

Unit - I

The Concept of Educational Technology

Meaning of Technology

The word '*Technology*' is derived from the two Greek words namely *Technic and Logia*. '*Technic*' -means '*art or skill.*' '*Logia*'- means '*Science or Study*'. So simplest meaning of '*Technology*' is "*Science of study of an art or skill.*"

Definitions of Technology

"Technology is Knowledge organized for Production".

- Sachs.I

"Technology is the application of scientific knowledge to a practical purpose".

- Page.T

"Technology is the set of instruments and skills which are used to satisfy the needs of the community".

- Hierra.A.

Meaning of Education

The word '*Education*' is derived from the Latin word '*Educatum*', which means '*To bring out*'. In the sense, the meaning of *Education* is *to bring out the better qualities of the individual*.

Acc. to Ross, the word '*Education*' is derived from the Latin word '*Educare*' which means '*to bring up*' or '*to raise*'. It means that education is that process which brings up or rears the individual in the right way.

Meaning of Educational Technology

There are three views regarding the meaning of educational technology.

Educational Technology 1 (ET 1)

The first view which may call *Educational Technology 1 (ET 1)* refers to the application of physical sciences and engineering technology to provide mechanical instruments or "*hardware*" which can be used for instructional purposes. This is the view of *James O. Finn and others (1960)*.

E.g. Tape-recorders (including language laboratory), television, teaching machines and computer- based teaching.

Educational Technology 2 (ET 2)

The second view which we may call *Educational Technology 2 (ET 2)* refers to the application of scientific principles or ‘*software approach*’ to instruction. This is the view of *Skinner, Gagne and others*.

Educational Technology 3 (ET 3)

The third and the modern view of *Educational Technology 3 (ET 3)* as described by *Davis and Hartley (1972)*, incorporates both ET 1 and ET 2 through the application of a ‘*system approach*’ to education and training.

Definitions of Educational Technology

“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 the application of scientific process to man’s learning conditions”.

- Robert A. Cox

“Educational technology is an application of scientific knowledge about learning to practical learning situation.”

- J. Bloomer

Characteristics of Educational Technology

1. ET has contributed in developing various methods e.g. Microteaching method, Interaction analysis, Audio Visual Aids and Programmed learning method.
2. In the field of ET, Psychology, Science and technology, system, art, AV aids and machines are used.
3. It is based on the application of the scientific knowledge.
4. It is helpful in making the teaching process objective, easy, clear, interesting and scientific.
5. It is a continuous dynamic technology.
6. It is an important medium of communication.
7. A desired change is possible in the behaviour of teachers and students.

Revolution and Development of Educational Technology

Erich Ashley (1967) has identified four revolutions in education. They are,

- ❖ **First Revolution:** Revolution of shifting the task of educating the young ones from parents to teacher and from home to schools.
- ❖ **Second Revolution:** Revolution of adoption of the written word as a tool of education.
- ❖ **Third Revolution:** Revolution as a result of invention of printing and availability of books and other teaching-learning material.
- ❖ **Fourth Revolution:** Revolution on account of development in electronic, chiefly involving radio, television, cassette recorder and computer, and development of systems concept.

Origin of Educational Technology

- ❖ *Sidney Pressey* of a University in Ohio, America who used a *teaching machine* in the field of teaching in 1926.
- ❖ 1930-40 Lumsdain and Glaser- Mechanized education (*Models of teaching*).
- ❖ 1950- B.F Skinner's *Programmed Learning*.
- ❖ 1950- Bryn more in England the term '*Educational Technology*'.
- ❖ B.S Bloom (1956) was introduced the *taxonomy of educational objectives*.
- ❖ In 1960 Flanders introduced the concept of *interaction analysis model of teaching*.
- ❖ *Micro-teaching technique* first adopted at Stanford University in USA (1961) by W.Allen et.al.
- ❖ *Personalized System of Instruction (PSI)* was first introduced by Keller in 1965.
- ❖ *Computer Assisted Instruction (CAI)* was developed by O.K Moore in 1966.

TECHNOLOGY OF EDUCATION AND TECHNOLOGY IN EDUCATION

Introduction

The term technology in education is a service concept like technology in the service of agriculture of farmers or science in the service of mankind. It refers to the use of equipment and machines for educational purposes. It involves the use of a wide range of audio- visual equipments, hardware and sophisticated electronic devices like films, projectors, radio, television, tape recorder, teaching machines and computers etc.

Educational technology as explained earlier is a wider term than technology in education. It includes hardware approach, software approach and systems approach.

Educational Technology is broadly classified into the following two heads:

1. Technology of Education.
2. Technology in Education.

1. Technology of Education

It is inherent in education itself. It refers to the application of behavioural sciences like psychology of educational theories and practical teaching –learning problems, instruction and motivation etc. It is concerned with the study of educational problems and the techniques to be used in solving the teaching-learning problems so that best results should be achieved. Broadly speaking, technologies of planning, financing and administration are also covered under the concept of technology of education. Techniques of curriculum planning, transacting and evaluating also come under technology of education. In technology of education, we use derived from psychology of learning.

In general, following techniques are included in technology of education:

1. Analysis of instructional problems.
2. Selection of instruments for evaluation
3. Selection of strategies to obtain desired result from the teaching-learning process.
4. Teacher behaviour.
5. Programmed learning.
6. System analysis.

2. Technology in Education

Broadly speaking, technology in education implies the use of implements, tools and machines in education in the same manner as we use these for the development of agriculture and gardening and industry and in fact our everyday life to reap the fruit of scientific and technological developments. Under technology in education we include electronic media projector, film, radio, T.V, teaching machine, computer and internet etc.

Technology in education refers to the application of engineering principles and technology in the process of education. Basically it is called hardware technology.

Silverman (1968) called this type of educational technology as ‘Relative Technology’ and technology of education as ‘Constructive Educational Technology’.

Differences between Technology of Education and Technology in Education

Areas	Technology of education	Technology in education
1. Basis	It is based on child psychology (age, ability and mental level).	In is based on the principles of physical sciences or engineering sciences.
2. Approach	Its approach is identified as software approach.	Its approach is identified as hardware approach.
3. Origin	Its origin lies in the application of behavioural sciences to the problems.	Its origin lies in the application of physical sciences or engineering to education.
4. Examples	Text books, work books, newspaper etc.	TV, Radio, Slide Projector, Computer, OHP etc.
5. Relation	It is related to learning aids.	It is related to teaching aids.
6. Requirement	The use of this approach does not require skilled personnel as in hardware technology.	Skilled personnel in hardware technology are needed.
7. Flexibility	This approach is very flexible	This approach is relatively rigid.
8. Type	It is called constructive educational technology	It is called relative technology
9. contribution to educational system	This approach is very helpful in understanding the need of the learners and educating them accordingly.	It is useful in mass education programmes.
10. Cost	It is less costly.	It is expensive.

NEED AND IMPORTANCE OF EDUCATIONAL TECHNOLOGY

Use of ET is needed in the process of education because of following reasons.

1. Population Explosion

- Populations of Asian countries are increasing at a very fast speed and we cannot educate all these people just by using teachers in the class.
- Modern media of communication like TV, Internet and CDs etc. can impart education to millions of people together in one setting.

2. Fast Generation of New knowledge

- New knowledge is expanding at a very fast speed.
- It is almost doubling in just 3 years.
- A teacher is not supposed to impart this huge amount of knowledge by tutorial or classroom teaching.
- ET can perform this function very easily.

3. Development of new strategies

- It is the ET that has helped to develop new strategies in the field of education like,
 - i. Microteaching (inculcation of teaching skills among teachers),
 - ii. Programmed instruction (Preparation of instructional materials in written or CAI forms for individualized learning).
 - iii. Instructional analysis (analysis of teaching materials into convenient parts to be presented to students one by one) and use of hardware technology in education etc.

4. Controlled Atmosphere

- Education cannot be treated as plaything by some teachers after the introduction of ET.
- It has made the whole process of teaching objective, clear, scientific and interesting.
- The teacher controls the classroom environment in his own favour but his performance is evaluated simultaneously by applying tests.

5. Importance of Teacher's role

- It emphasizes theories & Principles of teaching more than those of learning.

- Thus, it has removed many of the defects of ET and has raised the significance & relevance of a teacher in the class.

6. Mass extension of Model teaching

- The facilities of radio television and internet are now available on a large scale.
- By demonstrating the effective teaching of renowned teachers on these media we can benefit millions of students together.
- Even the less effective and less skilled teachers can take the benefit of these demonstrations & improve their teaching.

7. Advantages to private students

- Many universities have given permission to students for private examinations, even in higher education.
- These students do not attend classes
- In order to maintain standard of education in higher education, the use of ET becomes a necessity.

8. Beneficial for teacher training colleges

- Even teacher training colleges cannot produce good teachers without the use of ET.
- It is because; this branch of education puts emphasis on the modification of teacher's behaviour.
(E.g.) we can develop teaching skills in student with the help of micro-teaching techniques.

9. Improvement of school Administration

- ET helps us to analyze the problems of school administration scientifically leading to improvement in the system.
- This is done by applying various combinations of inputs or adopting the procedure followed by the other school systems.

10. Preservation of knowledge

- By using hardware technology, we can preserve knowledge in audio and video cassettes, CDs & floppy disks (Pen drive)

11. Development of teaching models

- When a definite combination of inputs and strategies gives good result repeatedly in a number of class room situations.

- It can be translated into teaching models to be used universally.
- It can be also lead to the development of teaching theories.

12. Creation of Interesting learning situations

- ET can transform the teaching-learning process from burden to enjoy which, psychologically very sound for students.
(e.g.) use of material aids in teaching increases the interest of students.

UTILITY / USE OF EDUCATIONAL TECHNOLOGY FOR TEACHERS

1. It has provided scientific and systematic approach to teachers to conduct action research in the classroom situations to overcome the classroom problems related to classroom environment, content, curriculum etc.
2. It helps the teacher to modernize and mechanize the teaching-learning process. It also helps the learners to study at their own speed/rate with the help of programmed instruction on video or computers.
3. ET supplements the teacher, with AV-aids to make the teaching-learning process more effective.
4. It helps in teacher's professional growth.
5. Add to their teaching competence, modify their teaching behaviour and style, inculcate a scientific outlook, approach & attitude and help them transfer these to their learners.
6. ET supplements teacher in their instructional programmes through the structured lessons for remedial, enrichment or drill purposes.
7. The learners get the training of self instruction and teachers are relieved of the burden of routine repetition for exercise & revision purposes.

FORMS OF EDUCATIONAL TECHNOLOGY

The various forms of ET are as follows,

- I. Teaching Technology
- II. Instructional Technology
- III. Behaviour Technology

I. TEACHING TECHNOLOGY

1. Introduction
2. Content of Teaching Technology
3. Assumptions of Teaching Technology
4. Characteristics of Teaching Technology

1. Introduction

- ❖ Teaching is the social and professional activity.
- ❖ Teaching is purposeful activity. The ultimate goal of teaching is to bring all round development of a child.
- ❖ Teaching is an art as well as science because teaching can be studied objectively and scientifically.
- ❖ The Chief exponents of Teaching Technology: I.K. Davies, N.L. Gagne, Herbert, Hunt, Burner and Robert Glaser.
- ❖ Teaching is such a classroom activity which is completed by the interaction between teachers and students.
- ❖ This activity leads to complete development of students.
- ❖ Today teaching is considered ‘Student-Centered’ and not ‘Teacher-Centered’.
- ❖ In other words, instead of teaching by the teacher, the learning by the student is emphasized.

2. Content of Teaching Technology

- I.K. Davies and Robert Glaser (1962) have developed the content of teaching technology and classified into 4 elements.
 - a. Planning of Teaching
 - b. Organization of teaching
 - c. Leading of teaching
 - d. Controlling of teaching

a. Planning of Teaching

- ❖ A teacher makes proper plan to what he is to teach in the class. In planning he does 3 things/activities.
 - i. Task analysis (He analyses the content and arranges such sub contents into systematic manner).
 - ii. Identification of Objectives (i.e. what changes he has to bring in the behaviour of his students).
 - iii. Writing learning Objectives (they can be evaluated at the end of the task).

b. Organization of Teaching

- ❖ This is the second stage of teaching.
- ❖ This stage is particularly related to the presentation of the subject-matter.
- ❖ In organizing, a teacher does the following things,
 - i. He selects suitable teaching strategies and techniques.
 - ii. He selects or prepares suitable material aids for making the presentation of the subject –matter effective.
 - iii. He matches the strategies and material aids with the nature of the sub content to give such an experience to his students which is conducive to the realization of teaching objectives.

c. Leading of teaching

- ❖ This stage is related to communication strategies and reinforcement devices.
- ❖ The techniques of motivation are employed for leading the behaviours of the students.
- ❖ The knowledge regarding reports between teacher and students is considered under this step.

d. Controlling of Teaching

- ❖ The last step concerns with evaluation of teaching.
- ❖ The main focus of this step is to assess the learning objectives in terms of student's performance.
- ❖ The learner's performance provides the basis for the feedback to teacher and learners.

3. Assumptions of Teaching Technology

The content of teaching technology is based on the following assumptions.

- a. Teaching is a scientific process and it has two major components: Content and Communication
- b. A close relationship may be established between teaching and learning.
- c. Teaching skills can be developed with the help of feedback devices.
- d. Teaching and learning are mutually inter-related (i.e.) they are affected with each other. In other words, better teaching leads to better learning and better learning environment leads to better teaching.
- e. Modification and improvement can be made in teaching activities according to the situations (i.e.) there is no general formula applicable to all circumstances.
- f. Appropriate conditions can be created by teaching for effective learning.

4. Characteristics of Teaching Technology

The following are the main features of Teaching Technology.

- a. All the 3 domains of objectives: cognitive, affective and psychomotor can be achieved by this technology.
- b. It can make the teaching more effective.
- c. Teaching technology is based on philosophical, sociological and scientific knowledge of education.
- d. Teaching can be organized at 3 levels namely: memory, understanding and reflective level of teaching.
- e. As a system it consists of the inputs, process and outputs with the focus on teachers.
- f. The teaching-learning process can be made effective with the help of teaching technology.

II. INSTRUCTIONAL TECHNOLOGY

1. Introduction

- ❖ The instruction has an important role in human learning. The systematic actions which induce learning is known as instruction. (or)
- ❖ Instruction means communication of information by means other than a teacher. For example various types of audio-visual aids can guide the students. The Correspondence Course and Open University students accomplish the task of instructions through press and television.

- ❖ Actually instructional technology is based upon Hardware approach.
- ❖ The instruction stands for development knowledge of and beliefs.
- ❖ Instructional technology means a network of techniques or devices employed to accomplish a set of learning objectives.
- ❖ It is based on psychological and scientific principles to instruction.
- ❖ The origin of IT is from psychological laboratory experiments.
- ❖ The most important example of IT is ‘Programmed Instruction’.
- ❖ The Chief exponents of IT: B.F Skinner, Bruner, Glaser, Gilbert and Mager.

2. Content of Instructional Technology

- ❖ The instructional technology involves the strategies and tactics which can be used outside and inside the class room teaching.
- ❖ Teaching is an instruction but the instruction is not the teaching.
- ❖ The instructional technology consists of the following content:
 - a. Meaning of I.T
 - b. Definition of Programmed instruction and its Origin
 - c. Structure of Linear programming and its Principles
 - d. Structure of Branching programming and its Principles.
 - e. Development of Programmed instruction material i. Planning, ii. Writing frames, iii. Evaluation.
 - f. Learner Controlled instruction and CAI.

3. Assumptions of Instructional Technology

The instructional technology involves the following assumptions:

- ❖ A pupil can learn according to his needs and capacities. (It means that an instruction cannot benefit the entire student equally, howsoever it is good).
- ❖ A pupil can learn even in the absence of the teacher.
- ❖ Reinforcement can be provided continuously by the use of instruction.
- ❖ The subject matter can be divided into its various elements and each element can be taught / presented independently through this technology.
- ❖ Students can be given feed back by instructional activities also, (i.e.) effective communication can provide feedback to learners.

4. Characteristics of Instructional Technology

The following are the main features of instructional technology

- ❖ Objectives of Cognitive domain can be achieved by the use of this technology.

- ❖ Right responses of students can be reinforced regularly which will lead to further right responses to occur.
- ❖ By the use of this technology, students can learn according to their need and speed (rate).
- ❖ It provides the deep insight into the content structure and sequence of its elements.
- ❖ The instructional theory may be developed by using this technology in learning process.
- ❖ It helps in development of ‘Learner-Centered’ education.

III. BEHAVIOURAL TECHNOLOGY

1. Introduction

- This technology is closely related to psychology.
- Psychology is the Science of behaviour and learning is the modification of behaviour through activities and experiences.
- It is an application of scientific knowledge or modifying teacher’s behaviour.
- It is also called as ‘Training Technology’
- The chief exponents of B.T: Flanders, B.F. Skinner, Anderson, and Amidon.

2. Content of Behavioural Technology

A teacher learns the following subject-matter (topics) under this technology:

- a. Meaning & definition of teacher behaviour.
- b. Methods of observing teacher’s behaviour and its rating (speed).
- c. The interpretation and evaluation of teacher behaviour.
- d. Assumptions & theory of teacher behaviour.
- e. Models of classroom interaction.
- f. Various techniques of developing teacher behaviour such as,
 - i. Micro teaching
 - ii. Team teaching
 - iii. Interaction analysis techniques
 - iv. Programmed instruction

3. Assumptions of Behavioural Technology

This technology is based on the following assumptions:

- The behaviour of the teacher is social as well as psychological. It means that psychological and social conditions directly affect teachers' behaviour.
- Teachers' behaviour can be observable and measurable.
- Teachers' behaviour is relative. It means that some teachers are good and some are not good.
- Teachers' behaviour can be modified by training and by using reinforcement devices.

4. Characteristics of Behavioural Technology

The following are the main features of Behavioural Technology:

- It has the focus to achieve the psychomotor objectives.
- The specific teaching skills can be developed in teacher with the help of this technology.
- The basic foundation is psychology.
- It is based upon software approach.
- Reinforcement and feedback are emphasized.
- It aims at producing effective teachers by modifying the behaviour.
- It is more useful for teacher training institutions.

Comparison among Different Forms of Educational Technology

Aspect	Teaching Technology	Instructional Technology	Behavioural Technology
1. Exponents	D. K Davies, N.L Gagne Herbert, Hunt, Bruner and Robert Glaser.	B. F Skinner, Glaser, Gilbert, Mager	Flanders, B.F Skinner, Anderson and Amidon
2. Objectives	Development of cognitive, affective and psychomotor domains.	Development of Cognitive domain.	Development of psychomotor (skills).
3. Components / approach	Content and communication	Physical (Hardware) approach	Behavioural (Software) approach
4. Basis / Foundation of teaching	Philosophical, sociological psychological and scientific	Psychological and scientific basis	Psychological and cybernetics.
5. content	<ul style="list-style-type: none"> - Planning of teaching - Organization of teaching - Leading of teaching - Controlling of teaching 	<ul style="list-style-type: none"> - Task analysis - Formulating objectives in behavioural terms - Reinforcement strategies 	<ul style="list-style-type: none"> - Teacher behaviour theories - Teaching models - Observation techniques - Analysis and modifications of Teacher behaviour.
6. Level / Types of teaching and learning	<ul style="list-style-type: none"> - memory - understanding - Reflective 	<ul style="list-style-type: none"> - Pprogrammed learning (self) - CAI - Learner Controlled Instruction 	<ul style="list-style-type: none"> - Interaction analysis - Micro Teaching - Team Teaching
7. Principles	- Art of teaching and science of learning	Input, Process, Output	Principles of learning feedback and reinforcement
8. Role of teacher	As Manager	As helper	As an observer or supervisor
9. Application	Improving classroom teaching and making it effective and purposive	Self – instruction, Correspondence education & remedial teaching	Teacher education and teacher training