecture, students writing papers by hand become students writing papers using a word processor, course syllabus on paper becomes course syllabus online). The adaptation of ICTs by teachers should (and does) challenge and support changes in teaching practice, building upon individual pedagogic expertise. As teachers' pedagogical practices with new technologies

continue to develop, and organizational support and access to ICTsgrow, it becomes possible to move beyond the adaptation of ICT applications that fit with existing practice. Transformation of the educational process will start to emerge and may move toward more student-centred learning environments. In summary, as professional teachers educators continually develop their pedagogical use of ICTs to support learning, teaching, and curriculum development, including assessment of learners and the evaluation of teaching, they will:

- demonstrate understanding of the opportunities and implications of the uses of ICTs for learning and teaching in the curriculum context;
- plan, implement, and manage learning and teaching in open and flexible learning environments;
- assess and evaluate learning and teaching in open and flexible learning environments.

Collaboration and Networking

ICTs provide powerful new tools to support communication between learning groups and beyond classrooms. The teacher's role expands to that of a facilitator of collaboration and networking with local and global communities. The expansion of the learning community beyond the classroom also requires respect for diversity, including inter-cultural education, and equitable access to electronic learning resources. There is growing evidence that communities learn through collaborative activities that reflect diverse cultures in authentic projects that serve society. Both local and global understandings can be enhanced using ICTs. The development of teachers' competencies in networking and collaboration are therefore essential to ICTs in education. Through collaboration and networking, professional teachers promote democratic learning within the classroom and draw upon expertise both locally and globally. In this process, they will:

- demonstrate a critical understanding of the added value of learning networks and collaboration within and between communities and countries;
- participate effectively in open and flexible learning environments as a learner and as a teacher;
- create or develop learning networks that bring added value to the education profession and society (locally and globally); and
- widen access and provide learning opportunities to all diverse members of the community, including those with special needs.

Social and Health Issues

The power to access information and communication technologies brings increased responsibilities for everyone. Legal and moral codes need to be extended to respect the intellectual property of freely accessible information. Copyright applies to web resources, too, regardless of the ability of the user to purchase the rights. This respect can be modelled in classroom practice with students from an early stage. The challenges faced by society, locally and globally, by adoption of technology should become part of the curriculum in a way that involves learners and helps them to develop an effective voice in the debates. Health issues of ICTs also need to be addressed. For example, prolonged engagement with ICTs (including screens and keyboards) requires appropriate support for the body, especially the hands and back. Similarly, hazards of electricity and other power sources require care and the modeling of safe practice. The technology standards for students and teachers from the International Society for Technology in Education (ISTE) offer guidelines for social issues, under the topic of social, ethical, legal, and human guidelines relating to the responsible use of technology. In summary, professional teachers need to understand social and health issues surrounding ICTs and apply that understanding in their practice. Specifically, they need to:

- understand and apply the legal and moral codes of practice, including copyright and respect for intellectual property;
- reflect upon and lead discussion of the impact of new technology on society, locally and globally; and
- plan and promote healthy use of ICTs, including seating, light, sound, and related energy sources (including electricity and radio signals).

Technical Issues

Technical issues regarding integration of ICTs into the curriculum include the technical competencies and provision of both technical infrastructure and technical support for technology use throughout the curriculum. Technical competencies of the individual are perhaps the most obvious but perhaps the least important in the long-term because use of technology should ultimately become transparent. When technology is robust and used competently, it moves from the foreground to the background and remains essential. This is similar to the process of gaining any new skillset, such as riding a bicycle. Each new skill must be consciously attended to and practiced until it becomes an automatic response. Competent bike riders do not focus on balance and the pedals of the bike, they focus on navigation and safety. However, we do recognize that in many contexts, the lack of

technology competence, infrastructure, and technical support can create barriers to access and reliability resulting in diminished support for the curriculum. Additional technical support or training is therefore advised, depending on local circumstances. Simply providing the technology for learners and teachers is not enough. The type and level of access is also important. ICTs will improve learning very little if teachers and students have only rare and occasional access to the tools for learning. Reasonable access to ICTs has been shown to be important for the acquisition of competence with hardware and software, especially for teachers. For example, provision of portable computers is an important strategy for ICTs teacher education. Teachers with portable computers can use them for both teaching in school and for other professional activities elsewhere.

In summary, professional teachers, provided with reliable technology infrastructure and technical assistance, demonstrate continual growth in their skill with ICTs and knowledge of their current and emerging applications within education and local and global society. Specifically they are able to:

- use and select from a range of ICT resources to enhance personal and professional effectiveness; and
- willingly update skills and knowledge in the light of new developments.

6.2.2 ICT Skills as Needs of the Digital Age Teachers

Today's teachers in order to be truly the teachers of the digital era have to assume new roles as detailed below:

- Facilitators helping learners to make judgments about the quality and validity of new source and knowledge;
- Open-minded and critical independent professionals;
- Active cooperators and collaborators; and
- Mediators between learners and what they need to know.

For teachers to be able to integrate the use of ICTs in teaching various skills, they need to be trained in vast array of competence such as:

- Operating computers and using basic software for word processing, spreadsheets, e-mail, etc;
- Evaluation and using computers and related ICT tools for instruction;

- Appling current instructional principles, research, and appropriate assessment practices to the use of ICTs;
- Evaluating educational software;
- Creating effective computer based presentations;
- Searching the internet for resources;
- Integrating the ICT tools into student learning activities across the curriculum;
- Creating multimedia documents to support instruction;
- Creating hypertext documents to support instruction;
- Demonstrating knowledge of ethics and equity issues related to technology; and
- Keeping up-to-date far as educational technology is concerned.

6.2.3 Barriers in ICT Integration into Teacher Education

Although educators acknowledge the importance of ICT in teaching-learning process and teacher training, difficulties continue to be encountered during the processes of adopting these changes. These difficulties are called 'barriers' i.e., conditions that make it difficult to progress or achieve the objective. These barriers can be classified on different bases as extrinsic and intrinsic barriers, institution-level barriers and teacher-level barriers, material and non-material barriers. However, the following are the key barriers in ICT Integration into teaching and teacher training:

- Lack of Teacher Motivation
- Lack of Teacher Confidence
- Lack of Teacher Competence
- Teachers' Negative Attitude
- Teachers' Resistance to Change
- Lack of Time in School / Teacher Training Institution
- Lack of Effective Training
- Lack of ICT Infrastructure
- Lack of Technical Support

Check your Progress-I

Note:

c) Fill in the blanks with right answers for Qns, 1 to 3 and answer the Qn. 4 as instructed.

d) Compare your answers with those given at the end of the units.

1. **The Four ICT Competencies, given in the UNESCO's Framework are** _____ _____ __.

2. **The Four supportive themes, given in the UNESCO's Framework are** _____ _____ __.

3. **NCFTE stands for** _____.

4. **State whether true or false:**

   a. Most of the barriers in ICT integration can be overcome by a motivated teacher.
   b. The UNESCO's Framework for ICT in Teacher Education can be interpreted in different ways in different contexts.

6.3 ICT SKILLS INTEGRATION INTO TEACHER EDUCATION

ICT is a very broad domain, and affects all aspects of life, the socio-cultural, the political and the economic. Since education is concerned with preparing learners to become responsible citizens, there is a great need for student-teachers to acquire a basic understanding of ICTs, including the Internet. So for, focus has been on basic proprietary software; however, we need to expose the prospective and in-service teachers to a larger

gamut of ICTs, so that they have basic understanding and can develop skills in areas that interest them. The course curriculum should hence cover the following:

- Basic hardware knowledge - Computers – laptops, net-books, tablets, radio and audio recorders, camera, Printer/peripherals; Cell phones
- Basic software knowledge - Public operating systems (e.g. GNU/Linux) – virus free, free of cost/free to share which support most languages, and basic software applications that are also free to share, modify and use for office automation, web browsing etc.
- Basic knowledge of Internet and web based tools and resources including of cyber security – avoiding dangers and risks as well as basic website and web tools use (for creating and maintaining institutional resource portals etc.)
- Larger socio-cultural, political and economic implications of the emerging network society, and effect of ICTs.

The goal in ICT literacy must be to expose teachers to a wide variety of ICT resources – hardware, software as well as digital learning resources. This requires an emphasis on using available free / public digital resources. Teachers must not treat ICTs as a black box – they should be taught to install even the operating system, open up hardware to study components. Programs that have done this (e.g. Kerala's IT@schoolsprogramme) have seen enormous confidence developed in teachers. Learning to install software and freely installing it on multiple computers (without such act being a violation of law) serves as a significant inhibition destroying process and encourages teachers to begin a journey of learning in the digital world. Teachers become learners and teachers instead of being consumers/users who have no idea and no right to study, share or customize resources.

According to Shelley (2004), with proper training in using technology teachers should develop the following techno-pedagogic skills:

- Create relationships between active learning and active teaching
- Develop an appreciation and an understanding of the potential of technology
- Learn to be authors of multimedia software
- Develop leadership skills and become role models for successful integration
- Understand the power of technology integration
- Design integrated curriculum activities
- Learn the benefits of technology in the classroom

- Develop ownership of the technology through authentic experiences
- Learn to motivate students with technology
- Achieve success by becoming informed and reflective decision makers
- Become advocates for technology integration

Welliver's Instructional Transformation Model (Welliver, 1990) has teachers progressing through five hierarchical states in order to integrate ICT effectively as given in the following figure:

1. Familiarization	Teachers become aware of technology and its potential uses.
2. Utilization	Teachers use technology, but minor problems will cause teachers to discontinue its use.
3. Integration	Technology becomes essential for the educational process and teachers are constantly thinking of ways to use technology in their classrooms
4. Reorientation	Teachers begin to re-think the educational goals of the classroom with the use of technology
5. Revolution	The evolving classroom becomes completely integrated with technology in all subject areas. Technology becomes an invisible tool that is seamlessly woven into the teaching and learning process.

Fig6.2: Welliver's Instructional Transformation Model

The Welliver model presumes that integration of ICT proceeds in a linear manner from the initial familiarization with the technology to the utilization of technology, then moves towards the beginnings of manipulation and eventually to more innovative ICT usage.

6.4 ICT FOR QUALITY IMPROVEMENT IN EDUCATION AND TEACHER TRAINING

Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills,

and by enhancing teacher training. ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment.

Motivating to learn: ICTs such as videos, television and multimedia computer software that combine text, sound, and colorful, moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered. More so than any other type of ICT, networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events.

Facilitating the acquisition of basic skills: The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programs use repetition and reinforcement to teach the alphabet, numbers, colors, shapes and other basic concepts. Most of the early uses of computers were for computer-based learning (also called computer-assisted instruction) that focused on mastery of skills and content through repetition and reinforcement.

Enhancing teacher training: ICTs have also been used to improve access to and the quality of teacher training. For example, institutions like the Cyber Teacher Training Center (CTTC) in South Korea are taking advantage of the Internet to provide better teacher professional development opportunities to in-service teachers. The government-funded CTTC, established in 1997, offers self-directed, self-paced Web-based courses for primary and secondary school teachers. Courses include "Computers in the Information Society and Education Reform," and "Future Society and Education." Online tutorials are also offered, with some courses requiring occasional face-to-face meetings. In China, large-scale radio-and television-based teacher education has for many years been conducted by the China Central Radio and TV University, the Shanghai Radio and TV University and many other RTVUs in the country. At Indira Gandhi National Open University, satellite-based one-way video- and two-way audio-conferencing was held in 1996, supplemented by print-materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutes in Karnataka State. The teachers interacted with remote lecturers by telephone and fax.

Check your Progress-II
Note: e) Fill in the blanks with right answers for Qns, 5 to 7 and answer the Qn. 8 as instructed. f) Compare your answers with those given at the end of the units. 5. **The key advantages of Public Operating Systems are _____, _____, and _____.**
6. IT@School Programme operates in the state of _____.
7. The final goal of Welliver's model is _____.
8. State whether true or false: a. South Korea's CTTC offers both pre-service and in-service training. b. IGNOU is the pioneer in India in ICT-based in-service training.

6.5. ICT FOR IMPROVEMENT IN EDUCATIONAL MANAGEMENT

Information and Communication Technology (ICT) plays a vital role in supporting powerful, efficient management and administration in education sector. It is specified that technology can be used right from student administration to various resource administration in an education institution. ICT in Educational Management is needed to create efficiency and effectiveness in the following aspects of administration and management:

Proper Utilization of Resources: If we see the current scenario it is very difficult to the track the teachers as well as students movement and progress at college/university, state and central level. It very difficult to track the assets and ultimately this is causing the impact on financial planning and budgeting and efficient tracking of available resources and its utilization.

***Effective Decision Making*:** The information present in the educational institutions is in fragmented and fuzzy form. And it is generally compiled in non-standard formats. Manual

handling of huge data is very difficult and causes delayed information collection and compilation. This will effect in decision making process for quality education.

Increasing Coordination: Because of lack of timely, structured and efficient information sharing, there is a chance of duplication of data collection and compilation. This leads to lack of coordination between departments and directorates.

Planned Management: The institution must hold summary of the information regarding performance of each subsystem. It needs to be made available regularly to the principal so that he/she can analyze the effectiveness of existing programme. The principal should have the complete and accurate information to consider the likely impact of change if necessary.

Access to the Stakeholders: The institution must maintain data on students so that it can be easily accessible to the parents, Government, students and the institution itself.

***School Improvement and Development*:** The institution must hold the information on students' achievement so that the government or the management can monitor the performance of the institutions and intervene where progress is weak. It can also help of sharing of good practices where progress is good.

***Backing the student*:** The institution needs to hold sufficient details on students to enable it to identify those students potentially at risk. The institution must be able to follow their progress through education and provide them special educational provisions.

***Reducing Workload*:** Manual work leads to huge workload for the administrative staff of the institution. Information communication technology can ensure technology enabled planning and institutional administration.

The following are the areas of Educational Management where ICT can be Implemented for Efficient Working of Institutions:

Learner and Scholastic Management: ICT can be used to maintain the personal record information of the students. ICT can also be useful in maintaining the record of enrolment and attendance/leave information. Fees management and examination performance and analysis can be done efficiently through ICT.

***Personnel Management*:** ICT can be used to maintain the personal record information of the staff. Attendance, leave, transfer and training information can be updated efficiently with the help of ICT. It can also be used in managing the salary and analyzing the staff performance.

***Infrastructure Management*:** Institutions can use ICT to maintain the accurate details of building, facilities available, and hardware and software facilities.

General Administration*:** ICT can be used to monitor the fund and grants. It can also be helpful in the management of inventory and procurement. To manage the above mentioned areas of the institutions effectively and efficiently and for providing the fast and accurate access of the information to the parents, teachers, students, management, community and government, the institution must use ***Institutional Administration / Management System (Institution Administration Software) which provides a single secure database structure that organizes, stores and retrieves real time information.

Institutional Management System (IMS) is a total managements system and windows-based Educational Management package with the power to revolutionize the way that university/colleges are managed. Institutional Management software is not just a technology solution but it is an educational system in itself that will improve the way institution is managed. This connects all the stakeholders of education.

6.6. ICT FOR PROFESSIONAL DEVELOPMENT OF TEACHERS

Professional development refers to a variety of activities, both formal and informal, designed for the personal and professional growth of teachers and administrators. It includes individual development, continuing education, and in-service education or staff development, as well as, curriculum writing, peer collaboration, study groups, peer coaching or mentoring, classroom visitation, attendance of conferences, action research, publication of papers, etc. Professional development activities are varied because they have to serve teachers and administrators not only at different levels of instruction or management but also at different points in their career development. It involves a wide variety of subjects and activities to insure that teachers acquire and maintain the competencies required to face the diverse challenges involved in teaching and learning. Although like training it involves the learning of new skills, more importantly, it is concerned with the development of new insights into pedagogy and stimulates an on-going reflection into one's own practice.

Technology has the potential to transform the professional environment for educators. Through the application of network technologies to research and collaborative planning, teachers can break loose from the isolating environments that the teaching profession had imposed on them in the past. Technology impactsnot only on the teaching and learning process but also on the ways and opportunities educators learn. The developments in technology influence two important aspects of education. One is the way schools train prospective teachers (pre-service) and the other is how schools design continuing education for their teachers to learn on the job either at the physical workplace or at virtual learning (in-service). Universities and other teacher training institutions have an active role in professional development beyond just providing undergraduate or graduate level teaching. This is because subject matter expertise and discipline knowledge reside in the universities. Teachers are members of learning communities; they learn from each other. Exchanging ideas with one another and solving common problems are powerful ways of learning among teachers. But the demands of teaching have often prevented regular or sustained sharing. Fortunately, technology can provide some solutions to structural problems that serve as obstacles to sustain collaboration among teachers. Inadequate training is the most important obstacle to the effective use of technology in instruction and in professional development. If teachers did not get enough of it in pre-service, then the learning gaps must be filled through in-service training.

ICTs can support effective professional development of teachers. Using ICTs as tools for training of teachers is an important as introducing the basics of ICTs to the prospective teachers. As sources of information and expertise, as well as tools for distance communication, ICTs can offer many new possibilities for teacher education.

Once teachers have mastered the basics of ICTs—operating systems, word processing, and e-mail and Internet navigation—they can use the technology to access professional development opportunities. This enables anytime, anywhere learning and overcomes the conventional limitations of face-to-face training workshops (cost, travel, accommodations, and low numbers of participants).

Many different technologies have been used to support or provide teacher professional development. Often grouped under the vague heading, “distance learning,” they include basic correspondence courses, broadcast television, interactive radio, and video. At the same time, the potential of new digital technologies (the Internet, digital radio, CD-

ROMs, DVDs) for teacher professional development is enormous. The professional development programmes involving these digital technologies can be better understood by looking through four models, based on Bob Tinker's taxonomy (2001) as detailed below:

- the course supplement model,
- the online lecture model,
- the online correspondence model, and
- the online collaborative model.

The *course supplement model* complements a traditional face-to-face teacher training course with online resources that often include readings, suggested activities, chat rooms and discussion forums, and answers to problems and tests. Many developing countries looking to improve the quality of their pre-service and/or in-service teacher professional development programs can begin here. However, this approach does not reduce costs (it increases them), nor does it replace face-to-face instructional time (the primary cost) or improve scalability of training.

The *online lecture model* offers opportunities to reduce instructional costs and reach large numbers of teachers. It emphasizes primarily one-way delivery of high-quality content. Considerable resources often are invested in developing online instructional resources, with personal contact provided over the Internet through instructor responses to assignments and exams, moderated discussion groups, online "office hours" for questions and answers, and collaborative project work. For motivated and disciplined teachers, this model can bean effective way to provide professional development at a reasonable cost, particularly in countries where qualified teachers are in short supply. However, the loss of personal contact implied by this model typically results in extremely high dropout rates.

The online *correspondence model* is similar to the online lecture model, but it usually invests fewer resources in content delivery in exchange for increased personal contact with the teacher through graded assignments and examinations. Indeed, quite a few traditional correspondence training programs that used postal systems to exchange the work of participants and instructors have transferred their courses to the Internet. The cost is relatively low, but the lower quality/quantity of instruction (much of the training is actually self-paced reading) limits this model to highly motivated teachers and specialized content.

The *online collaborative model* emphasizes the full potential of technology to enable teacher-teacher collaboration during their training course. Typically, it emphasizes asynchronous collaboration (essential for learning across time zones, less costly, and easy to implement); limited enrollment; and expert facilitation, trust-building activities among participants, explicit schedules, high-quality learning materials of many kinds, continuous assessment, and quality assurance with respect to instructional design, subject matter content, delivery, and impact. This model often requires more time (i.e., more money) to design and deliver than traditional face-to-face courses, but it does offer many advantages (higher impact, anytime/anywhere learning, modeling of what teachers may do in their classrooms with their students, etc.).

For developing countries like India, the ideal online teacher professional development program may be a hybrid of these models, combining the high-quality content delivery (lecture model)with a system of mentors/facilitators for personal feedback(correspondence model) and frequent participant collaboration on assignments/learning activities (collaborative model).

Check your Progress-III
Note: g) Fill in the blanks with right answers for Qns, 9 to 11 and answer the Qn.12 as instructed. h) Compare your answers with those given at the end of the unit. 9. **ICT integration can enhance the _____ and _____ of Educational Management.**
10. The Institution Management System is a _____.
11. Anytime anywhere learning in real terms happens only in _____.
12. State whether true or false: a. The course supplement model does not reduce the cost of training. b. Teachers can use ICTs for Professional Development only after mastering the basics.

6.7 LET US SUM UP

In this unit, we have discussed elaborately the integration of ICT into Teacher Education in terms of its need, significance and barriers. Further, we have explored the easy in which the ICTs can enhance the quality of teacher training and educational management. At the end, we have seen the opportunities thrown open by ICTs for professional development of teachers and the four different models of teacher professional development through ICTs.

6.8 UNIT END EXERCISES

1. Discuss in detail UNESCO's Framework for ICTs in Teacher Education.
2. List out the ICT skills required for the 21st century teachers.
3. What are the barriers to ICT integration into Education and Teacher Training?
4. Explain in detail 'ICT for Educational Management'.
5. Discuss the potentials of ICTs for professional development of teachers.

6.9 CHECK YOUR PROGRESS: ANSWERS

1. The Four ICT Competencies, given in the UNESCO's Framework are **Pedagogy, Collaboration and Networking, Social and Health Issues and Technical Issues.**
2. The Four supportive themes, given in the UNESCO's Framework are **Context and Culture, Leadership and Vision, Lifelong Learning and Planning & Management of Change.**
3. NCFTE stands for **National Curriculum Framework for Teacher Education.**
4. State whether true or false: c. Most of the barriers in ICT integration can be overcome by a motivated teacher. **- True** d. The UNESCO's Framework for ICT in Teacher Education can be interpreted in different ways in different contexts. **- True**
5. The key advantages of Public Operating Systems are **Virus Free, Free of Cost and Free to Share.**

6. IT@School Programme operates in the state of **Kerala.**
7. The final goal of Welliver's model is **Revolution.**
8. State whether true or false: c. South Korea's CTTC offers both pre-service and in-service training. **- False** d. IGNOU is the pioneer in India in ICT-based in-service training. **- True**
9. ICT integration can enhance the **efficiency and effectiveness** of Educational Management.
10. The Institution Management System is a **windows-based software package.**
11. Anytime anywhere learning in real terms happens only in **on-line collaboration model of training.**
12. State whether true or false: c. The course supplement model does not reduce the cost of training. **- True** d. Teachers can use ICTs for Professional Development only after mastering the basics. **- True**

6.10 SUGGESTED READINGS AND REFERENCES

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Unit VII: ICT Enriched Learning Experiences

STRUCTURE

7.0 INTRODUCTION

This unit on "ICT Enriched Learning Experiences" introduces you to certain advanced concepts like Educational Multimedia, Web Page creation for facilitating learning and academic blogging. The first part focuses on Educational Multimedia in terms of its concept, functions, uses and elements. The next part presents an overview of educational software for classroom situations and the final part shares the methods, techniques and steps involved in creating web pages and blogs for academic purposes.

7.1 LEARNING OUTCOMES

After working through this unit, the learner will be able to:

- Understand Educational Multimedia, its potential, uses and elements;
- Know the different technologies involved in educational software; and
- Create web pages and blogs for academic purposes;

7.2 EDUCATIONAL MULTIMEDIA: BASICS, ADVANTAGES, FUNCTIONS, USES AND CREATION

Multimedia has always fascinated educationists because of its strengths to communicate difficult concepts in simple ways. With the availability of more and more sophisticated computers with multimedia capabilities, the potentialities to use multimedia have also grown tremendously. Both in face-to-face and distance learning environments, the use of multimedia enriches the teaching learning experiences by providing a multi-sensory perspective.

Multimedia is a term frequently heard and discussed among educational technologists today. In essence, multimedia merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation.

The following are some of the popular definitions of Multimedia:

“Multimedia is the exciting combination of computer hardware and software that allows you to integrate video, animation, audio, graphics, and test resources to develop effective presentations on an affordable desktop computer.” (Fenrich, 1997)

“Multimedia is characterized by the presence of text, pictures, sound, animation and video; some or all of which are organized into some coherent program.” (Phillips, 1997)

As such multimedia can be defined as an integration of multiple media elements (audio, video, graphics, text, animation etc.) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media element can provide individually. (Somnaidu 2006)

Today's multimedia is a carefully woven combination of text, graphic art, sound, animation, and video elements. When you allow an end user, i.e. the viewer of a multimedia project, to control 'what' and 'when' and 'how' of the elements that are delivered and presented, it becomes interactive multimedia.

7.2.1 ADVANTAGES OF EDUCATIONAL MULTIMEDIA

Besides being a powerful tool for making presentations, multimedia offers unique advantages in the field of education. For instance, text alone simply does not allow students to get a feel of any of characters and situations in literature. In teaching biology, an instructor cannot make a killer whale come alive in a classroom. Multimedia enables us to provide a

way by which learners can experience their subject in a vicarious manner. The key to providing this experience is having simultaneous graphic, video and audio, rather than in a sequential manner. The appeal of multimedia learning is best illustrated by the popularity of the video games currently available in the market. These are multimedia programmes combining text, audio, video, and animated graphics in an easy-to-use fashion.

Multimedia enables learning through exploration, discovery, and experience. Technology does not necessarily drive education. That role belongs to the learning needs of students. With multimedia, the process of learning can become more goal-oriented, more participatory, flexible in time and space, unaffected by distances and tailored to individual learning styles, and increase collaboration between teachers and students. Multimedia enables learning to become fun and friendly, without fear of inadequacies or failure.

The pedagogical strength of multimedia is that it uses the natural informationprocessingabilities that we already possess as humans. Our eyes and ears, inconjunction with our brain, form a formidable system for transforming meaninglesssense data into information. The old saying that "a picture is worth a thousandwords" often understates the case especially with regard to moving images, as oureyes are highly adapted by evolution to detecting and interpreting movement.

For example, a photograph of Ganges in Varanasi, apart from being aesthetically pleasing, can contain a wealth of information relating to the culture, religion, geography, geology, climate, history, and economics of the area. Similarly, are cording of a politician's speech can allow us to discern significant semantic features not obvious in a written transcript. For the student, one advantage of multimedia courseware over the text-based variety is that the application looks better. If the courseware includes only a few images at least it gives relief from screens of text and stimulates the eye, even if the images have little pedagogical value. More often than not, the inclusion of non-textual media into courseware adds pedagogical value to the application. For example, a piece of courseware describing a dig at an archeological site would be more valuable to the student, if it included images of the site, such as enhanced aerial images showing features like old field boundaries, or diagrams illustrating where the digging and scanning took place. In this respect, using the text only, even in a creative way, has obvious limitations as compared to the use of both text and pictures.

7.2.2 USES AND FUNCTIONS OF EDUCATIONAL MULTIMEDIA

Educational Multimedia provides a technology based constructivist learning environment where students are able to solve a problem by means of self explorations, collaboration and active participation. Simulations, models and media rich study materials like still and animated graphics, video and audio integrated in a structured manner facilitate the learning of new knowledge much more effectively. The interactive nature of multimedia provides the room to enhance traditional "chalk-and-talk" method of teaching with more flexibility to learners to adapt to individual learning strategy. It enables both the educators and learners to work together in an informal setting. The role of educators and learners are extended. Furthermore, it encourages and enhances peer learning as well as individual creativity and innovation.

Multimedia facilitates mastering basic skills of a student by means of drill and practice. It helps in problem solving by means of learning by doing, understanding abstract concepts, provide enhanced access for teachers and students in remote locations, facilitate individualized and cooperative learning, helps in management and administration of classroom activities and learning content, and simulate real life problem handling environments.

7.2.3 ELEMENTS OF MULTIMEDIA

A Multimedia Learning environment involves a number of components or elements in order to enable learning to take place. Hardware and software are only part of the requirement. Multimedia learning integrates five types of media to provide flexibility in expressing the creativity of a student and in exchanging ideas. These are known as ‘Multimedia Elements’ as detailed below:

Text

Out of all of the elements, text has the most impact on the quality of the multimedia interaction. Generally, text provides the important information. Text acts as the keystone tying all of the other media elements together. It is well written text that makes a multimedia communication wonderful.

Sound

Sound is used to provide emphasis or highlight a transition from one page to another. Sound synchronized to screen display, enables teachers to present lots of information at once.

This approach is used in a variety of ways, all based on visual display of a complex image paired with a spoken explanation (for example, in art, pictures are 'glossed' by the voiceover; or in mathematics a proof fills the screen while the spoken explanation plays in the background). Sound used creatively, becomes a stimulus to the imagination; used inappropriately it becomes a hindrance or an annoyance. For instance, a script, some still images and a sound track, allow students to utilize their own power of imagination without being biased and influenced by the inappropriate use of video footage. A great advantage is that the sound file can be stopped and started very easily.

Video

The representation of information by using the visualization capabilities of video can be immediate and powerful. While this is not in doubt, it is the ability to choose how we view, and interact, with the content of digital video that provides new and exciting possibilities for the use of digital video in education. There are many instances where students, studying particular processes, may find themselves faced with a scenario that seems highly complex when conveyed in purely text form, or by the use of diagrams and images. In such situations, the representational qualities of video help in placing a theoretical concept into context. Video can stimulate interest if it is relevant to the rest of the information on the page, and is not 'overdone'. Video can be used to give examples of phenomena or issues referred to in the text. For example, while students are reading notes about a particular issue, a video showing a short clip of the author/teacher emphasizing the key points can be inserted at a key moment; alternatively, the video clips can be used to tell readers what to do next. On the other hand, it is unlikely that video can completely replace the face to face lecture: rather, video needs to be used to supplement textual information. One of the most compelling justifications for video may be its dramatic ability to elicit an emotional response from an individual. Such a reaction can provide a strong motivational incentive to choose and persist in a task. The use of video is appropriate to convey information about environments that can be either dangerous or too costly to consider, or recreate, in real life. For example, video images can be used to demonstrate particular chemical reactions without exposing students to highly volatile chemicals, or in medical education, where real life situations can be better understood via video.

Animation

Animation is used to show changes in state over time, or to present information slowly to students so they have time to assimilate it in smaller chunks. Animations, when combined with user input, enable students to view different versions of change over time depending on different variables. Animations are primarily used to demonstrate an idea or illustrate a concept. Video is usually taken from life, whereas animations are based on drawings. There are two types of animation: Cel based and Object based. Cel based animation consists of multiple drawings, each one a little different from the others. When shown in rapid sequence, for example, the operation of an engine's crankshaft, the drawings appear to move. Object based animation (also called slide or path animation) simply moves an object across a screen. The object itself does not change. Students can use object animation to illustrate a point – imagine a battle map of Gettysburg where troop movement is represented by sliding arrows.

Graphics

Graphics provide the most creative possibilities for a learning session. They can be photographs, drawings, graphs from a spreadsheet, or pictures downloaded from the Internet. With a scanner, hand-drawn work can be included. It is said that, "the capacity of recognition memory for pictures is almost limitless". The reason for this is that images make use of a massive range of aspects: color, form, line, dimension, texture, visual rhythm, and especially imagination.

7.2.4 MULTIMEDIA DEVELOPMENT

A significant aspect of multimedia in education is related to authoring or developing multimedia. Multimedia authoring as a form of computing has made it possible for students and teachers to construct knowledge and discover worlds which do not exist in conventional methods of learning or teaching. Above all, this new experience has defined a new concept of edutainment - a combination of education and entertainment.

The development of multimedia courseware is a complex process of Integration and Interaction. It is an integration of a technology with learning; it is an interaction of the technology with the learner and the teacher. Both integration and interaction require planning, design and implementation. Planning involves the identification of goals, the end users and the available resources.

Multimedia development projects are complex; they often involve the skills and efforts of multiple teams or people. During the development process, a project moves from story creation to technical editing, with regular collective review sessions. Each stage is designed to refine the project with attention to the stated needs, technical requirements and audience preferences. The educational multimedia development process begins with front-end analysis and ends with publication.

Though there are many models that describe the process of multimedia development, the most popular in the field of educational multimedia is the ADDIE model. The following figure illustrates this model:

Fig. 7.1 ADDIE Model of Multimedia Development

The ADDIE model is a systematic approach to the multimedia development process. It provides multimedia developers with a framework in order to make sure that their products are effective and that their creative processes are as efficient as they can possibly be. The steps involved in the ADDIE model are detailed below:

Analysis:

This step is the description process of what is going to be taught and forms the basis of all other steps. In this step, the designer determines the needs and the difference between knowledge, skills and behaviors, which the learners presently have, and behaviors which they must have or they are expected to have. In other words, needs analysis is conducted. The system is analyzed and the problem and the roots of the problem are described. The constraints are determined and the possible solutions for the problem are found.

Design:

This is the determination process of how the information is going to be learnt. In this step, the development strategy is determined in accordance with the data obtained during the analysis phase and how the objectives will be reached is clarified. In other words, it is the part where the instruction method, learning activities and evaluation process become clear. During the analysis process, the tasks are separated into learning steps, thus, the design can be implemented in a more accurate and easy way.

Development:

All of the components of multimedia are prepared during this phase. This is the process of producing the instruction materials, all the tools which will be used during instruction and any kind of support materials. The product is created during this phase and an evaluation, which is mostly for correction, is made and modifications are carried out if necessary. The detailed plan prepared during the phases of analysis and the design is implemented and all the components of the learning environment are developed and the environment is prepared for the test.

Implementation:

Regardless of whether the end use will be in the classroom, laboratory or on a computer, it is necessary to put the design into practice with the actual learners. The purpose of this part is to introduce the designed instruction in a way that it will be effective and efficient. During this phase, the students should be supported to ensure that they understand the material and they area ware of the objectives and there should be no doubt that the information is being transferred to the learner.

Evaluation:

This is the process of determining the instruction is sufficient and measuring the effect in order to check to what extent the design meets the learning objectives and the needs of learners. The evaluation is directly related to all of the previous four stages, and it may be necessary to return to any one of the previous stages at the end of this phase Moreover, at the end of the each of the stages, an evaluation is made to ensure that the process is being carried out in a more sound manner then at the end of each evaluation, modifications, if necessary, are made for the next implementation.

Check your Progress-I
Note: i) Fill in the blanks with right answers for Qns, 1 to 3 and answer the Qn. 4 as instructed. j) Compare your answers with those given at the end of the units. 1. Multimedia enables learning through_____, _____ and _____.
2. The key elements of multimedia are _____.
3. The term 'edutainment' refers to _____.
4. The two types of animation are _____and _____.
5. State whether true or false: a. The first step in multimedia development is front-end analysis. b. In multimedia development, evaluation is done only after implementation.

7.3 EDUCATIONAL SOFTWARE

Educational software are computer applications developed for the purpose of teaching and learning. Educational software encompasses a variety of forms, costs, and purposes. Programs exist to teach individual preschoolers letter names, sounds, and grammar in English as well as other languages. Other programs introduce mathematical concepts for all grades, or are aimed at helping to develop good writing skills. Some programs, such as flight simulators, teach professionals the details of their jobs. The different types of educational software are as follows:

Tutorials are designed to teach new content in a step-by-step manner. Tutorials typically provide a complete lesson on a topic including 1) presenting new information, 2) providing practice, and 3) evaluating student learning. Students should be able to work at their own pace and review material when needed. Tutorial programs are designed to provide additional instruction to students who need extra help or enrichment to students who want to explore a topic that is different from that of the rest of the class.

Drill-and-practice software is designed to help students practice facts and remember processes or procedures they have encountered previously. Basic literacy and numeracy skills, such as letter and sound identification and mathematical operations, as well as other skills that need to become automatic, are well suited for drill and practice. Typically, students are presented with a task to which they respond, which is followed by feedback on the adequacy of their responses. Some programs allow students to adjust the rate at which the problems are presented; others automatically adjust the rate of display based on students' responses. Some drill-and-practice software incorporates competition in a game-like format. It's important to remember that drill-and-practice software is designed to provide practice in areas in which students have already received instructions. Drill-and-practice software is an effective means of reinforcing knowledge to the extent that it can be recalled quickly and automatically.

Games are characterized by rules, have entertainment value, and typically involve competition. Students can compete against time constraints, for points, or with other students. Many games are available online. Some games allow students to complete drill-and-practice exercises, often within the context of earning a score. These games support low-level cognitive activities and skill acquisition and many emphasize performance goals over learning goals, but the performance goals can be directed at competition with one's self rather than with others. Others can require sophisticated skill and knowledge development such as when games incorporate aspects of simulations. Games can also take the form of board games, word games, adventure games, role-playing games, or logic games. Educational games may require students to explore and develop an understanding of complex concepts and manipulate a variety of variables in order to complete the games successfully. Games can address such complex systems as commerce, economics, diplomacy, and politics. Just as in real life situations, games often do not have one correct answer or solution and can draw upon multiple higher-order thinking skills and strategies.

Simulations allow students to experience events that are too dangerous, expensive, or difficult to experience in reality. Variables can be manipulated and processes sped up or slowed down, such as the growth of a plant or the rise and fall of a civilization, to demonstrate the effects of such manipulations. Simulations can be used to provide practice in the operation of tools and equipment prior to using the actual device. Typically, simulations are not used to introduce new content, but to provide an opportunity to illustrate ideas in action and apply skills in a safe environment. Before using a simulation, students may need

instruction in both the content of the simulation and the correct operation of the tools embedded within the simulation. There are many different types of simulations as well as applications to support them. Simulations are available for almost any grade level. They are found in elementary and secondary classrooms as well as in military settings and are even used for licensure exams in fields such as medicine.

Problem Solving Software are those that require the use of higher-order thinking skills in order to achieve a solution to the problem presented. Problem solving software can present a realistic problem for the students to solve or can be game-like, sometimes both at the same time. Typically, students develop, test, and refine hypotheses as they synthesize information to solve the problem. Problem solving software can focus on a specific subject area or require the application of knowledge across several curricular areas. It can be open-ended in nature or model specific problem-solving strategies. The problems often addressed core content areas, such as mathematics and science, but were contextualized in entertaining videos that - like real-life problems - often contained confounding information.

7.4 CREATING WEB PAGES: HTML, EDITING TOOLS, HYPERLINK AND IMAGES

In this section, we will focus on some of the basics of creating a website / web pages using HTML. Hyper Text Markup Language, commonly abbreviated as HTML, is the standard markup language used to create web pages. This is used to create web pages, as well as to create user interfaces for mobile and web applications. Web browsers can read HTML files and render them into visible or audible web pages. Web site developers use HTML to format text as titles and headings, to arrange graphics on a webpage, to link to different pages within a website, and to link to different websites.

First developed by Tim Berners-Lee in 1990, HTML is used to create electronic documents (called pages) that are displayed on the World Wide Web. Each page contains a series of connections to other pages called hyperlinks. Every web page you see on the Internet is written using one version of HTML code or another. HTML code ensures the proper formatting of text and images so that your Internet browser may display them as they are intended to look. Without HTML, a browser would not know how to display text as elements or load images or other elements. HTML also provides a basic structure of the page, upon which Cascading Style Sheets (CSS) are overlaid to change its appearance. One could think of HTML as the bones (structure) of a web page, and CSS as its skin (appearance).

If you want to understand HTML, it is important to be aware of certain terms like elements, tags, attributes etc. HTML is all about elements. To learn HTML is to learn and use different tags. Elements give structure to a HTML document and tell the browser how you want your website to be presented. Generally elements consist of a start tag, some content, and an end tag. Generally speaking, there are two kinds of tags - opening tags: <html> and closing tags: </html>. The only difference between an opening tag and a closing tag is the forward slash "/". You label content by putting it between an opening tag and a closing tag.

As we have seen above, elements give structure to a HTML document and tell the browser how you want your website to be presented. In some elements you can add more information. Such additional information is called an attribute. Attributes are always written within a start tag and are followed by an equals sign and the attribute details written between inverted commas.

To make links, you use what you always use when coding HTML: an element. A simple element with one attribute and you will be able to link to anything and everything. If you want to make a link between pages on the same website, you do not need to spell out the entire address (URL) for the document. For example, if you have made two pages (let us call them page1.htm and page2.htm) and saved them in the same folder you can make a link from one page to the other by only typing the name of the file in the link.

Tables are used when you need to show "tabular data" i.e. information that is logically presented in rows and columns. Building tables in HTML may at first seem complicated but if you keep cool and watch your step, it is actually strictly logical - just like everything else in HTML. Theoretically, you can insert anything in tables: text, links and images. But, tables are meant for presenting tabular data (i.e. data which can be meaningfully presented in columns and rows).

In the same way as tables are created and inserted to web pages, you can include images into your web page.

With the above given basics, you may attempt to create a web page, using some free on-line tutorials available on HTML. (Eg. http://html.net/tutorials/html)

7.5. CREATING BLOGS

The word ‘blog’ is a shortened form of ‘weblog’, meaning a web-based record of events, things or ideas. It is a discussion or informational site published on the World Wide Web consisting of discrete entries ("posts") typically displayed in reverse chronological order (the most recent post appears first). The one who has, maintains and authors content on a blog is called a ‘blogger’. It is one of the most famous second generation web tools (Web 2.0). Blogging has quickly become one of the most popular ways of communicating and spreading information and news. There are literally millions of blogs. It’s a great way to express yourself and also a fantastic way to share information with others. There are many companies that give you the blogging service free of cost. The most famous ones are Word Press and Blogger. Blogs are of different types as follows:

- Personal blogs - an ongoing diary or commentary written by an individual.
- Collaborative blogs - A type of weblog in which posts are written and published by more than one author.
- Microblogging - the practice of posting small pieces of digital content—which could be text, pictures, links, short videos, or other media - on the Internet.
- Corporate and organizational blogs - blogs used internally to enhance the communication and culture in a corporation or externally for marketing, branding, or public relations purposes are called corporate blogs. Similar blogs for clubs and societies are called club blogs, group blogs.

Creating a blog for you is not so difficult and time-consuming. It is easy and may not take more than half an hour. The steps involved in the process are as follows:

1. Choose your preferred blog platform. (Word Press / Blogger / any other)
2. Choose a name for your blog. (Eg. www.physicsteacher.wordpress.com)
3. Choose web hosting for your blog. (Mostly self-hosting)
4. Design your blog (Theme and Layout - Different Templates are available)
5. Create by completing the registration process.
6. Start blogging. (Better to have some content (text, images, videos etc.) ready for sharing on the blog.

Now that you know the steps involves, you may go to www.wordpress.com or www.blogpsot.com and create an academic blog for yourself. The above sites are suggested, keeping in mind their popularity and ease of use.

Check your Progress-II
Note: a) Fill in the blanks with right answers for Qns, 5 to 8 and answer the Qn. 8 as instructed. b) Compare your answers with those given at the end of the units. 6. The steps involved in ADDIE model are_____.
7. The different types of Educational Software Games are_____.
8. _____ is responsible for the appearance of pages in a website.
9. State whether true or false: a. Educational Software are meant only for school level students. b. Drill and Practice Software are good for skill-development in students.

7.6 LET US SUM UP

In this unit, we have discussed elaborately the Educational Multimedia in terms of its need, significance, elements, uses and functions and the process of multimedia development. Further, we have explored the basics of creating a website in HTML, though it requires comprehensive training through tutorials for website creation in reality. At the end, we have seen what is a blog and how can one create a blog.

7.7 UNIT END EXERCISES

1. Discuss potential of multimedia in education.
2. Describe the process of developing educational multimedia.
3. Explain in detail HTML and its different aspects for creating a website.
4. Use a free on-line tutorial and develop a web page.
5. Create an academic blog on Word Press or Blogger and post different types of content on topics in your subject.

7.8 CHECK YOUR PROGRESS: ANSWERS

1. Multimedia enables learning through **exploration, discovery and experience.**
2. The key elements of multimedia are **text, sound, video, animation and graphics.**
3. The term 'edutainment' refers to **the combination of education and entertainment.**
4. The two types of animation are **Cel-based Animation and Object-based Animation.**
5. State whether true or false:

   e. The first step in multimedia development is front-end analysis. - **True**
   f. In multimedia development, evaluation is done only after implementation. - **False**

6. The steps involved in ADDIE model are **Analyse, Design, Develop, Implement and Evaluate.**
7. The different types of Educational Software Games are **board games, word games, adventure games and role-playing games.**
8. **Cascading Style Sheets (CSS)** are responsible for the appearance of pages in a website.
9. State whether true or false:

   c. Educational Software are meant only for school level students. - **False**
   d. Drill and Practice Software are good for skill-development in students. - **True**

7.9 REFERENCES AND FURTHER READINGS

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