

Module Detail	
Subject Name	Education
Course Name	ICT in Education
Course Code	EDU504
Module Name/Title	Information and Communication Technology: meaning and nature; educational technology: concept, nature and scope of educational technology; approaches of educational technology: hardware, software, multimedia, mass media approach.
Module Code	IIE001
Pre-requisites	Learner should have scientific attitude and awareness regarding hardware and software technologies.
Learning Outcomes	<p>After going through this lesson, the learners will be able to:</p> <ol style="list-style-type: none"> 1. Analyze the concept of Educational Technology to understand its nature 2. Differentiate different approaches and apply the appropriate approach in different situation.
Keywords	ICT, framework, educational technology, hardware, software, multimedia, mass media.

2. Development Team

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1. INTRODUCTION

In this digital era, we cannot think of any field where we are not using information and communication technology. We use information and communications technology to support, enhance, and optimize the delivery of information in education. Today ICT has become an essential and indispensable tool for teaching and learning. It is a well-known fact that ICT can provide more flexible and effective ways for improving pre-service and in-service teacher training programmes and promote professional development of teachers. Integrating ICT to the education leads to improvement in student learning and teaching methods. Students who use technology judiciously in their learning have better knowledge, presentation skills, innovative capabilities, and are ready to take more efforts into learning as compared to their peer group. To use ICTs effectively and efficiently teachers need to have knowledge and skills about them.

According to UNESCO, “Measuring ICT in education is therefore important to inform policy makers in setting national priorities and developing ICT in education policy.”

2. MEANING OF ICT

For a wider use of the information, it must be communicated to people. It is only when the information reaches the intended audience; the purpose of creation of information as well as its communication would be served.

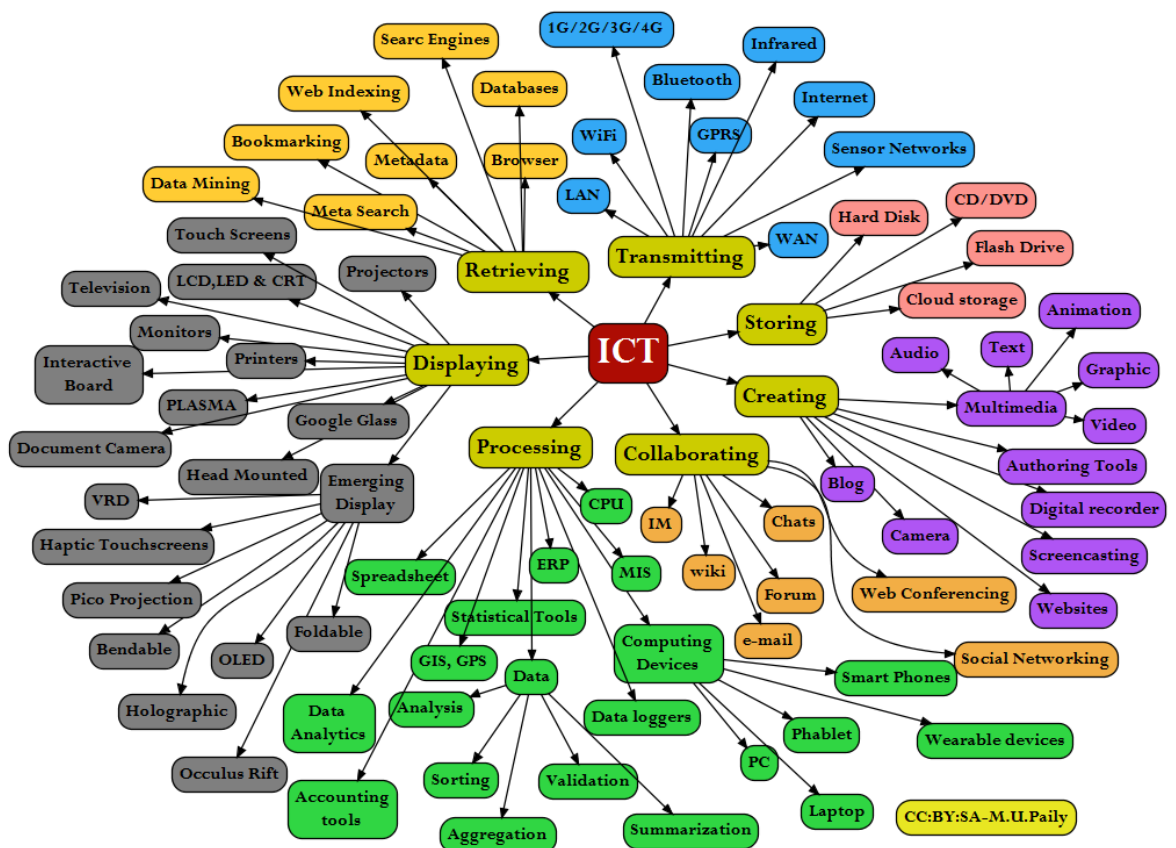
For example, in our institution we can create a worksheet for a class and can transfer the worksheet template to our mail or carry it in a pen drive. In other words, you have stored the information either in a cloud storage service (mail cloud) or in a storage device (pen drive). Now to check students’ progress we can transfer the information of student responses into a spreadsheet to analyze. Further we can record these developments in the students’ e-portfolio and can communicate students’ progress to their parents through mail.

Here we found that the information in digital form is created, stored, processed, transmitted, displayed and shared through electronic media. The technologies used in these processes are Information and Communication Technologies

With this example, let us try to arrive at a definition of ICT.

UNESCO has defined ICT as forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means. It includes not only traditional technologies like radio and television, but also modern ones like cellular phones, computer and network, hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing.

A graphical representation of what is ICT is represented in more details in the figure below (*Graphic courtesy: Dr.M.U.Paily, RIE, Mysore*)



Rhine (2006) Information and Communication Technologies can be split into three components namely the technology part; information that the technology helps to deliver; and a communication process that the technology facilitates and serves as a medium for the information.

Basically, ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning.

3. NATURE OF ICT

Having learnt that ICT has penetrated every walk of our life, it is important to understand why ICT has such a penetration? Some features of ICT have facilitated this widespread use. Let us see some of them.

- **Speed:** The innovations in internet and broadband have made the communication instantaneous. Modern mobile applications have allowed people to communicate with each other in real time. There is no time lag between two places which are thousands of kilometers apart.
- **Precision:** The information that is communicated through ICT is very precise. Since there is no time lag in the communication, there is less chances of miscommunications.
- **Versatile:** ICT can help in doing multiple tasks. Data can be gathered, verified, processed, and managed. Information can be communicated. ICT provides a multi-media platform for such communication.
- **Cost:** ICT tools seem very expensive. But when we account for their reach, they come out to be very cheap. For example, the cost involved in printing text books is very high economically as well as environmentally. On the other hand, preparing and using digital form of the book need high one-time investment in creating. But once created, it can be used by any number of users without incurring additional cost.

Here is a YouTube link of video giving additional information on ICT:

https://www.youtube.com/watch?v=zHVaw_Ouv8w

For more detailed visual description of ICT, please visit the following sites:

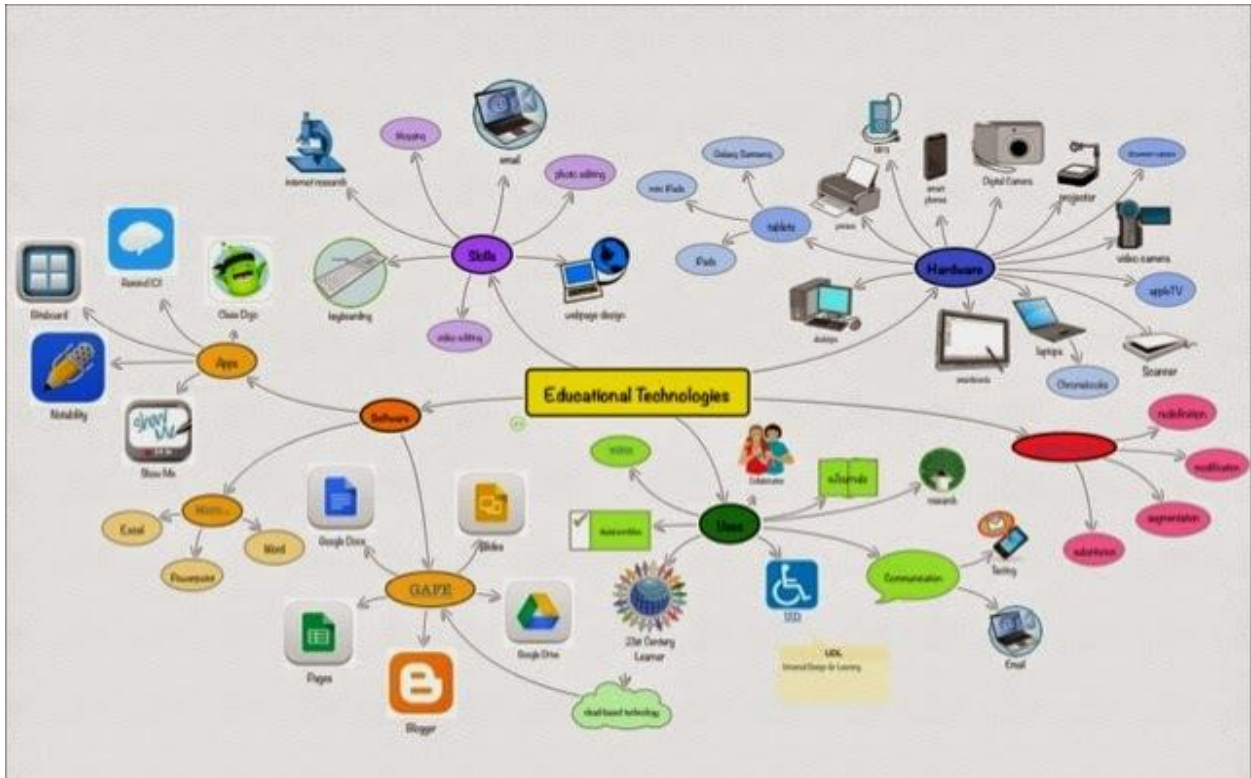
<https://www.youtube.com/watch?v=JON2IC-S4NY>

4. CONCEPT OF EDUCATIONAL TECHNOLOGY

In the early period of human civilization, when writing was unknown, verbal presentation on the part of the teachers and memorization on the part of the students were the common practices adopted in education. With the initiation of writings as the means of communication, the next advancement was the use of writing technology for teaching and learning. It provided great momentum for printing materials and textbooks, a great scientific and technological advancement.

The use of writing and printing technology then took its next in the creation and use of the instructional resources like chalkboard, pictures, chart, models, maps, diagrams and other graphic material. Later on with the technological advancement, sophisticated scientific instrument, mass media and educational materials such as radio, television, tape recorder, films, transparency, etc. were used in the field of education.

Further the concept of programmed instruction and theories added another aspect to the concept of educational technology. This was again broadened when the new approaches in the form of system approach, microteaching, interaction, analysis and computer assisted instruction came into existence. With the result of electronic revolution there came an era of sophisticated hardware and software like projectors, television and computers as the means for presenting instructional material.



In brief, Educational Technology is not restricted to the use of audio-visual aids, software materials and hardware tools but a sensible and well thought-out application of the available human and non-human resources for improvement of the teaching-learning process and to offer suitable solutions to the problems in education.

Here is a YouTube link of video giving additional information on history of Educational Technology: https://www.youtube.com/watch?v=oT-df_zdnfi

5. MEANING OF EDUCATIONAL TECHNOLOGY

Educational technology as an academic field can be considered either as a design science or as a collection of different research interests addressing fundamental issues of learning, teaching and social organization. Educational technology as practice refers to any form of teaching and learning that makes use of technology. It is concerned with the application of modern skills and techniques to the requirements of education and training. Some definitions are:

According to Council for Educational Technology, UK “Educational Technology is the development, application and evaluation of systems, techniques and aids to improve the process of human learning.”

National Centre for Programmed Learning, UK defined Educational Technology as the application of scientific knowledge about learning, and the conditions of learning, to improve the effectiveness and efficiency of teaching and training. In the absence of scientifically established principles, educational technology implements techniques of empirical testing to improve learning situations.

According to S.S. Kulkarni “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.” -

Further, S.K. Mitra defined Educational Technology as a science of techniques and methods by which educational goals could be realized.”

From the above definitions we can conclude educational technology as a organized way, a process or an application of the scientific knowledge, to improve the effectiveness of the process of teaching and learning.

Here is a YouTube link giving additional information on what is Educational Technology: <https://www.youtube.com/watch?v=gGY2cwWC8Ag>

6. NATURE OF EDUCATIONAL TECHNOLOGY

Features of educational technology are closely linked with its definitions.

Here are its important characteristics which will reflect its nature.

Modern discipline: Educational technology is a fast developing modern discipline that is ready to face the challenges of education. For example, we can actually deal in real time synchronous feeling (sharing of a two-way communication online and getting feedback instantly) by using technology in education.

Based on scientific advancement: Advancement in scientific knowledge produces more and more refined electronic devices which in turn develop advanced educational technologies.

Improving the educational system: Educational technology facilitates effective communication between the teachers and students, in order to accomplish learning objectives.

Based on research: Educational Technology makes use of the research findings of psychology, sociology, engineering, physical sciences and social psychology and applies the same to the field of education.

Practical discipline: Educational Technology provides hands-on experience to both the teachers and the learners.

A mean: Educational technology is a mean to achieve an end but is not an end in itself.

7. SCOPE OF EDUCATIONAL TECHNOLOGY

The scope of educational technology refers to the jurisdiction within which it works. Being a fast developing modern discipline it is almost practical field aiming at all-round development in the field of education.

National Policy on Education (1986), recommends that, “Educational technology will be employed in the spread of useful information, training and retraining of teachers, to improve quality, sharpen awareness of art and culture, inculcate abiding values, etc., both in the formal and non-formal sectors.”

The scope of educational technology can be accessed from the following points:

Managing the Process of Teaching and Learning: Educational technology tries to discuss the concept, theories, stages and principles of teaching. It also describes the relationship between teaching and learning.

Fulfillment of the Educational Goals or Objectives: Educational technology tries to discuss the topics such as identification of educational needs and aspirations of the community and survey of the resources available for satisfaction of these needs.

Development of Curriculum: This aspect of educational technology is concerned with the designing of a suitable curriculum for the achievement of the stipulated objectives.

Improvement of Teaching-Learning Material: This area of educational technology is concerned with the production and development of the suitable teaching-learning material in View of stipulated objectives, design curriculum and available resources.

Teaching-Training: Teacher is a key figure in any process of teaching and learning. Educational technologies take care of the proper preparations of teachers for exercising their complex responsibilities.

Development and Selection of the Teaching-Learning Strategies and Topics: This aspect deals with the central problems of teaching-learning act. Educational technology tries to describe the ways and discovering, selecting and developing suitable strategies and tactic of teaching.

Development, Selection and Use of the Appropriate Audio-Visual Aids: Teaching learning is greatly influenced and benefited by the use of appropriate audio-visual aids. Educational technology covers this aspect by discussing various types of audio-visual aids used for educational purpose, their proper selecting suiting to a particular teaching-learning situation.

In above discussion, an attempt has been made to identify the scope of educational technology by mapping out its field of operation, but in true sense, it is injudicious to enclose such a developing and fast growing subject.

Here is a YouTube link of video giving additional information on Educational Technology: <https://www.youtube.com/watch?v=sIH-ODOgpGg>

For more detailed visual description of meaning and scope of educational technology, please visit the following sites:

<https://www.youtube.com/watch?v=-hCcsc07Pa8>

8. APPROACHES OF EDUCATIONAL TECHNOLOGY

The scientific investigations of technological developments have influenced every walk of human life. The educational process does not remain untouched by these advances. There is rapid mechanization in field of education. It has result the introduction of technology in field of education. Many different approaches of technology can be used to support and enhance learning. Various approaches of Educational technology deliver different kinds of content and serve different purposes in the classroom. Each approach of

technology is likely to play a different role in students' learning. There are several educational approaches in technologies and there is great overlap among them. The educational process does not remain untouched by these advances. It has necessitated introduction of these approaches in technology in the field of education.

9. **HARDWARE APPROACH**

The hardware approach refers to the use of machines and other mechanical devices in the process of education. It is based on the application of engineering principles for developing electro-mechanical equipment for instructional purposes. Silverman, called this type of educational technology 'Relative Technology'. Motion pictures, tape recorders, television, teaching machines, computers are called educational hardware.

Hardware approach mechanizes the process of teaching so that teachers would be able to deal with more students with less cost in educating them.

Human knowledge has three aspects: *Preservation, Transmission and Development.*

The history of preservation of the knowledge is believed to exist since the printing machines started. The knowledge is preserved with these machines in the form of books.

The second aspect of human knowledge is its transmission. Now a day, transmission of the knowledge is supported by machine like mike, radio and television. With these, thousands of students can enjoy home-delivery of such benefits.

The third aspect of human knowledge is its development. For this aspect, provisions are made for research work. In the research programmes, the main function is the collection and analysis of data. For this purpose, presently the researcher uses the electronic machines and computers.

Hence, all the three phases of knowledge allow the use of machines. In short, the teaching process has been mechanized. The mechanization of teaching process is termed as the Hardware Approach.

10. SOFTWARE APPROACH

The pioneering work in software approach was done by Skinner and other behaviorists. The programmes which such a technology produces are often called software. Software Approach is also termed as Instructional Technology or Teaching Technology or Behavioural Technology. Silverman termed this educational technology as 'constructive educational technology' and also known as 'Management Technology'.

The software approach used the principles of psychology for building in the learners a complex repertory of knowledge or modifying his behavior. Psychology of learning provides solid technology for bringing desirable behavioral changes in the pupils and serves the cause of education of laying down definite instructional procedure, teaching behaviour and behaviour modification devices.

Newspapers, books, magazines, educational games, flash cards may also form part of software. Software approach is characterized by task analysis, writing precise objectives, selection of appropriate learning strategies, immediate reinforcement of responses and constant evaluation.

Software approach refers to the application of teaching- learning principles to the direct & deliberate shaping of behavior. Its origin lies in the application of "behavior science" to the problems of learning & motivation.

Software approach tries to develop all the three basic components of technology, i.e. Input, Process and Output.

11. MULTIMEDIA APPROACH

The concept of multimedia is defined in many ways. Most of the definitions agree on the characteristic that multimedia contains texts, graphics, animations, video and sound in an integrated way and the content can be structured and presented differently.

Multimedia is very helpful and fruitful in education due to its characteristics of interactivity, flexibility, and the integration of different media that can support learning, take into account individual differences among learners and increase their motivation.

The provision of interaction is the biggest advantage of the digital media in comparison with other media. It refers to the process of providing information and response. Interactivity allows control over the presented content to a certain extent: learners can change parameters, observe their results or respond to choice options. They can also control the speed of applications and the amount of repetition to meet their individual needs.

Furthermore, the ability to provide feedback tailored to the needs of students distinguishes the interactive multimedia from any other media without a human presence.

The interactive opportunities of multimedia lead to high flexibility, which can be very helpful for students with special needs. Dyslectic students can use synthetic speech in order to become familiar with the content of digital texts. Autistic children show an increase of phonologic awareness and word reading by using multimedia. Students with severe speech and physical impairments gain from learning with multimedia, because the computer is flexible enough to meet individual needs – they can repeat as often they want, can hear it loud, etc. For deaf students, the visual presentation of content improves their motivation to learn.

For more detailed visual description of Multimedia - Understanding Technology, Please visit:

<https://www.youtube.com/watch?v=kccUxGDsMAQ>

12. MASS MEDIA APPROACH

The mass media is a diversified collection of media technologies that reach a large audience via mass communication. The technologies through which this communication takes place include a variety of outlets.

The term Mass media stands for the dissemination of Information, ideas and entertainment by the use of communication media. The media include those which are modern means of communication such as Radio and Television Film, the Press, publication and advertising.

Mass media means technology that is intended to reach a mass audience. It is the primary means of communication used to reach the vast majority of the general public. The most common platforms for mass media are newspapers,

magazines, radio, television, and the Internet. The general public typically relies on the mass media to provide information regarding political issues, social issues, entertainment, and news in pop culture.

Wimmer, R. and Dominick, J. (2013, p. 3) defines “mass communication, which is any form of communication transmitted through a medium (channel) that simultaneously reaches a large number of people. Mass media are the channels that carry mass communication.”

Education today, therefore, has a far greater responsibility than it had ever before. It has to meet the demands of a dynamic world which change its character every day. Contemporary education has to be more comprehensive and complete than it was ever before. The role of the various agencies of education like home, society, community etc. has consequently increased, so has the role of the mass media like television, radio, cinema, newspaper increased. So now-a-day, press, radio, cinema, television, etc. are becoming more and more important in an individual’s life.

Here is a YouTube link of video giving additional information on role of mass media in education : <https://www.youtube.com/watch?v=e4-slRzkoFM>

13. SUMMARY

ICT is evolving in a very fast pace. Education is one major sector which has undergone the influence of innovations in ICT. ICTs are basically the scientific integration of information technology and communication systems for the transmission of information in multimedia formats. Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources. It is concerned with the application of modern skills and techniques to the requirements of education and training. The characteristics of educational technology are closely linked with its concept of educational technology. The scope of educational technology refers to the jurisdiction, the limits or the boundaries within which it works.

Various approaches of Educational technology deliver different kinds of content and serve different purposes in the classroom. Each approach of

technology is likely to play a different role in students' learning. The hardware approach refers to the use of machines and other mechanical devices in the process of education. Its origin lies in the application of "physical science" to education and training system. Software approach refers to the application of teaching- learning principles to the direct & deliberate shaping of behavior. Its origin lies in the application of "behavior science" to the problems of learning & motivation. The concept of multimedia is defined in many ways. Most of the definitions agree on the characteristic that multimedia contains texts, graphics, animations, video and sound in an integrated way and the content can be structured and presented differently. The interactive opportunities of multimedia lead to high flexibility, which can be very helpful for students with special needs. Mass media means technology that is intended to reach a mass audience. It is the primary means of communication used to reach the vast majority of the general public. Now-a-day, press, radio, cinema, television, etc. are becoming more and more important in an individual's life.

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SELF-ASSESSMENT

i) Multiple Choice Questions with answers

- (1) ICTs is that electronic mean that
(A) Captures information (B) Processes Information
(C) Stores and Disseminates information (D) All of the above
- (2) ICT includes:
(A) Communication Infrastructure (B) Physical Equipments
(C) Applications (D) All of the above
- (3) Who said, "Educational Technology can be conceived as a science of techniques and methods by which educational goals could be realized."
(A) S.K. Mitra (B) I.K. Davis
(C) S.K. Mangal (D) S.S. Kulkarni
- (4) Which approach refers to the use of machines and other mechanical devices in the process of education?
(A) Hardware Approach (B) Software Approach
(C) System Approach (D) Mass Media Approach
- (5) Software approach is also known as:
(A) Technology in Education (B) Technology of Education
(C) Education of Technology (D) None of the above
- (6) Characteristics of Multimedia are:
(A) Interactivity (B) Flexibility
(C) Integration of different media (D) All of the above

ii) True & False Statements with answers

- (7) Speed is not among the important feature of ICT. **True/False**
- (8) A holistic framework proposed by the UNESCO (2002) takes into account the factors, e.g. cultural, educational, technology resources that are important in planning the integration of technology into pre-service curriculum. **True/False**
- (9) Educational Technology is not the development, application and evaluation of systems, techniques and aids to improve the process of human learning. **True/False**
- (10) Teaching machines, radio, television, tape recorder, video-tape, projectors are examples of hardware technology. **True/False**
- (11) Newspapers, magazines, radio, television, and the Internet are the examples of mass media. **True/False**

Answers: (1) D; (2)D; (3) A; (4) A; (5) B; (6) (D); (7) False; (8) True; (9) False; (10) True; (11) True