Meaning and Definitions

G.O.M. Leith: "Educational technology is the systematic application of scientific knowledge about teaching-learning and conditions of learning to improve the efficiency of teaching and training (Leith, 1967)".

Shiv K. Mitra: "Educational technology can be conceived as a science of techniques and methods by which educational goals could be realized (Mitra, 1968:4)."

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 (Kulkarni, 1969)."

D. Unwin: "Educational technology is concerned with the application of modern skills and techniques to requirements of education and training. This includes the facilitation of learning by manipulation of media and methods, and the control of environment in so far as this reflects on learning (Unwin, 1969)."

W. Kenneth Richmond: "Educational technology is concerned with providing appropriately designed learning situations which, holding in view the objectives of teaching or training, bring to bear the best means of instruction (Richmond, 1979)."

I.K. Davies: "Education technology is concerned with the problems of education and training context and it is characterized by the disciplined and systematic approach to the organization of resources for learning (Davies, 1971)."

J.R. Gases: "Education technology has to be seen as part of a persistent and complex endeavour of bringing pupils, teachers and technical means together in an effective way (Ford Foundation Team, 1971)."

US President Commission of Enquiry: "Education technology may be defined as a systematic way of designing, carrying out and evaluating a total process of teaching and learning in terms of specific objectives based on findings from research in human learning and communication (cited in, Tucker, 1979:159)."

DES Working Party UK: "Education technology is the development, application and evaluation of systems, techniques and aids in the field of human learning (cited in, Tucker, 1979:159)."

Scottish Council for Educational Technology: "Educational technology is systematic approach to designing and evaluating learning and teaching methods and methodologies and to the application and exploitation of media and the current knowledge of communication techniques in education, both formal and informal (cited in, Tucker 1979:160)."

An overview of the definitions listed here reveals that there exists wide differences of opinion regarding a particular definition of the term educational technology. These definitions initially encompass the whole range of educational technology activities from the analytic methods of psychology of learning and teaching to the audio-visual communication and mass media technology. The views propagated by these definitions may help us to conclude about the meaning and nature of educational technology as follows:

1. Educational technology is concerned with the systematic application of science and technology in the field of education and thus may be defined as the application of technology to education in order to further the cause of the latter.
2. Just as science and technology help in carrying out the practical task in general, educational technology helps in providing efficiency to the task of teaching and learning.

3. Educational technology provides technical guidance and solution to the problems of education.

4. Teaching is communicating and education technology can play an effective role in the communication between teacher and student.

5. Education technology encompasses the total teaching and learning process involving the elements like the following:

   - Specification of goals and behavioural objectives.
   - Analysis of the characteristics of the learner.
   - Selection and organization of the content or subject matter to be learned.
   - Methods and strategies of the presentation of the content.
   - Use of aid-material, software and hardware, mass media and communication techniques.
   - Effective arrangement of learning situations and learning environment.
   - Effective classroom control and management.
   - Continuous feedback and evaluation of the results.

6. Educational technology is not limited to the use of audio-visual aids and does not symbolize merely educational hardware such as the sophisticated gadgets and mechanical devices used in education. For the effective management of the total teaching-learning process it tends to utilize the results of all good, experiments and researches in the field of human learning and the art of communication and employs a combination of all possible human and non-human resources to achieve the desired educational objectives.

In this way, the term educational technology carries a wide meaning. It can neither be confined to the use of audio-visual aids, software materials and hardware equipment, nor can it be limited to the use of psychological principles and instructional theories for bringing improvement in education. It should cover all that happens during the planning, implementation, and evaluation of the teaching-learning process. It should devise ways and means to explore and utilize all the resources to bring improvement in the teaching-learning process.

In brief, *educational technology should stand for a wise application of the available human and non-human resources for providing appropriate solution to the educational problems and to improve the processes and products of education.*

The Nature of Educational Technology

To understand the nature of educational technology, let us try to view it from the following angles:

1. Evolution of the concept of educational technology.
2. Existing position and latest concept.
3. Distinction from other related concepts.

Evolution of the Concept of Educational Technology

It may be discussed in detail as follows:

- The earliest concept of educational technology was linked with the use of audio-visual aids like charts, models, maps, specimen and concrete material. In this sense, the term educational technology was used as a synonym to audio-visual aids meant for direct teaching and learning.
- With the advent of physical science and consequently the electronic revolution there came an era of sophisticated hardware and software (gadgets and mechanical devices) like projectors, tape-recorders, radio and television. As a result, educational technology was taken in terms of these sophisticated instruments and equipments used for presenting instructional material.
- Then came the age of mass media. It led to a massive communication revolution for instructional purposes. Utilization of radio, television, tele-text and computer-assisted instructions for individualized learning, thus, brought more sophistication in the use of appliances and instruments for formal and informal education.
- With the advent of programmed learning and programmed instruction concept, a new dimension of educational technology came into the educational horizon. It tried to individualize the process of education and introduced a system of self-learning in the form of designed self-instructional material and teaching machine. As a result, educational technology was regarded as being concerned with the preparation and use of individualized instruction or self-instructional programmed material, leading to the use of teaching machine for auto-instruction or learning.
- The concept of programmed learning added another dimension to the meaning of educational technology when some new devices and approaches like wide applications of the theories of learning and teachings, micro-teaching, analysis of behaviour and systems approach, etc. came into existence.

The Existing Position and Latest Concept

Although the term 'educational technology' has been in vogue for several decades, yet on account of its complex nature involving many disciplines and demanding too much specialization and understanding of the planning, processing and products of education, it has been narrowly conceived by different individuals depending on where one works and stands within the educational spectrum. It has resulted in the formation of varying concepts of educational technology. For example, for those who are working in audio-visual aids, educational technology is confined to the use of audio-visual aids, while mass media experts emphasize the importance of sophisticated hardware, software and communication technology. For the experts of programmed learning and individualized instruction, it means the programming of the self-instructional material and use of teaching machines or computer-aided learning material. There are others who tend to look at educational technology only from the management point of view and consider it as an application of system approach to teaching-learning.

In this way, in actual sense, educational technology exists, to a very large extent, in a fragmented way not only in India but also globally. As a result, in any course or scheme of educational technology related to B. Ed., M. A. or M. Phil. (Education) of the universities in India and abroad, we find significant diversification in terms of objectives, topics and the coverage of contents. However, serious attempts are now being made to arrive at some general consensus to end the confusion and debate regarding the concept and meaning of educational technology. This latest concept involves the concept of systems engineering or systems approach originated from computer science. According to this concept, educational technology is more than the sum of its parts. It is a systematic way of designing, carrying out and evaluation of the total process of learning and teaching in terms of specific objectives based on research in human learning and communication leading to a combination of human and non-human resources reorganized into an efficient and economic system for the best possible results. In other words, it means a systems approach adopted in the field of education to organize educational systems, keeping in view the broad objectives and the available resources.

This aspect of educational technology carries a wide meaning and multifaceted concepts. It emphasizes the application of systems approach to the study of the multidimensional problems of education. Some of these problem areas are as follows:

- The educational planning and organization.
- The psychology of learning.
- The curriculum development and course design.
- The production of teaching-learning material.
- Audio-visual method of presentation and dissemination of information, storage and retrieval.
- The allocation and management of human and non-human resources.
- The cost-effectiveness of media in education.
- Innovations.
- Evaluation.

Educational Technology and other Related Concepts

The concept and meaning of educational technology may be made a little more clear by distinguishing it from other related concepts.

Educational technology and instructional technology

These two terms should not be considered as synonymous. Educational technology is a more comprehensive and broad-based concept. Instructional technology is a subsystem of the main system of educational technology. Education is a comprehensive process and imparting of instruction is one of the several means to achieve the goals of education. As a result, the technology of instruction may be regarded as a part and section of the whole phenomenon of technology of education.

In strict sense, instructional technology is concerned with determining and providing appropriate stimuli to the learner to produce certain type of responses for making learning

The strongest protagonists for educational technology are not, however, satisfied with a role limited to technology in education and the provision of audio-visual aids. They see themselves as crucially involved in the design and evaluation of systems of learning involving an understanding of the psychology of learning and of communication and information theory to be used to establish a rational for good teaching practice which uses a variety of media and modes and which enables the teacher to deploy his skills more effectively and apply them more widely. This is technology of education.

In view of the discussion carried out in the above pages, the following conclusions can be drawn about the concept of educational technology:

1. Educational technology cannot be taken as a synonym to audio-visual aids, and technology in education emphasizes the concept of service, i.e. the use of different equipment, gadgets and mass media.

2. Educational technology must mean technology of education presenting itself as a system for bringing improvement in the total process of teaching-learning by carefully analyzing its problems and reorganizing all available resources in an economic way for obtaining the optimum results.

3. Educational technology cannot be viewed in terms of its parts or processes. Instructional technology, teaching technology, behaviour technology, programmed learning, micro-teaching, system analysis, management of teaching-learning teacher or pupil behaviour, etc. are all its constituents and resources. Not a single one of these alone is enough to represent the concept of educational technology. All these branches, innovations, approaches and strategies should be integrated as a whole according to the needs and requirements of the system represented by educational technology at a particular time in a given situation for accomplishing its useful objectives.

Objectives of Educational Technology

Educational technology, in the capacity of technology of education, provides valuable help in the total teaching-learning process for achieving the best possible results in an economic way through the available human and non-human resources. In this respect, the major objectives of education technology can be summarized as follows:

Objectives at the Macro Level

In view of the broad educational goals, i.e. the macro level, the objectives of educational technology can be listed in the following way:

1. To identify educational needs and aspirations of the community.
2. To determine the aims of education, broad strategies and structure of education.
3. To develop a suitable curriculum with interaction of science, art and human values.
4. To identify man-material resources and strategies for achieving the stipulated aims of education.

5. To develop certain models leading to improvement of the process of teaching and learning.
6. To develop the appropriate aids and equipment to meet the educational purposes.
7. To identify major constraints in the environment and the ways and means to tackle those.
8. To help in extending educational opportunities to the masses especially the neglected section of the community.
9. To manage the whole educational system covering planning, implementation and the evaluation phases.

Objectives at the Micro Level

In view of the specific classroom teaching, i.e. the micro level, the objectives of educational technology are as follows:

1. To identify and analyze the characteristics and educational needs of the pupils.
2. To determine the specific classroom objectives and state them in behavioural terms.
3. To analyze the contents of instruction and organize it in a proper sequence.
4. To identify the available teaching-learning material and resources.
5. To identify the nature of the interaction of the sub-systems like students, teachers, teaching-learning material, content of instruction and methodologies.
6. To plan the teaching strategies and utilize the man-material resources for achieving specific classroom objectives.
7. To evaluate the effectiveness of the classroom teaching in terms of the pupil's performance or change in behaviour.
8. To provide appropriate feedback to the students as well as teachers to bring modification in the teaching-learning process.