BLOCK I:
CONCEPTUAL BASES OF EDUCATIONAL TECHNOLOGY

UNIT- 1

EDUCATIONAL TECHNOLOGY

Unit Structure:

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1.0 Introduction:

The modern era is characterized by fast changes and development. These changes are brought to man by science and technology. We often make use of the term 'technology'. From morning to night, we are making use of number of technologies. Indeed, it has become one of the integral organs of our lives. Uses of technology have made human lives so comfortable that at present day context, life without technology cannot be imagined. To get our maximum work done, we have to rely on technologies. Thus, it has influenced each and every aspect of human lives. The social, economic, health and so on aspects of human lives are significantly influenced by technology. Education is one of most prominent part of human lives. This part is also being influenced by technology. In this unit, we are going to discuss the role of technology in education under the heading of Educational Technology along with it nature and scopes.

1.1 Objectives:

After going through this unit you will be able to–

- *comprehend* the meaning of educational technology,

- *identify* the nature of educational technology,

- *know* about the area of studies under educational technology.

1.2 Meaning and Definition of Educational Technology:

Before coming to the meaning of educational technology, we should first of all, know what the word technology signifies? In common language, the application of scientific laws and principles for the purpose of making daily life easy and comfortable is technology. By these applications, we construct such machines and devices which accelerate and systematize our daily life. Thus, technology refers to two aspects—Theoretical- based on ideas and Practical based on putting ideas in to practice. Etymologically, the word technology has been derived from a Greek word-'technikos' which means 'an art'. Again, some are of the opinion that Technology has been derived from a Latin word-'Texere', which means 'to weave or construct'. On the basis of these derivations, technology has been perceived as a pattern of interrelated part. It can be said that any system of interrelated parts that are organized scientifically to achieve its goal is technology. It is a means component. It is the application of science to art.

Educational Technology:

When technology is used for the purpose of accelerating and facilitating educational processes with certain objectives in view, that technology is called Educational technology. But this is the incomplete meaning of educational technology. As it has already been stated that technology is not limited to the construction of machines and other devices (hardware) Designing, modeling and organization of hardware are needed before their construction which are primarily based on well testified laws and principles (software). Thus, in Educational technology, humans and machines both have their respective roles and both work as complements to each other in the process of education. It means that man uses his intellect

and experiences along with the machines and devices and by using his arts he organizes the teaching-learning process in the best possible manner.

Educational technology implies the application of system analysis to teaching and learning. It is the application of technology of modeling to education. To comprehend the meaning of educational technology simply, it can be termed as a science of techniques and methods by which educational goals can be realized. But, it is not primarily concerned with the task of prescribing the goals of education; it also helps in specifying the goals and translating them into behavioral terms. Educational technology is the science on the basis of which various strategies and tactics are being designed for the realization of specific goals of education.

Educationists have understood educational technology in different ways. Some of these dimensions are given below–

A) First Meaning of Educational Technology:

J. K Galbreth, in his book "New Industrial State" has stated that every type of technology implies two important characteristics

First— Application of scientific laws and principles for practical works

Second— Dividing the practical works into steps and sub-steps and then completing them systematically.

These two techniques are followed in educational technology too. Functional analysis of the task is done first and then each section of the task is completed by applying relevant scientific laws and principles. This functional analysis requires formulation of objectives which is actually the task of philosophers and thinkers. When a teacher uses educational technology in the class, he provides (physical) concrete structure to these mental (abstract) objectives.

Thus educational technology is that science of strategies and techniques. In other words, by using educational technology refers to teaching strategies and techniques. In other words, by using educational technology, after preparing the environment, all inputs (Hardware and Software) are

organized in such a manner that students learn themselves what they want to learn. This whole process completes in four stages-

1. **Analysis of teaching task**: Identifying all the components of inputs, process and output related to teaching-learning process.

2. **Observation of relative impacts of all these components**: Doing action research in order to study the utility of any component in the class

3. **Drawing conclusion**: On the basis of his observation a teacher draws the conclusion to what extent a particular strategy or combination of strategies and behaviour is successful in the class.

4. **Translating the experiences**: Whatever conclusion a teacher arrives at is translated into usable language for the benefit of other teachers.

Thus, this meaning of educational technology makes teaching process of research which is carried out in the field on dependent variable (students) for the use of other independent variables (teachers)

B) Second Meaning of Educational Technology:

Mechanization of teaching –learning process for the benefit of the big masses is Educational technology. It is related to hardware technology. This is applicable to all the three stages of human knowledge.

1. **Preservation of Knowledge:** Preserving the present knowledge of humans is the first function of education. This knowledge was preserved orally or in the form of manuscripts before the invention of printing press. Now this is preserved in printed books, tape recorders, CDs, films and digitals.

2. **Transmission of Knowledge:** Whatever knowledge is acquired is transmitted to others at others places. In the classroom situations this task is done by the teacher to transmit knowledge to limited number of students. But when this knowledge is to be transmitted to a large number

of students simultaneously TV, Internet or printed books are used. Besides, this knowledge can be tapped to be communicated to the learners again and again. This special type of technology can help the students to remove their doubts by listening or reading any educational programme pacing with their abilities, and convenience.

3. **Advancement of Knowledge:** Machines or hardware technology has no direct role to play in the advancement of knowledge. But when a part of knowledge reaches to a large number of learners through these machines they apply this knowledge in their life situations and many new problems of life arise. When any of these learners take the initiative to search the solution of these problems, the knowledge advances automatically. Knowledge which was imprisoned by some selected well off people is now open to reach to the masses. This universalization of experiences has accelerated and multiplied the research works too. People of new skills and intelligence are now giving many new dimensions to knowledge by using their creative potentials. As far as computer application is concerned, nobody can deny its role in the analysis and presentation of data in all research works.

C) Third Meaning of Educational Technology:

Educational Technology unites the science of learning with the art of teaching and leads to the development of teaching theories and principles. While doing so, educational technology does the following activities

1. Analysis teaching /instructional problems.

2. Selects suitable teaching strategies and techniques for the purpose of preparing desired output (Students).

3. Constructs relevant tests and applies them to students to evaluate their behaviour. Thus, inputs and processes are evaluated in terms of output.

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STOP TO CONSIDER

- Etymologically, the word technology has been derived from a Greek word-'technikos' which means 'an art'.

- Any system of interrelated parts that are organized scientifically to achieve its goal is termed as technology. It is a means component.

- It is the application of science to art.

Definitions of Educational Technology:

Educationists have defined educational technology in different ways. Some of the representative definitions are given below-

G.O.M.Leith-'' Educational technology is the application of scientific knowledge about learning and conditions of learning to improve the effectiveness of teaching and training.''

According to this definition, purpose of educational technology is to improve the process of teaching and training. For this purpose, it uses all those research findings which have been done in the field of learning and its conditions.

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"

According to this definition, the purpose of educational technology is to create suitable learning conditions in the class. For this purpose the teacher uses the best means of instruction out of so many available with him. In this way, he reaches the objectives which he formulated in the beginning. Thus, educational technology is related to goal based teaching.

R.A. Cox: " Educational technology is an application of practical study which aims at maximizing educational effect by controlling such relevant facts as educational purposes, content, teaching materials, methods,

educational environment , conduct of students, behaviour of instructions, and inter-relation between students and instructors."

According to this definition the purpose of educational technology is to increase the effectiveness of teaching to the maximum level possible. This is done by controlling all the relevant factors such as the teaching process, content, strategies, material aids, behaviour of students, behaviour of the teacher, educational environment etc. Thus, this definition emphasizes the role of educational technology in teaching as well as educational administration. It treats the learners as experimenters in the class who are given least opportunity to manipulate.

Robert M. Gagne: "Educational technology can be understood as the development of a set of systematic techniques and accompanying practical knowledge of designing, operating and testing schools educational system."

J. R. Gass: "Educational technology has to be seen as a part of persistent and complex endeavour of bringing pupils, teachers and technical means together in effective way."

S.S Kulkarini: "Educational technology can be defined as the application of laws and discoveries of science and technology to the process of education."

I.K Devies: "Educational 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."

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

D. Unwin: "Educational technology is concerned with providing appropriately designed learning situations which, holding in view the objectives of teaching or 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.

STOP TO CONSIDER

There are two senses of Educational Technology–

- First sense-Educational technology means the use of mass media and audio-visual aids in education or **technology in education**. It projects the picture of educational hardware like the teaching machines, film-projectors, slide projectors, language laboratories, tape recorder, cassettes, satellite, television, video tape recorder, computer etc.

- Second sense-Educational technology is the utilization of all available resources in a system in order to optimize teaching learning process or **technology of education**. It implies to the software-used by the teachers in the classroom for making teaching and learning effective and successful. It is characterized by task-analysis, writing objectives in behavioral terms, selection of appropriate strategies, reinforcement for correct responses and constant evaluation.

SELF-ASKING QUESTION:

1. How will you explain the second meaning of educational technology?

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1.3 Nature of Educational Technology:

Till now, we have discussed the meaning and basic concept of educational technology. The discussion helps us to derive the characteristics feature of Educational Technology to get a more clear meaning of it. Let's know its feature—

- Educational technology is the science of techniques and methods. The application of these methods helps in the realization of the educational objectives.

- It emphasizes on the development of new strategies and techniques for an effective and result oriented learning.

- Educational technology defines the objectives of education in behavioral terms. Through this, it creates suitable teaching learning environment to realize these goals.

- It makes optimum utilization of the available learning resources for sake of realizing the objectives of education.

- Educational technology is the combination of learning theories, art and science of teaching. Art and science of teaching go hand in hand.

- Educational technology is the mechanization of educational process. The mechanization is being done in the three phases of human knowledge-a. Preservation of Knowledge, b. Transmission of knowledge and c. advancement of knowledge.

- The primary function of educational technology is to make functional analysis of the teaching-learning process to identify the various components of education and observation of the effect of manipulating the various components.

- Educational technology borrows different ideas from the field of engineering, physical science and behavioral science for developing the teaching and training process of education.

On the basis of the above characteristic, educational technology can be perceived as the development of a set of systematic technique, and accompanying practical knowledge for designing, testing and operating schools as educational system.

CHECK YOUR PROGRESS

Que.1: What is meant by educational technology?

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Que.2: What are the two important characteristics of technology according to J. K Galbreth?

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Que.3: State two features of Educational Technology.

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1.4 Scope of Educational Technology:

The scope of educational technology depends upon the perception of its concept. The scope of educational technology in the context of hardware approaches like-audio-visual aids, mechanical and electric gadgets is limited. But, the scope of educational technology is not limited to the Medias. Its scope is very wide. Before going to discuss the scope of educational technology, let's know about the three major aspects of it—

A) Input

B) Process

C) Output

A) Input:

This aspect of educational technology involves the entering behavior of the learner. It includes the previous knowledge or achievement and abilities of the students as well as their motivational level. This aspect of educational technology is concerned with the comprehension level of the learner. The

skill and teaching methods used by the teacher are also covered by this aspect of educational technology.

B) Process:

The process here indicates the teaching and learning process of education. It involves the means and devices of learning experiences to generate situation for effective and meaningful content presentation, for selection of appropriate teaching and communication strategies and tactics. It also helps in establishing good rapport between teacher and the taught.

C) Output:

The output aspect of educational technology refers to the terminal behaviour of the students. It involves the process of analyzing the stimuli in the teaching –learning process. It refers to the determination of the context to which the determined educational objectives have been achieved.

Keeping an eye over such broad concepts of educational technology, one is able to map out the areas of its operation in terms of topics or aspects covered through its study or application. In brief, they may be summarized as below-

1. Analysis of the process of Teaching and Learning:

Educational technology tries to discuss the concept of teaching, analysis of the teaching process, variables of the teaching, phases of teaching, levels of teaching, theories of teaching, principles and maxims of teaching, the concept of learning, the relevance of the theories of learning, the relationship between teaching and learning, the integration of the theories and principles of teaching as well as learning for attaining optimum educational purposes.

2. Spelling out the Educational goals or objectives:

Educational technology tries to discuss the topics such as identification of educational needs and aspirations of the community, survey of the resources available for the satisfaction of these needs and aspiration,

spelling out the broad educational objectives, analysis of the broad objectives in terms of the specific classroom objectives of teaching and learning, specifications of these objectives in behavioural terms etc.

3. Development of the curriculum:

This aspect of educational technology is concerned with the designing of a suitable curriculum for the achievement of the stipulated objectives. It may be describe the ways and means for the selection of suitable learning experiences or contents, organization of these contents is a suitable framework in order to bring out more effective instruction and thus analyze the suitability of the curriculum in relation to the objectives, means and materials and devices of evaluation.

4. Development 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 the stipulated objectives, designed curriculum and available resources. Here educational technology tries to discuss the essential techniques of developing software and instructional material like programmed learning material, computer assisted learning material, mass media instructional material, personalized system of instruction, planning for the teaching and learning and preparation of lesson plans, etc.

5. Teacher preparation or teacher- training:

Teacher is a key figure in any process of teaching and learning. Educational technology, therefore, takes care of the proper preparation of teachers for exercising their complex responsibilities. For this purpose, educational technology includes topics like models of student teaching, micro teaching, stimulated teaching, team teaching, teacher effectiveness, modification of teacher behaviour, classroom interaction, T-group training and interaction analysis etc.

6. Development and selection of the teaching- learning strategies and tactics:

This aspect deals with the central problem of teaching-learning act. Here educational technology tries to describe the ways and means of

discovering, selecting and developing suitable strategies and tactics of teaching in terms of the optimum learning and available teaching- learning resources, the availability of the different types of teaching methods, devices and models of teaching along with their appropriate selection and use for the optimum results.

7. Development, selection and use of the appropriate audio- visual aids:

Teaching learning is greatly influenced and benefitted by the use of appropriate audio- visual aids. Educational technology covers this aspect by discussing various types of audio-visual aids used for the educational purpose, their proper selection suiting to a particular teaching learning situation, their development and production in view of the available resources and problems faced in a teaching learning act, audio- visual methods of presentation and dissemination of information, their proper storage and retrieval and consideration about their cost- effectiveness and effective utilization.

8. Effective utilization of the hardware and mass media:

Various sophisticated instruments, equipment, gadgets and communication devices brought through mechanization and electronics revolution are playing an effective role in the attainment of educational objectives by helping the teachers and learners in their respective roles. Educational technology tries to describe these resources in terms of their specific functions and applicability in a particular teaching –learning situation; their selection, proper handling and maintenance; their preparation and development; the cost- effectiveness of these equipment and mass media in education; appropriate teaching-learning material for these appliances; and the ways and means of their optimum use in formal education on the individual and collective basis.

9. The work for the effective utilization of the subsystem of education:

Educational technology considers education as a system operating, in a systematic and scientific way, for the achievement of educational objectives. For the coverage of a systematic approach, it tries to include

the topics dealing with the theory and principles of a system approach, explaining education as a system. It also includes study of its different sub systems , their operation and processes in terms of input and output, the needed development in the working of the subsystem in view of the economy, output and functionality of the system, and the organization and management of the system in an effective way by specifying the respective roles of the man, machine and media in relation to the purposes of teaching and learning.

STOP TO CONSIDER

The three major aspects of Educational Technology are—

1. Input: This aspect of educational technology involves the entering behavior of the   learner.

2.**Process**: The process here indicates the teaching and learning process of education.

3. Output: The output aspect of educational technology refers to the terminal behaviour of the students.

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10. To provide essential feedback and control through evaluation:

Educational technology is essentially concerned with the task of exercising appropriate control over the process of teaching and learning by planning and devising suitable tools and devices for the continuous evaluation of the process and products of the teaching- learning activities. Such evaluation provides an appropriate feedback to the learners as well as the teachers for bringing necessary improvement at the preparatory and implementation stages of their specific acts. For these purpose, educational technology discusses the ways and means of suitable evaluation techniques and their planning, development, selection and appropriate use in relation to the objectives of teaching –learning system.

Thus, educational technology is concerned with all the variables, phases, levels and aspects of the teaching –learning process. In brief, it works for the overall planning and organization of the system or subsystems

of education. It helps all those who are connected directly or indirectly to the processes and products of education. It teaches the teacher the art of teaching, the learners the science of learning, the educational planners the stricter of planning and the administrators or managers the skill of managing or administering the task of teaching and learning. It works for individualization of instructions as well as for improving the group dynamics of the classroom. It reaches to the individuals, groups and the masses, privileged or unprivileged through its media and means. The use of mass media for educational purposes through radio, television, tele-text, and computer controlled devices and correspondence courses have given new dimensions to the application and scope of educational technology.

In the above discussion, an attempt has been made to identify the scope of the subject educational technology by mapping out its field of operation, but in true sense, it is unwise to put hedge and boundaries around such a developing and fast growing subject. Its scope is essentially unlimited as it is concerned with the task of helping and organizing a discipline like education and the acts like teaching and learning that know no limits and boundaries.

CHECK YOUR PROGRESS

Que.4: What are the three major aspects of educational technology?

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Que.5: What does the process aspect of educational technology mean?

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SELF-ASKING QUESTION

2. How educational technology is important for teacher education?

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1.5 Summing Up:

Coming to the last part of this unit, it can be said that this unit has tried to familiarize you with the concept, nature and scope of educational technology. Thus we can summarize the unit as-

- The application of scientific laws and principles for the purpose of making daily life easy and comfortable is technology.

- Etymologically, the word technology has been derived from a Greek word-'technikos' which means 'an art'. Again, some are of the opinion that Technology has been derived from a Latin word-'Texere', which means 'to weave or construct'.

- Educational technology implies the application of system analysis to teaching and learning. It is the application of technology of modeling to education.

- According to **S.S Kulkarini**, "Educational technology can be defined as the application of laws and discoveries of science and technology to the process of education."

- Educational technology is the combination of learning theories, art and science of teaching. Art and science of teaching go hand in hand.

- The scope of educational technology in the context of hardware approaches like-audio-visual aids, mechanical and electric gadgets is limited. But, the scope of educational technology is not limited to the Medias. Its scope is very wide.

- The three major aspects of educational technology are-A. **Input,** B. **Process** C. **Output.**

- The input aspect of educational technology involves the entering behavior of the learner. It includes the previous knowledge or achievement and abilities of the students as well as their motivational level. The process here indicates the teaching and learning process of education. The output aspect of educational technology refers to the terminal behaviour of the students.

1.6 Sample Questions:

1. Define educational technology.

2. Discuss the meaning of educational technology from a broader perspectives.

3. Why do you think technology is important for our lives?

4. Elaborate the aspects of educational technology with adequate examples.

5. Discuss the important characteristics of educational technology.

6. Explain the scope of educational technology.

1.7 References and Suggested Readings:

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1.8 Answer to Check Your Progress:

Answer to question 1:

Educational technology implies the application of system analysis to teaching and learning. It is the application of technology of modeling to education.

Answer to question 2:

According to J. K Galbreth, every type of technology implies two important characteristics

Firstly—Application of scientific laws and principles for practical works

Secondly—Dividing the practical works into steps and sub-steps and then completing them systematically.

Answer to question 3:

Two characteristics feature of Educational Technology are-

- Educational technology is the science of techniques and methods. The application of these methods helps in the realization of the educational objectives.

- It emphasizes on the development of new strategies and techniques for an effective and result oriented learning

Answer to question 4:

The three major aspects of educational technology are–

A) Input, B) Process, C) Output.

Answer to question 5:

The process here indicates the teaching and learning process of education. It involves the means and devices of learning experiences to generate situation for effective and meaningful content presentation, for selection of appropriate teaching and communication strategies and tactics. It also helps in establishing good rapport between teacher and the taught.

Answer to SAQ 1:

According to Second Meaning of Educational Technology, mechanization of teaching –learning process for the benefit of the big masses is Educational technology. It is related to hardware technology. This is applicable to all the three stages of human knowledge- 1. Preservation of Knowledge 2. Transmission of Knowledge and 3. Advancement of Knowledge

Answer to SAQ 2:

Educational technology is important for teacher education as we know that teacher is a key figure in any process of teaching and learning. Educational technology, therefore, takes care of the proper preparation of teachers for exercising their complex responsibilities. For this purpose, educational technology includes topics like models of student teaching, micro teaching, stimulated teaching, team teaching, teacher effectiveness, modification of teacher behavior, classroom interaction, T-group training and interaction analysis etc.

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UNIT- 2

FORMS AND TYPES OF EDUCATIONAL TECHNOLOGY

Unit Structure:

2.0 Introduction:

Educational technology is the science on the basis of which various strategies and tactics are being designed for the realization of specific goals of education. One of the crucial functions of educational technology is to structure the environment for learning. Technology provides a structure for the learning environment through the application of various resources and facilities. Thus, educational technology stands for the sum total of all educational facilities- media, method and technique for optimizing learning. It refers to the facilitation of teaching and learning through resource mobilization and utilization of learning principles. Earlier unit has helped you to get a clear conception of this concept. Here, in this unit, we will be focusing on the different forms and types of educational technology.

2.1 Objectives:

After going through this unit you will be able to –

- *comprehend* the different forms and its characteristics of educational technology,

- *identify* the types of educational technology,

- *distinguish* between important types of educational technology.

2.2 Forms of Educational Technology:

Educational Technology, as has already been discussed in the unit 1 of this block, has a wide range of scope and applicability in the field of education. In broader sense, it stands for the application of the principles and techniques of science and technology as well as psychology and pedagogy in the activities of teaching and learning. As a result, it has been capable of providing necessary ways and means, theoretical as well as practical, for improving the processes and products of teaching- learning related to both formal and informal education. With such a broad concept, educational technology has formed its roots and wings in certain distinct aspects and forms in various courses and programmes related to the study and application of educational technology. These forms of educational technology, in general, can be listed follows-

    i.   Teaching Technology

    ii.   Behavioural Technology

    iii.   Instructional Technology

    iv.   Instructional Design Technology

Detail discussion of these forms will enable you to get better understanding of each form. The following sub-sections will cover these areas.

2.2.1   Teaching Technology:

Teaching is such a classroom activity which is completed by the interaction between teachers and students. This activity leads to complete

development of students. It differs from instruction in the sense that only teacher is active and communicative in instruction while in teaching, students fully participate in the learning process and outcome is the result of interaction between teachers and students.

Teaching technology refers to the application of laws and principles of science and philosophy for realizing certain objectives in education. Teaching is an art in itself is made a science when technology gives it practical, objective and goal based shape.

Content of Teaching Technology

A) **Planning Teaching:** A teacher makes proper plan to what he is to teach in the class. In planning he does three things–

➢ He analyses the content and arranges each sub content into systematic manner. It is called task analysis.

➢ Then he identifies the objectives i.e., what changes he has to bring about the behaviour of his students.

➢ Finally, he writes the objectives in the language of behavioural change of learners so that they can be evaluated at the end of the task.

B) **Organizing Teaching:** This is the second stage of teaching. This stage is particularly related to the presentation of the subject matter. In organizing stage, a teacher does the following things-

➢ He selects suitable teaching strategies and techniques.

➢ He selects or prepares suitable material aids for making the presentation of the subject matter effective.

➢ 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 learning objectives.

In order to make this stage of teaching a success, teacher trainees are taught lessons like principles and theories of teaching and learning, behaviour development, strategies and devices of teaching, methods of evaluation etc.

C) Leading Teaching: This stage is related to communication strategies and reinforcement devices. Teacher motivates the students in such a way as learning becomes their necessity and they take full interest in the process. In order to learn various techniques of behaviour development, motivating devices, classroom behaviour model, observation of classroom behaviour etc.

D) Controlling Teaching: This stage is related to evaluating teaching tasks. At this stage teacher evaluates organizing and leading stages separately and tries to ascertain whether the objectives formulated in the planning stage are achieved or not. If objectives are not found realized, the teacher will find out at what stage- Organizing or leading he is doing mistakes and consequently he modifies his behaviour. A teacher does the following things here-

➢ He decides which form of procedure of evaluation he has to use.

➢ He selects suitable measuring instruments.

➢ If instruments are not available, he constructs them.

➢ He scores the tests by following certain rules.

➢ He interprets the scores in relation to objectives formulated in the beginning.

In order to make this stage a success, a teacher must know the techniques and procedure of evaluation.

Assumption of Teaching Technology:

Teaching technology based on the following assumption-

➢ Teaching is a science more than an art and it can be learnt by efforts as is done in teacher training colleges.

➢ Modification and improvement can be made in teaching activities according to the situation, i.e., there is no general formula applicable to all circumstances.

➢ Teaching and learning are mutually inter related i.e., they are affected with each other. It otherwise means that better teaching leads to better learning environment which in turn leads to better teaching.

➢ Desired learning situations can be created by suitable teaching situations. It means that the role of the teacher is very significant in the class.

➢ If teaching is effective, objectives will surely be realized i.e., a teacher will not be unsuccessful if he desires so.

Characteristics of Teaching Technology:

➢ This technology can make the teaching effective.

➢ This technology also takes the help of sociology, philosophy and psychology from planning to controlling stages.

➢ Here inputs, process and output work together and result in the form of behavioural changes coming to the fore every moment.

➢ All the three domains of objectives-- Cognitive, affective and psychomotor can be achieved by this technology.

➢ Teaching can be organized on any of the three levels – memory, understanding and reflective levels by the use of teaching technology.

➢ New teaching theories can be developed by the use of teaching technology.

➢ This technology is equally effective to all grades of learning i.e., primary, secondary, post-secondary etc.

2.2.2 Behavioural Technology:

This technology emphasizes the application of teaching and learning principles into teaching so that behaviour of students as well as teachers may be modified in accordance with the objectives of teaching. Because of this reason, this technology is also known as training technology.

This technology is closely related to psychology. Psychology is the science of behaviour and learning is the modification of behaviour through activities and experiences. Behavioural technology applies all these principles of psychology to bring about desirable change in behaviour. Skinner believed that can train the behaviour of any person by reinforcing his desirable responses. This technology puts more emphasis on the behaviour of the teacher than that of students and whatever changes we want to bring about

in the behaviour of learners can be brought through the behaviour of the teacher only. For this purpose, behaviour of the teacher is closely monitored and reinforced by expert observers

Content of Behavioural Technology:

A teacher learns the following subject-matter under this technology-

➢ Meaning, assumptions and principles of teacher's behaviour.

➢ Methods of observing teacher's behaviour and its rating.

➢ Analysis of teacher's behaviour.

➢ Manifestation of behaviour under different situations.

➢ Evaluation of teacher's behaviour and its manifestation.

➢ Different models of teacher's behaviour.

➢ Different techniques of developing teacher's behaviour i.e., reinforcement models.

➢ Micro teaching, team teaching and stimulated teaching.

➢ Social Skill training.

➢ Teacher group training.

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 teacher's behaviour.

➢ Teacher's behaviour can be observed and measured.

➢ Teacher's behaviour is relative. It means that some teachers are good and some are not good.

➢ Teacher's behaviour can be modified by training and by using reinforcement devices.

➢ There is always a possibility of improvement in teacher's behaviour. Behaviour can be made good by imitating good models.

Characteristics of Behavioural Technology:

➢ Psychology is the base of this technology. By using psychological principles and methods teacher's behaviour can be modified in the desirable way which will lead to the desirable changes in the behaviour of the learner.

➢ Teaching skills can be developed in teachers with the help of this technology. It means that teacher's behaviour in the class can be given by experts for improvement.

➢ Reinforcement is the backbone of this technology which is used at all desirable responses.

➢ Here teaching activities are evaluated objectively. This makes the evaluation free from bias.

➢ This technology emphasizes more on the realization of psychomotor objectives.

➢ This technology is based on the use of software technology and role of machines is negligible here, though video recording devices can be used for observation and reproduction of behaviour.

➢ This technology is especially useful for teacher training institutions where modification of teacher's behaviour in the desired direction is needed.

➢ This technology is useful for principles of schools who can observe the classroom behaviour of their teachers and suggest remedial measures.

➢ This technology can tell us how teaching can be made successful by keeping the individual differences of students into account.

➢ Content and methods of communication both can be used in order to improve teaching aspects in the class.

2.2.3 Instructional Technology:

Instructional technology refers to the communication of content or information's to the learner. Content can be presented on all the three levels- memory, understanding and reflective levels. Instructional technology, can however, present the content to the second level of teaching only and we will have to take the help of teaching technology for reflective level of teaching.

Similarly, communication also has two elements- verbal and non-verbal. For example, questioning by the teacher and its responding by the students in the class is verbal communication. But in non-verbal instructions teacher uses his body actions, gestures, stimulus variations and material aids for communicating the content. For example, if a teacher wants to convey the meaning of jump to the class, he jumps slightly and say it jump. This is non-verbal instruction.

Instruction can be given either by the teacher or by the machine and it does not make any difference. For example, open universities use TV, radio or Internet for instructing thousands of students in a single setting and whosoever is interested can take the benefit of this programme. Thus instructional technology is based on hardware approach i.e., here teaching-learning material can be communicated to learners by using audio- video recorders, radio, television or computers. Direct interaction between the teacher and the students is not seen here as is the case of teaching or behaviour technologies. Instruction cannot be termed as teaching due to lack of participation on the part of students. Even a teacher becomes an instructor when he does not invite the students to participate in the lesson. In spite of that if instructor is very much effective in this communication skills, he can make the instructions living and interesting. This technology basically refers to communication of contents in an effective manner either by teacher or by a machine

In instructional technology too, instructional materials are prepared keeping in view the objectives formulated in advance. Then subject –matter is presented by using different strategies, techniques and material aids. Finally the outcomes are evaluated in terms of the objectives in order to ascertain whether instructional process is success, knowledge of psychological and scientific principles and laws and awareness of social values and norms is a must i.e., Maxims and principles of teaching must be kept in mind while preparing instructional materials.

Content of Instructional Technology:

Following subject-matter is suited in this technology-

➢ Meaning and definitions of instructional technology.

- Meaning and principles of programmed instruction.

- Linear programmed instruction, meaning, concept, principles and models.

- Branching programmed instruction, meaning, concepts, principles and models.

- Computer assisted instruction, its nature and various models.

- Construction of programmed instruction in various subjects.

- Adjustment procedures of individual differences and development of suitable equipment.

- Media and printing equipment and their functioning.

- Principles of learning and instruction.

- Devices of feedback and their uses.

Assumption of Instructional Technology:

This technology is based on the following assumptions-

- If we divide the whole subject- matter into parts, then each part can be taught separately. If it is not possible to divide the subject-matter into natural parts, this technology cannot help to make the presentation of the subject- matter effective. In this way, learning can be created from outside by reorganizing different elements of the lesson.

- A student can learn only according to his needs and rate of learning. It means that an instruction cannot benefit all the students equally, howsoever it is good.

- A student can learn by machines (radio, TV, computers, etc.) without the help of the teacher provided that instructional materials are prepared after dividing the content into different natural elements.

- Students can be given feedback by instructional activities also i.e., effective communication can provide feedback to learners.

- Learning objectives can be achieved with the help of instructional objectives. For this purpose instructional techniques will have to change again and again.

Characteristics of Instructional Technology:

➢ Objectives of cognitive domain can be achieved by the use of this technology.

➢ This technology can fill up the deficiency of effective teachers because we can communicate the instructional materials to thousands of learners at a time by recording the teaching of an effective teacher into machines.

➢ By the use of this technology, students can learn according to their own ability and needs, e.g., if the rate (speed) of learning of a student is very slow, he can rebound the tape recorder or log on the website more than once until the topic is clear to him. Thus, with the help of this technology, we can control the problem of individual differences to a great extent.

➢ Right responses of students can be reinforced regularly which will lead to further right responses to occur.

➢ This technology is also based on principles of psychology and social values and instructional materials are prepared by following these principles and values.

➢ By using this technology into researches instructional principles can be developed.

➢ Comprehensive analysis of the subject- matter is also possible with the help of this technology and it can make the presentation easy and logical.

STOP TO CONSIDER

Forms of educational technology are Teaching Technology, Behavioural Technology, Instructional Technology and Instructional Design Technology.

2.2.4 Instructional Design Technology:

Instruction as a process stands for helping the individual as a learner for achieving the stipulated teaching-learning objectives. A good instruction is always goal –oriented with a specific purpose or purposes implying that

the manner in which a learner is imparted instruction (assisted in his learning process) should always be well –conceived, planned and effectively controlled phenomenon. Educational technology, with one of its various domain /forms, namely instructional design technology, brings out effective instructional designs for improving the process and products of instruction.

The term instruction design in its simple meaning thus stands for a layout or plan describing the manner in which an instructional process which involves teaching and learning and its interaction should be carried out for attainment of the stipulated instructional objectives. An instructional design technology in this way should be essentially concerned with the planning, execution and evaluation of the instructional process for the effective control on the process and products of instruction.

Instructional design technology for exercising such control and manipulation , may be seen to adopt a few distinctive approach like system approach, cybernetic approach and training psychology for generating effective instructional design with a clear- cut motive of helping the learner and teacher in the attainment of the stipulated instructional objectives.

CHECK YOUR PROGRESS

Que.1: What are the forms of educational technology?

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Que.2: What are the contents of teaching technology?

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Que.3: State two characteristics of behavioural technology.

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Que.4: State two assumption of Instructional Technology.

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2.3 Types of Educational Technology:

Types of educational technology comprise the most important discussion under study of educational technology. The types of educational technology is classified under three most popular categories of-

A) Hardware Approach;

B) Software Approach;

C) System Approach.

A) Hardware Approach

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. The process of teaching-learning has been gradually mechanized through the use of teaching machines, radio, television, tape recorder, video-tape, projectors etc. The teacher can deal with a larger group of students at the same time by his discourse through these machines.

The hardware approach is based on the application of engineering principles for developing electro-mechanical equipment for instructional purposes. 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 expenditure in educating them. Human knowledge has three important aspects-

i.   Preservation

ii.   Transmission

iii.   Development.

The history of **preservation** of the knowledge is believed to exist since the printing machines started. The knowledge is preserved with the machines in the form of books which are conserved in library, in terms of film etc.

The second aspect of human knowledge is its **transmission**. A teacher can impart knowledge himself to his pupils. Now a day, transmission of the knowledge is supported by machine like mike, radio and television. With these, thousands of pupils can enjoy this 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 aspects 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.***

Basis of Hardware Approach:

➢ Hardware Approach has physical science and applied engineering as its basis.

➢ Hardware Approach has mechanized the whole teaching- learning process.

➢ Hardware Approach adopts a Product-oriented approach.

➢ Hardware Approach has the potential to hand over the educational benefits to the mass with greater ease and economy.

Characteristics of Hardware Approach:

➢ Silverman called this type of educational technology 'Relative Technology'. Based on physical science and applied engineering field approach. The concept of hardware approach is derived from the application of "physical science" to education.

➢ The new mechanism of teaching-learning with improved technology as its basis. Suggesting innumerable new ways of doing things to the class-room teachers

➢ The job and the duties of the teacher are likely to have multifaceted changes as they are to deal with many new gadgets for teaching and learning.

➢ Engineering principles are used for the development of these types of technical equipment. The teacher can deal with larger group of students with the help of these 'Mechanical device' or 'Machines'.

➢ The teacher can deal with larger group of students with the help of these 'Mechanical device' or 'Machines' , resulting in less cost and economy in finance

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SELF-ASKING QUESTION

1. What are the bases of Hardware approach?

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B) 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.

It originates from behavioural sciences and their applied aspects concerning psychology of learning. 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 behavioural 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.

Educational technology is closely associated with the modern principles & theories of teaching. Models of teaching, theory of instruction, theory of teacher- behavior & principles of programmed learning. It is characterized by task analysis, writing, objectives in behavioral terms, selection of the appropriate teaching strategies, reinforcement for correct responses & continuous evaluation.

Software Approach is concerned with teaching objectives in behavioural terms, principles of teaching, methods of teaching, reinforcement of instructional system, feedback, reviews and evaluation. Software approach tries to develop all the three basic components of technology, i.e. Input, Process and Output.

Basis of Software Approach:

➢ In software approach, the basis of all thinking and working is behavioural science and psychology of learning.

➢ Software approach uses the principles of psychology for the purpose of behaviour modification.

➢ A teacher with added knowledge of software approach can use the films, flashcards, tapes etc., for various purposes.

➢ A teacher can plan better teaching which results into better learning. There is not end to his thinking.

Characteristics of Software Approach:

➢ This view of educational technology is closely associated with the modern principles of programmed learning and is characterized by task analysis, writing precise objectives, selection of appropriate learning strategies, reinforcement of correct responses and constant education.

➢ Silverman termed this educational technology as 'constructive educational technology.' Also known as 'Management Technology'.

➢ A modern approach in educational administration and organization. It has brought to educational management a scientific approach for solving educational administrative problems.

➢ Origin of software approach lies in the application of 'behavioural science' to the education. It refers to the application of teaching-learning principles in the shaping of behaviour.

➢ Its application while writing objectives in behavioral terms, selection of appropriate teaching, strategies, reinforcement for correct response etc.

C) System Approach:

In the age of modern educational technology, system approach is not a new concept. This approach is significant for technology, commercial and administrative work. The term System approach has been formed by two words: *system and approach*.

System means the totality in which all the elements, factors and components work in a self-contained manner. System approach believes in totality. Teaching and learning according to this approach is a social and technological process. This approach is learner centered. As a process, a system approach incorporates all the elements of education. In system approach, all the elements are included like-teachers, students, curriculum, classrooms, instructional materials and strategies, social environment.

According to Keshow and Michean, "Systems approach is one of the techniques which aims at finding the most efficient and economically intelligent methods for solving the problems of education scientifically. Again, Hall opined, "A system approach is a set of objects together with a relationship between the objectives and their attributes."

Characteristics of System Approach:

➢ System approach is the base of planning, development, presentation and evaluation of instruction.

➢ In provides a suitable basis for the determination of objectives from analysis of environment system.

➢ This approach is integrated and dynamic.

➢ Instructional objectives are so set by which their accomplishment can be observed easily.

➢ In this approach, elements are systematically arranged which functions in a specific manner.

➢ This approach uses the human resource, finance, machinery and material for problem solving in an effective manner.

STOP TO CONSIDER

The three most popular categories of educational technology are-

A) Hardware Approach,

B) Software Approach,

C) System Approach.

CHECK YOUR PROGRESS

Que.5: What are the major types of educational technology?

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Que.6: State two characteristics of Software approach.

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Que.7: Define system approach.

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2.3.1 Difference between Software type and Hardware type of Educational Technology

Through the above discussion, you must be clear with the concepts of hardware and software approach. These are two important types of educational technology. There are some basic differences between these approaches. The following elaboration will make your concept more clear and distinct.

Distinction between Hardware and Software Technologies-

Hardware technology	Software technology
1. Hardware technology has its origin in physical sciences and applied engineering	1. Software technology has its origin in behavioural sciences and their applied aspects concerning psychology of learning
2. It is more concerned with the production and utilization of audio visual aid material and sophisticated instruments and mass media for helping teacher and learners in their task.	2. It tries to make use of psychology of learning for the production and utilization of software techniques and materials in terms of learning material, teaching-learning strategies and other devices for smoothening the task of teaching learning.
3. It tries to adopt product-oriented approach, in the shape of teaching-learning material and strategy through the utilization of the hardware instruments and gadgets for effective teaching learning.	3. The material produced here is made available for being used by the hardware application.
4. It is based on the concept of service meaning hereby that it provides services in the field of education.	4. It helps in the production of software material being used by the hardware applications and gadgets for delivering their service to the users i.e. teachers and learners.
5. As examples of the appliances and gadgets being used in hardware technology service we can name radio, television, tape recorder, video, slides and film projectors, teaching machines and computer etc.	5. As examples of the material produced through software technology we can name, programmed learning material, in the shape of charts, pictures, models, slides filmstrips, audio and video cassettes, software packages etc.
6. Needs the services of software technology for its use and functioning. It can't go without the aid of software technology e.g. computer hardware in the shape of a machine like device is of no use if it does not make use of software services both for its operation as a machine and its multi-dimensional utilities. The use of application and utility software is in fact must for taking any service from the hardware technology of the computer.	6. Most useful and productive in the case if it is assisted and made into use by the hardware applications and gadgets. However, it can go alone for delivering its services to the users without calling aid from the hardware technology.
7. It has its mass appeal and utilization. It can contribute a lot in handing over the	7. It has no such wide application and appeal to masses as found in the case of

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SELF-ASKING QUESTION

2. How would you differentiate between hardware and software approach?

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2.4 Summing Up:

Coming to the last part of this unit, it can be said that this unit has tried to familiarize you with the basic forms and types of educational technology. Thus we can summarize the unit as-

- Educational Technology has been capable of providing necessary ways and means, theoretical as well as practical, for improving the processes and products of teaching- learning related to both formal and informal education. With such a broad concept, educational technology has formed its roots and wings in certain distinct aspects and forms in various courses and programmes related to the study and application of educational technology.

- The forms of educational technology in general are-Teaching Technology, Behavioural Technology, Instructional Technology and Instructional Design Technology.

- Teaching technology refers to the application of laws and principles of science and philosophy for realizing certain objectives in education.

- Behavioural Technology emphasizes the application of teaching and learning principles into teaching so that behaviour of students as well as teachers may be modified in accordance with the objectives of teaching.

- Instructional technology refers to the communication of content or information's to the learner.

- Instructional design technology brings out effective instructional designs for improving the process and products of instruction.

- The types of educational technology is classified under three most popular categories of-

  Hardware Approach, Software Approach and System Approach.

- The hardware approach refers to the use of machines and other mechanical devices in the process of education.

- The software approach used the principles of psychology for building in the learners a complex repertory of knowledge or modifying his behavior. Software approach tries to develop all the three basic components of technology, i.e. Input, Process and Output

- System approach is learner centered. As a process, a system approach incorporates all the elements of education.

2.5 Sample Questions:

1. What are the basic forms of educational technology?

2. Discuss the characteristics of teaching technology.

3. Elaborate behavioural technology with its content and assumption.

4. Discuss the types of educational technology with its essential features.

5. Differentiate between hardware and software approach of educational technology.

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2.7 Answer to check your progress/Possible Answers to SAQ:

Answer to question 1:

The forms of educational technology in general are-Teaching Technology, Behavioural Technology, Instructional Technology and Instructional Design Technology.

Answer to question 2:

The contents of teaching technology are-Planning Teaching, Organizing Teaching, Leading Teaching and Controlling Teaching.

Answer to question 3:

Two characteristics of behavioural technology are-

➢ By using psychological principles and methods teacher's behaviour can be modified in the desirable way which will lead to the desirable changes in the behaviour of the learner.

➢ Teaching skills can be developed in teachers with the help of this technology. It means that teacher's behaviour in the class can be given by experts for improvement.

Answer to question 4:

Assumption of Instructional Technology are-

➢ A student can learn only according to his needs and rate of learning. It means that an instruction cannot benefit all the students equally, howsoever it is good.

➢ A student can learn by machines (radio, TV, computers, etc.) without the help of the teacher provided that instructional materials are prepared after dividing the content into different natural elements.

Answer to question 5:

The types of educational technology is classified under three most popular categories of-

A) Hardware Approach

B) Software Approach

C) System Approach

Answer to question 6:

Two characteristics of Software approach are-

➢ Origin of software approach lies in the application of 'behavioural science' to the education. It refers to the application of teaching-learning principles in the shaping of behaviour.

➢ Its application while writing objectives in behavioral terms, selection of appropriate teaching, strategies, reinforcement for correct response etc.

Answer to question 7:

According to Keshow and Michean, "Systems approach is one of the techniques which aims at finding the most efficient and economically intelligent methods for solving the problems of education scientifically."

Answer to SAQ 1:

Basis of Hardware approach can be listed as-

➢ Hardware Approach has physical science and applied engineering as its basis.

➢ Hardware Approach has mechanized the whole teaching- learning process.

➢ Hardware Approach adopts a Product-oriented approach.

➢ Hardware Approach has the potential to hand over the educational benefits to the mass with greater ease and economy.

Answer to SAQ 2:

Hardware and software technologies can be distinguished as-

Hardware technology has its origin in physical sciences and applied engineering whereas, software technology has its origin in behavioural sciences and their applied aspects concerning psychology of learning

Again, it is more concerned with the production and utilization of audio-video aid material for helping both teachers and learners but, software approach tries to make use of psychology of learning for the production and utilization of software technique and material for teaching-learning task.

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UNIT- 3

ROLE OF EDUCATIONAL TECHNOLOGY IN DISTANCE EDUCATION

Unit Structure:

3.0 Introduction:

Distance education as a super system to fulfil the educational needs of vast majority of the people in our country is of recent origin. In enthusiasm and haste its conceptual framework and application has taken different shades, sometimes confusing it with informal education, merely correspondence, courage, brief orientation or intensive courses or prolonged correspondence cum contact programmes. Thus, to give it a proper shape and to develop it into an effective system it is essential to be very clear about the underlying concepts and its boundaries.

Distance Education system can be defined as 'organized systematic educational activity' carried on out-side the framework of the established formal system. Whether operating separately or as an important feature of some broader activity that is intended to serve identifiable learning objectives. It is very clear from this definition that Distance Education system differs from the formal education in the sense that it takes place outside the formal

school system. Probably freeing education from the four walls of the school sometimes creates confusion in the minds of educationists and they begin to take distance education as synonymous to informal education. But it is not incidental as non-formal. Distance Education is a well organized system with definite objectives, mode of communication, content and target population. In this sense it is par with formal education with the only difference of compulsory attendance, sifting face to face with the real teacher in a fixed class room of a particular school for a fixed number of days.

3.1 Objectives:

After going through this unit you will be able to—

- *understand* the concept of Distance Education,

- *analyse* various modes of Imparting Distance Education,

- *know* the role of educational technology in Distance Education,

- *understand* the utility of Distance Education,

- *understand* the role of multimedia and its influence as well as its advantages on Distance Education.

3.2 Concept of Distance Education:

The methods of education and training are equally important in the fulfilment of educational needs of the people. These should offer an opportunity to all sections of the society. The methods should encourage independent thinking and grasping in relation to age, maturity and degree of keenness to improve professional competency. These should also help to enhance educational qualifications, and provide job opportunities. Under the present circumstances, in spite of best intentions and resources it is not possible to have a network of teachers or resources for all the individuals for all time. This raises the question as to which system of education then could meet all the requirements. Certainly distance education can meet all these requirements.

Concepts like correspondence course, correspondence educations, distance-study, distance-teaching, distance-learning, open learning, self learning, home study etc., are in vogue reflecting the philosophy and spirit of distance education. The concept of distance education is much broader. The concept of distance education was also adopted by the International Council of Distance Education during the 12th International Conference held on the theme, 'Learning at Distance' at Vanceuver, Canada during June, 1982. It covers wide range of approaches of reaching the students to meet their varied educational needs. It believes in the philosophies envisaged by Holmberg (1972) and Chib (1977). This system of education provides equal opportunities to all to become productive citizens. The students here devote spare time to their studies and work at the speed that suits them. Needless to say, this method requires on the part of the students a good deal of will-power, self-discipline, a sense of innate curiosity and a habit of self-study.

Adiseshiah has very aptly defined distance education as the teaching-learning process undertaken where a space and time dimension intervene between the teaching and learning.

Thus, distance education denotes,

- physical distance between the teacher and the learner.

- time distance between preparation and delivery of the lessons or learning material.

- time distance between delivery of lesson or learning material and its reception by the learner.

Thus distance education,

1. is an organized and systematic teaching-learning activity and not incidental or informal education or just home-study.

2. is a teaching-learning system which may not follow the constraints like fixed-contents, time, teaching methods, face to face interaction etc., which are essential elements of formal education.

3. is linked with learner's needs, standards and their day to day work.

4. finally is always addresses to specific groups of learners with specific objectives.

The system of distance education emancipates education from the boundaries of educational institutions and carries the benefits of education to each and every one who desires to be educated and to improve his life and quench his thirst for knowledge. Specifically distance education helps the varied groups like,

1. the learner who are settled in remote rural areas where the educational facilities have not yet reached or are limited.

2. the learner who may have migrated to another place where continuance of his education is not possible.

3. the learner who may have entered into jobs for earning their livelihood and are not able to avail of formal education, education owing to their job living conditions.

4. Adult learners who may decide to learn something more for their professional enhancement.

5. Illiterate farmers and labourers.

6. Housewives

7. Handicapped and special group of learners who are not capable of attending formal schools.

To make really a democratic welfare state distance education may play a vital role in the transformation of society through wide dissemination of education among people. It has various advantages over the orthodox methods of education. For instance it enables the workers for national production. It may provide continuing education for millions of those who seek it. It opens the gate of higher education to those who need it for personal development or for professional advancement. Through the various techniques of distance education the educational planners and social workers can spread the light of education to every section of people to fulfil the long cherished desire of achieving happiness for the one and all of the nation.

CHECK YOUR PROGRESS

Que.1: What do you mean by Distance Education?

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3.3 Modes of Imparting Distance Education:

1. Correspondence Education:

Although correspondence education is essentially based on the supply of instructional material for home study yet it has to be supported by personal contact programmes. Students responses. Library facilities, study centres and audio-visual aids. Hence, the essentials of correspondence scheme of education are as follows:—

(i) Study Material

The first essential of correspondence education is to provide study material to the students which may be in the form of learning manuals, pamphlets, books, printed or cyclostyled lecture scripts. Study material should be compiled and edited by the top experts of the field or area of the subject.

(ii) Response Sheets

A student's response sheet refers to an assignment which is usually appended to each lesson or lesson unit. Home assignment or response sheet should be well planned. Students must regularly submit properly attempted home assignments. The home assignments or student's response sheets should be studied critically, properly evaluated and promptly returned to the students, with remarks, grades and suggestions for improvement.

(iii) Personal Contact Programme (PCP)

In correspondence, education, personal contact programme has been essential for creating interest and liveliness among the students and to provide personal touch. Besides class-room teaching necessary

(52)

guidance and tutorial assistance should be provided in personal contact programmes.

2. Open University:

Open University is basically a correspondence university, Open University through its mode of distance education has been considered as a viable approach with pragmatic solutions to many complex problems of ever expanding higher education in the country.

In this, the students are independent learners working largely in their own homes. They receive teaching materials and return their work by post.

The Open University uses broadcasting and other media. It puts in radio and television programmes which are integrated with written materials and transmitted by the B.B.C. at off-peak times; broadcasts are intended to take up roughly 5 to 6 percent of the students study time.

The Open University students are mostly adults. All these students are part-time, students, and there are no entrance qualifications.

The Open University is a nationally spread organization. The students are spread all over the country. It operates on a calendar year, beginning in January with final examinations in November.

Many of the widening problems of higher education such as quality and quantity. Vocationalization, diversification of courses, specialization and compartmentalization of subjects, pursuit of excellence and equalization of educational opportunities, all find their answers in the Open University.

The Open University system has tremendous flexibility with regard to the admission and choice of courses and optional papers.

Thus, the philosophy behind the Open University is to throw open the doors of higher education to all. Its emphasis is an openness, the meaning of which is providing university level education for all those who are destroys and capable of acquiring it, irrespective of their age or previous academic qualifications.

The Open University is open to learners to learn—

➤ when they want,

➤ how they want and

➤ What they want.

CHECK YOUR PROGRESS

Que.2: What are the modes of Imparting Distance Education?

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3.4 Role of Educational Technology in Distance Education:

Considering the fact that India has its own communication satellite in space and a large network for radio and television broadcasts with enough manpower having potential to produce educational programmes, the distance mode of education is ideally suited for mass education. Making optimum use of the existing facilities a large number of people hitherto untouched by education can be brought into the fold of education and teaching-learning process therein can be revolutionized. The British Open University which has greatly influenced the Indian distance education systems brought in certain radical innovations when established in 1969. Its teaching system in particular was based on a combination of broadcasting and especially written printed texts. As Bates (1984) puts it 'from its inception the Open University was technologically based'.

1. **Radio:**

   Radio can be considered as a medium as it consists of transmission through broadcasting of audio signal to listeners. The number of listeners of a radio broadcast may range those within the radius of a few kilometres in the case of FM transmission to several millions in the case of national broadcasting. Educational broadcasts are a

part of the programmes of several all stations. Largely, the radio broadcasts are for listening at the time it is broadcast. However, with the availability of storing devices the message can also be store by concerned persons / institutions. These two abilities make it necessary that a decision is taken before broadcasting whether the material is for direct hearing or to be recorded for later use. Another related question is whether the message is to be broadcasted once more than once and with what interval. Radio and television broadcasts are of particular importance in distance teaching as alternatives to face to face contact which is almost missing in it. Researchers have found that the use of radio in correspondence education is accompanied by increases in the percentage of written assignments submitted by the students of the Delhi University correspondence courses as compared to their counter parts without radio lesson facilities. There could be various programme formats for education broadcasts. It could be a lecture or radio talk by experts. Interview/discussion involving a team, sound recording of completes text or excerpts of historic interest, or radios vision consisting of talk to be accompanied by diagrams/pictures/slides. The use of radio broad-casts in the open universities abroad, however, has been decreasing with a dramatic increase in the use of audio-cassettes which are mailed to the students along with the printed course material. This is largely due to the inconvenience in listening to a programme as and when it is broadcast. However, as a distance learner you can see there is a provision of Radio Counselling in Gauhati University (Community Radio Station namely Radio Luit 90.8 FM). It is not for profit and endeavors to provide a mechanism for facilitating students, teacher, non-teaching staff, their family members and the members of the community hailing from the surrounding areas to tell their own diverse stories, to share experiences in a media rich world and to become active creators and contributors of media. This Radio station covers an area of approximately 15 km of radius from the premise of Gauhati University Centre for Disntace and Online Education (GUCDOE) where the studio is situated.

2. Television:

T.V. broadcasting is an important component in the Open University in other countries. With the acquisition of its production technology and failing prices, home receiving sets of T.V. broadcast are available in large number of Indian households and the number in increasing day by day. The specific value of T.V. broadcast will vary according to the context in which it is used. But there is no doubt that it can provide distance learners with unique resource material. Demonstration of complex or expensive experiments, field visits, microscopic observations, advanced technical equipments, industrial processes, social and interpersonal interaction and interviews with outstanding persons in a field are just some of the experiences that can be offered to students in their own homes through broadcast television. Generally, the broadcast television programmes have their strength, in encouraging interpretations by synthesis, demonstrating continuous processes, raising awareness and developing skills of evaluation. At the same time they have their weakness in achieving mastery learning, giving feedback, and presentation of complex ideas and probably even development of abstract thinking. The T.V. programmes are short lived, they cannot be reviewed, are presented at the same pace for all learners and do not provide scope for reflecting on an idea or thought during a programme unless one looses the thread of the programme itself. However, it would be too early to talk of its affectivity in certain terms since much needs to be explored in terms of its use in distance teaching.

Television is considered as another important and powerful media or providing distance education. Television took shape of education instructional media in 1972. Television plays a definite role in eradication of illiteracy and in the education and training of all types of persons. Only this medium can reach out to a vast number of illiterates in a persuasive and readily understandable manner.

It is regarded as a very effective medium of instruction because both audio and visual senses are involved at a time. It becomes difficult to demonstrate any experiment through correspondence or radio or in other medium of education but through television it becomes possible to impart

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education of practical subjects also. Students should watch the experiment on television and will try themselves to carry out the experiment by their own. Instructional television can play a vital role in imparting training to under qualified teachers of single teacher schools which are usually located in rural areas.

3. Satellite Instructional Television Experiment (SITE):

It is an innovation in the media communication. Television telecast is having limited range but by using satellite its range has been extended to the whole world.

Satellite Instructional Television Experiment was launched in August 1975 which covered about 2400 villages of six states. The programmes were telecasted every morning and evening. SITE, programmes were telecasted for both in school and out of school education. It was able to disseminate information about specific aspects of science, agriculture, health and the family planning etc.

4. Indian National Satellite (INSAT-1-B):

This became operational in October 1983. Its two distinct features of INSAT programme are Direct Telecast and National networking using existing terrestrial transmitters. Under the scheme nearly 2000 district relay lets and 2000 very high frequency sets in addition to the existing areas were installed in specially identified villages for community viewing. INSAT was able to provide television services throughout India.

5. Audio-Cassette:

This and the video cassettes are the media which would probably be crucial for the success of distance education. For students, study material presented on cassette offers considerable freedom. It can be used when it appears most relevant to the individual needs of students and at a time and place convenient to them. This is precisely the reason why it might be more appropriate for distance teaching. Moreover, the hardware, viz., cassette-player provides the learner with a scope to stop, pause and reply the text according to the personal preferences of students. It has been argued in the past that cassettes provide students with a learning medium which shares

many of the advantages inherent in a written text such as skimming, reviewing and control of pace while restoring the advantages of voice modulation.

6. Video-Cassette:

Video cassette is more recent and an evolving educational medium. Video-cassettes are like broadcast television in the sense that they combine moving pictures with sound. At the same time they are different in the sense that they can be viewed in ways which are independent of predetermined transmission time. Video-cassettes have the advantage over broadcasting of increased student control of the medium. Their more flexible control characteristics allow students to adjust the pace of the material to an individually appropriate level by replaying sections that move too quickly or by skimming forward over sections that move too slowly. Even through at present a majority of the distant learners do not have any access to video cassette players, considering the fact that it is a high growth industry. It is expected that in about a decade or two its accessibility figures would be far more satisfactory.

7. Video Disc:

The video disc technology is at present not available in India. A video disc is a brilliant silver coloured disc about 30 centimetres in diameter. Use of a laser based photochemical process makes it possible to produce a reflective surface master which faithfully reproduces the audio-visual proper-ties of the original programme material. From this master disc plastic copies can be relatively inexpensively produced by moulding or stamping processes similar to those used for producing gramophone records. One can think of a video disc as a high fidelity gramophone disc with pictures to accompany the sound. With the existing technology a videodisc can contain up to 55,500 individually numbered pictures or can play continuously for more than one hour. A beam of laser light is used to play the disc. It can be viewed on a standard T.V. set and hence has all advantages of a video-cassette. However, there are two features of the video disc player which makes it unique. One, since only a beam of light is striking the surface of a video disc, the

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disc will last indefinitely. Two, the location on the disc from which the laser beam is receiving information can be changed rapidly and precisely. The precise rapid single picture access makes it possible to step through the whole video disc one picture at a time. In addition it provides slow motion forward and reverse and rapid scan forward and reverse. Most video disc players are equipped with an input port to accept digital signals directly from a computer. This combination of computer / video disc player is the basis interactive video-disc system. This system makes it possible to develop computer assisted learning materials that combine the logical control and flexibility of computer software with the audio-visual characteristics of a video disc. Considering the fact that the physical capabilities of the computer / video disc system are much more than any of the educational lessons now available, its educational uses can only be speculated.

8. Word-Processors:

If the technologies mentioned so far were mainly or the delivery of the educational programmes a word-processor is more for planning, designing and production of programmes. Considering the fact that the printed text has been and will continue to be for some time the basic medium for providing learning experiences in distance teaching, one can imagine the manpower, materials and energy being spent in production of texts. Word-Processors are like electronic typewriters with additional abilities for electronic as well as permanent external storage, computerized housekeeping, and visual display of atleast 20-30 lines of text. Since the material, is first stored in memory instead of direct typing on paper, a lot of amendments in the text in terms of spacing, sequencing, deleting right / left justification etc., can be done before arriving at the final script to produce any number of copies through a printer unit. These facilities are extremely helpful in preparing a distance teaching text which routinely undergoes several processes such as drafting, typing, redrafting, retyping, editing, illustrating and printing. Having these facilities in one single machine, helps in keeping the production of a course on schedule.

Success of distance education depends largely on the use of alternative media available to us. There could be several other media not discussed here but of relevance to distance education such as telephone teaching, teleconferencing, computer aided instruction, tele-text systems etc what is important is not a well defined instructional strategy, which is the essence of educational technology. Knowledge needs to be presented in a variety of symbolic ways for deep understanding of a concept or idea. While knowledge can be presented or represented through any medium, media differ in their facility to develop different intellectual skills in appropriately using and applying that knowledge. However, it may be difficult to reach all the learners with all the media mainly because several of them are inaccessible to several learners. This probably requires that local study circles and local media resource centres are available to all learners within easy reach. With growing access to radio and television serious efforts need be made to include them in every distance education course. A suitable system of using audio / video cassettes and the large network of telephone facility needs to be evolved. As far as the utilization of radio and T.V. transmission network is concerned the targets identified in the programme of Action on the National Policy on Education - 1986 are promising. They include expansion of the existing network, establishment of radio stations in teaching universities, provision for a dedicated educational T.V. Channel, and in the long run creation of a dedicated satellite system for educational needs.

STOP TO CONSIDER

Radio, Television, SITE, INSAT-1-B, Audio Cassettes, Video Cassettes, Video Discs and Word Processor play a significant role in Distance Education.

3.5 Utility of Distance Education:

The Distance Education System, which imparts off-campus teaching, is an effective answer to the explosion in higher education. While the

conventional system of classroom oriented education requires full-time attention, and adherence to rigid rules and regulations, the non-formal pattern of education is flexible, and reaches out to the learner, wherever he or she may be. The non-formal system of education, which is an integral part of the New Education Policy, is the only alternative to the formal education system.

In the United States, the United Kingdom and in some western and Eastern countries, where the concept of distance education has been in operation, the radio and the television are used extensively for instructional programmes. In the UK, the Open University uses the radio for about 26 hours and the television for about 35 hours a week. In china, the Open University uses the radio and the television considerably. In Japan, the Open University relies heavily on the uses the radio and the television for its instruction. The study material is presented on the audio and the video cassettes also. The telephone teaching is imparted, particularly, in the US, Canada, Europe and Australia. Thus, opportunities are given to the students for using the different media which integrate the printed learning material. The employment of a verity of media enables the distance teaching institutions to get the feedback from the students.

The printing press plays a vital role in distance education. Both the institutes of Correspondence Education and the Open Universities mail the printed material periodically to the students. The printed material provides textual content, where a good deal of ground needs to be covered, or where the subject matter needs to be deal with in depth, or where certain skills -conceptual and analytical need to be developed. The students work at their own pace, and at their own convenience. After doing the assignments, the students send them back to the teachers, who correct them and mail them to students. Thus, the students get the feedback.

At present only a few Distance Education Institutes, namely of Delhi, Punjab, Rajasthan and Madurai arrange radio talks for their students with a view to making the instructional material and the study centres more meaningful and purposeful. It seems however, necessary that, apart from the radio talks, there should be radio group discussions and seminars ensuring student participation.

Television is a powerful audiovisual medium for distance teaching. The TV educational programmes can provide distance learners with useful resource material. The demonstration of intricate scientific experiments, the presentation of complex ideas, interviews with outstanding educationists on various disciplines can be presented to the students in their homes through the T.V. broadcasting. The broadcast television educational programmes encourage interpretations by the individual learners, stimulate thinking and provide an overview. Instructional materials received through the eye and the ears have a good chance of retention by the distance learner. Although T.V. broadcasting is an effective medium. However, distance education has to exploit the potential of this electronic medium to maximum.

The audio cassettes provide opportunities to distance teaching students in regard to the explanation and discussion of the instructional material periodically sent to them by post. These can be used for providing resource material, such as panel discussions and interviews with distinguished educators. The audio cassettes give considerable freedom to the students in that they can stop the cassette player to relax and replay the taped material. The human voice of voices they listen to make them mentally alert, establishing a contact through a remote one. While some developed countries use the audio cassettes with advantage, in our country the distance teaching institutes have yet to exploit this supplementary teaching electronic medium.

A video cassette in an excellent technology on the audiovisual materials front. The video cassettes provide bridges to understanding by giving concrete examples of complex' and abstract ideas covered in print.

The telephone also offers the two way communication across the distance. This medium can provide tutorials and seminars, where interactive communication can take place between the students and the teachers.

There are two kinds of computer operations for distance teaching. The first is computer-assisted instruction, and the second in computer-managed instruction. In the former, the student interacts directly with a computer, while in the latter there is no direct interaction. The computer provides the students with an additional support and the feedback on their works. The computer-supported systems for distance education programmes cover countries like West Germany, Holland and England.

The British Open University is planning to send micro computers to student's residences as part of its educational programmes.

3.6 Multi-Media Influence on Distance Education:

Multi-media in Distance Education has influenced the following areas—

1. **Supplement:** It is able to supplement the studies of regular students along with being a separate system of education.

2. **Individual speed:** Under this system learner can progress at his own speed and convenience.

3. **Flexible System:** Distance education has been found to be very flexible educational system, which is not limited by time and place restrictions.

4. **Self-learning:** Distance education leads to self-learning and self-improvement.

5. **Improvement of skills:** Distance education can be used for improving technical and vocational skills.

6. **Useful for remote areas:** Distance education is able to reach any remote or far-off areas through radio, television or postal service (printed material).

7. **Various categories of persons:** Distance education is quite successful to fulfil the needs of various categories of persons who are not able to make use of the formal system of education. In-service personnel, people residing in remote areas, disabled persons, underprivileged persons, school dropouts, etc., may all avail of distance education.

8. **Study in privacy:** In distance education system learners are able pursue to their studies in privacy at their homes. They could study at any time convenient to them.

9. **Universalization of Education:** Distance education is helpful to achieve the cherished goal of the nation for universalization of education.

10. Economical: It is regarded as an economical method of teaching when compared to regular formal system. Depending upon the kind of programme and number of students involved, correspondence course has been found to be almost more effective. Efficient and economical than any other technique.

CHECK YOUR PROGRESS

Que.3: Write any 3 Multimedia approaches that influence Distance Education?

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3.7 Advantages of Multi-Media in Distance Education:

Distance Education institutions are meant to provide education to improve their professional skills and competencies. But these institutions alone can't achieve the objectives without the support of the new media Multi-media refers to different media which can reach the masses or a large number of people in shortest possible time. Education imparted through multi-media becomes more effective and meaningful. The advantages of multi-media can be stated as follows—

1. The electronic media affect the sensibilities greatly. Therefore it is important to utilize multimedia to improve skills and competencies.

2. Multi-media can act as a support system to the education programme conducted in institutions.

3. Multi-media are means or instruments of communication that make available or each large number of teachers with a common message in the shortest time.

4. Multi-media and television can present information in such an attractive way which may not possible in conventional meetings, conferences and workshops.

5. Multi-media make the constraints of time and distance manageable. It reaches out to the most distant and the next deprived sections.

6. By distance education it is possible to introduce new courses according to the needs of the learners, through multi-media.

7. Multimedia are not substitutes for teachers, rather they supplement the effort of teachers.

8. The broadcast programmes of All India Radio. Educational Television (ETR), IGNOU and UGC Programmes telecast by Door Darshan are helpful for students.

3.8 Summing Up:

Distance learning refers to the technique of getting education through utilizing all the audio-visual inputs that are available. Correspondence course is designed to impart education to any learner living at a distance. It provides graded lessons in the printed medium. Educational programmes through the radio and television have now become common and regular. Besides, newspapers also carry articles on educational topic which are beneficial for a large number of learners. In a poor socially backward country which is over populated like ours, it is not possible to impart education to every one through formal system. Therefore, the scheme of correspondence courses or external courses has come into being.

3.9 Sample Questions:

1. What do you understand by Distance Education? State the present status of Distance Education in India.

2. Discuss various modes of Imparting Distance Education?

3. Discuss the multimedia approaches that influence Distance Education?

4. What are the advantages of Multi-Media in Distance Education?

5. Highlight the role of Educational Technology in Distance Education?

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UNIT- 4

APPROACHES TO EDUCATIONAL TECHNOLOGY

4.0 Introduction:

Everywhere in our society today we can see the influence of Technology in our lives. Mobile phones, Television, Radio, Desktop, Laptop, Palmtop, Audio-Visual Aids in teaching-learning process, devices used in our household activities to save our time and effort like freeze, refrigerator, washing machines, electric cooker etc. are some of the ideas of technology that assist in our day-to-day activities. Even Technology has multiple ways to entertain people. The younger generations are fully taking the advantages of technological assets to keep them busy by playing games, listening to music, composing creative videos and sharing it in the social media. The

older people are also showing great interest to have technological knowledge and avail the services. The revolutionized scenario of today's world has its base in Technology. Technology has been rapidly updating itself with creative innovations, evolving and implementing new theories beneficial to the world. In fact it has presented the world into a global village connecting people whenever and where ever. Without Technology it is impossible to think of the progress and development of a country. Technological assets have become part and parcel of our lives. In almost every field such as education, economics, medical science, research and politics, technology is a must to make a work successful. Technology has made it possible to communicate among people living in distant and remote places immediately and share information, feelings, knowledge etc. Technology provides enough scope for the upliftment, progress and development of any society. Technology that is used for Educational purpose is called Educational Technology in simple sense.

Earlier Educational Technology included within its meaning only the use of simple audio-visual aids and these were used for direct teaching-learning process. But later on, with the rapid development of science and technology, sophisticated scientific instruments, mass media and educational materials were being used. In other words Hardware and Software like Radio, Television, Tape Recorder, Films, Transparency etc. were used in the field of education.

In broader sense, Educational Technology is that technology which applies the theories and principles of Technology in the field of education. It makes the teaching-learning process smooth, active, effective, interesting, motivational and influential. This type of technology has greatly assisted both the teachers and learners in achieving the desired instructional objectives. It facilitates the learners to learn according to their own rate of speed and time. Educational Technology can create a controlled learning environment with controlled media and methods.

According to Dieuziede, Director General of UNESCO's Division of Methods, Materials and Techniques, "Educational Technology implies all the intellectual and operational efforts made during recent years to re-group, re-arrange and systematize the application of scientific methods to

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the organization of new sets of equipment and materials to optimize the learning process."

According to Scottish Council for Educational Technology, "Educational technology is a 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."

Educational Technology thus can be considered to be the valid and reliable use of applied education sciences, like equipment or devices and procedures and strategies derived from scientific research. It helps the learners and teachers to interact positively promoting a more diverse learning environment. Modern Electronic Educational Technology includes within itself E-learning, Virtual-learning, Instructional Technology, Information and Communication Technology (ICT), Multimedia learning, Technology Enhanced Learning (TEL), Computer-based Learning or Computer-aided Instruction (CAI), Internet-based Training (IBT), Flexible learning, Web-based Learning (WBT), Online Education, Digital Education Collaboration, Distributed Learning, Computer-Mediated Communication, Cyber-Learning, Multi-Modal Instruction, Video-Conferencing. Educational Technology is such a great technology that has led the countries of our world to communicate with each other for a better tomorrow towards the learning environment. It has facilitated the teachers and learners to bring about positive goals of education with advanced techniques and devices easily accessible to all in all ranges.

4.1 Objectives:

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

- *discuss* the meaning of Educational Technology,

- *identify* the approaches of Educational Technology,

- *discuss* the approaches of Educational Technology,

- *describe* the differences between Hardware and Software Approach,

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- *identify* the importance of Hardware and Software Approach,

- *describe* the uses of Educational Technology in India.

4.2 Types of Approach:

The urgent demand of the time is knowledge acquisition and being up-to-date with the current technological world. To make the learners more active and knowledgeable, Educational Technology is inseparable. Educational Technology has reduced physical labour among the teachers and students as they can communicate with each other through various ways of social media within a few seconds. It has provided enough scope to modify and improve the educational field making the learners competitive with the modern world. Communication among the teachers and learners have become very interesting and easy now-a-days as technology has gifted us with many devices, strategies and ideas as far as possible. Educational Technology has emerged as a great source assisting the teachers and learners in the teaching-learning process. This technology emphasizes the application of systems approach to the study of multi-dimensional problems of education like Educational planning, psychology of learning, curriculum development, course design, production of teaching-learning material, audio-visual aids, management of human and non-human resources, innovations and evaluation. It has three approaches namely-Hardware Approach, Software Approach and Systems Approach. They are discussed in the following points.

4.2.1 Hardware Approach:

Hardware is any physical device that is used with a machine. For example the hardware of a computer includes Monitor, Keyboard, Mouse, CPU, DVD or CD-ROM, Modem, Drive, Video Card, RAM, Sound Card, Speakers, Printer, Motherboard, Display, Memory, Power Supply etc. Now coming to Hardware Approach in Educational Technology, it refers to the application of the electro-mechanical equipments like motion pictures, tape recorders, teaching machines, computers, desktop, laptop, mobile tablets, model, charts, slides, projectors, video-tapes, Closed Circuit

Television, radio, television, Epidiascope etc. in the teaching-learning process. Such mechanization in the teaching-learning process has helped the teachers to deal with a larger number of students with less expenditure of time, money and energy. Hardware Approach has further improved the classroom condition by facilitating the teachers with innumerable new or innovative methods to teach the learners. It is very suitable for the learners as it meets the present needs of the students to achieve their learning objectives according to their own pace of learning. The utility of hardware approach can be explained with an example like-In a classroom of overcrowded students, the teacher can use sound proof micro phones so that all the students in the entire classroom can hear the lecture and it would not disturb the other classrooms too. It reduces the extra force of a teacher to speak out loud by making him energetic till the end of the lecture and it improves the teaching-learning process. This Approach is also named as "Borrowed Technology" because the hardware materials and equipments used in education are borrowed from the physical science and applied engineering.

4.2.2 Software Approach:

Software is often referred to as the brain of a computer. A computer must have an operating system that allows the user and computer to interact with the computer hardware. Software allows the user to do numerous tasks in the computer like typing, drawing, calculating, playing games, listening to music, watching videos and films, creating and saving important documents, connecting with the internet and search for any information that he/she wants. For example-If we visit any page on the Internet Browser, the operating system that the browser is running on is called the Software. Now coming to the Software Approach in Educational Technology, it refers to the application of psychological principles for behavior modification purpose. This Approach uses the knowledge of psychology of learning to create teaching-learning strategies and materials. It is an indirect way which helps the learners in the hardware appliances. Teaching strategies, learning material, evaluation tools, teaching models, Programmed Instruction etc. are under the software approach that assists the learners to gain knowledge

according to their speed and modify the learning behaviour. Software Approach helps a teacher to plan his teaching in a very effective and interesting way because he can use films, *flash-cards,* tapes etc. in the classroom. Software Approach creates a congenial classroom environment where the students can learn with a great interest and joy as it removes the dullness of the traditional classroom. Software Approach emphasizes on task analysis, writing objectives in behavioural terms, selection of the appropriate teaching strategies, reinforcement for correct responses and continuous evaluation. The other names of Software Approach are Teaching Technology, Instructional Technology or Behavioural Technology.

4.2.3 Systems Approach:

This is also an important approach of Educational Technology. According to Systems Approach education is a system which has to be analyzed systematically. This process includes Input, Process, Output and Analysis and Feedback. Systems Approach is designed to understand and manage the education system technically and scientifically. It acts as the mediator between hardware and software approach. It has assisted largely in the administration and organization of education and achieving the learning objectives. It manages the education system including Instructor, learners and goals of Instruction very economically and effectively. In other words it manages the sub-system of an institution i.e. classroom, faculty, student groups, informal groups etc. Systems Approach makes it clear how teaching-learning process takes place in the classroom systematically with the help of devices and psychological principles to bring out positive learning outcomes among the learners. There are three major steps in systems approach. They are

a) **System Analysis:** This is the first step of a systems approach. Here analysis is done in the system in the form of identifying its elements, the organization of elements, the function or performance of these elements individually or as a whole. This step helps to sort out the problems that hampers in the proper functioning of a system.

b) **Systems design and development:** Second step is concerned with synthesis. It has tasks like the determination of the objectives of a system, selection of appropriate devices, methods, strategies and approaches, formulation of a comprehensive programme for better working of a system.

c) **Systems operation and evaluation:** This step is related with the study of practical operation of a system and its evaluation in terms of the pre-determined objectives for bringing necessary feedback to lead to modification in the proper functioning of the system.

Application of Systems Approach in education can effectively improve the instructional system, planning, administration and management of school, examination and evaluation, organisation of co-curricular activities, guidance services of schools. It helps in maximum utilization of man, machine and resources associated with educational process.

STOP TO CONSIDER

Flash-card is a card bearing pictures, information of numbers, vocabulary, historical dates, formulae or any subject matter that can be learned via a question and answer format. **System Analysis, Systems design and development, and Systems operation and evaluation** are three major steps in systems approach.

CHECK YOUR PROGRESS

Que.1: What is Educational Technology?

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Que.2: Define Educational Technology.

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Que.3: Why Hardware Approach is called "Borrowed Technology"?

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Que.4: What are the other names of Software Approach?

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Que.5: What is Systems Approach?

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4.3 Difference between Hardware and Software Approach:

Educational Technology having the three important aspects or types-Hardware Approach, Software Approach and Systems Approach have played a pivotal role in promoting and developing the educational field. The system of education would not have developed to this extent today without the help of these three approaches. In fact these approaches are always in a search to introduce new, creative and constructive devices and strategies to suit the present educational needs of the learners. Hardware and Software Approaches have numerous useful activities to be performed in the teaching-learning process. They are supportive or complementary to each other. One cannot work without the other. They are two sides of the same coin. Hardware Approach provides the devices practically whereas Software Approach provides the ethical and theoretical principles to be applied in the teaching-learning process. Hardware provides the platform to express the psychological ideas useful for the students. Although these two approaches-Hardware and Software are interrelated with each other yet they are not free from differences. Some of the differences are described below:

4.4 Importance of Hardware and Software Approach:

To break the barriers of the age old traditional classroom teaching-learning process, Hardware and Software Approaches have played a pivotal role. These approaches assist in solving the various educational problems or the problems related with the administrative and organizational aspect of the education system. They attempt to help larger and larger groups of

learners as far as possible with cost effective technology. The learners and teachers are facilitated with a platform where they can get easy access to the educational world. It takes no time nowadays to interact with one another. Within a second a teacher can communicate with the students or vice versa through the use of multiple ways of mobile devices and share information related to their learning objectives. Mass media of Technology have helped greatly to provide mass education. The importance of Hardware and Software Approach can be described below:

1) Hardware approach provides the devices and software approach provides the strategies to make the teaching-learning process easy, interesting and cost effective. Software cannot perform any activity without Hardware.

2) Both these approaches have made it possible for the learners to learn easily at their own pace of learning. They have facilitated the learners with a great mode of learning environment.

3) Hardware and Software Approaches emphasize on the individual differences of the students and meet with their educational needs. The slow learners now do not have to worry about feeling ashamed before the average and talented students. Because they can learn at their own place and speed suitable to their learning objectives.

4) In this current modern world of knowledge explosion, sharing of knowledge and information can be done within a few seconds that saves the time, money and energy of both the teacher and learner with the help of Hardware and Software Approaches.

5) Hardware and Software Approaches motivate the learner's continuously to learn as they remove the dullness of conventional classroom teaching-learning process. Students get encouragement to learn with more enthusiasm as there are innumerable interesting ways to learn with these two approaches.

6) Even in the Distance mode of learning, correspondence and open learning both these approaches have proved to be useful and successful. The learners can learn from their home without any loss of money and physical effort.

7) Hardware and Software Approaches have opened up new hopes for those learners who are unable to receive formal education due to various socio-economic problems. The learners who engaged in jobs are happy as they can learn and earn at the same time.

8) Many new Software Programmes and Audio-Visual Aids have been created in the recent years that have proved to be beneficial in the teaching-learning process.

9) E-learning, E-library, Virtual Classrooms, Online teaching-learning etc. are results of the Hardware and Software Approaches where the students can access for any information related to their educational objectives.

10) School tube and YouTube are channels that provide the facilitators and learners to upload some informational ideas, videos concerning their learning goals. These are creations of Hardware and Software Approaches.

STOP TO CONSIDER

E-learning, E-library, Virtual Classrooms, Online teaching-learning, Schooltube and Youtube etc are some of the important and useful creations of Hardware and Software Approaches to provide a congenial teaching-learning process.

CHECK YOUR PROGRESS

Que.6: Mention three uses of Hardware and Software Approach.

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4.5 Uses of Educational Technology in India:

Educational Technology has been a part and parcel of educational system in India since recent years. The traditional and conventional mode of learning has been overpowered by the modern technologies in the field of education. Its use has wide spread in our country as it is concerned with improvement in all the levels and stages of education with its effective design and products of Hardware and Theories or Software Programmes. India although being a developing country has advanced in the technological field to a great extent. The mechanical devices and the software programmes have brought about a drastic change in the educational field in India. Proper use of Educational Technology obviously brings positive changes in the learning outcomes of the learners. The uses of Educational Technology can be pointed out as follows:

1) Educational Technology with its innovative techniques in education has played a pivotal role. The utilization of Radio in educational purpose is a good way to approach students in every corner of the country. The well planned educational programmes are broadcasted in the Radio which benefit the learners.

2) The use of Television in educational purpose is a step more than the radio as here it is possible for the learners to both watch and listen the telecasted programmes. Creative and constructive programmes telecasted in the Television helps in awakening the need of national development among the students, specially in the rural and remote areas.

3) The introduction of many new dimensions for training the teachers for effective teaching like Micro-teaching, Team teaching, Simulated teaching, Teaching Models etc. have greatly assisted in the modification of teaching-learning process.

4) Mass media has proved to be very useful for the students of open, correspondence and distance institutes. They can avail the educational services at any time and place they are comfortable with. They are benefitted with new ways to achieve their desired learning outcomes.

5) Besides providing Mass Education, Educational Technology in India has even facilitated the learners to learn some languages of other countries like English, German, Russian, French.

6) The Software Programme now-a-days has even facilitated the students with the availability of some regional languages that can be used in media to share information in mother tongue. This greatly benefits the students who are more interested to learn through their own language.

7) It is not that in India the technological devices and theories regarding education have been used roughly without planning. It is based on proper analysis and feedback whether or not the used devices and strategies are suitable for the students' educational needs.

8) In modern India the introduction of computer application is a must in the educational institutes. Therefore it is seen that in many Indian schools the computer application course is opened up so that students can learn computer from their early education.

9) The NCERT and SCERT are making numerous efforts to develop the education system in our country. For this they provide pre-service and in-service training to the teachers with the help of technology along with human resources. This step greatly helps in the improved and effective teaching-learning process.

10) Even in the field of educational seminar, conferences, workshops etc. Educational Technology has proved to be beneficial in promoting the learning outcomes according to necessity.

STOP TO CONSIDER

NCERT and **SCERT** are making numerous efforts to develop the education system in our country. For this they provide **pre-service** and **in-service training** to the teachers with the help of technology along with human resources.

CHECK YOUR PROGRESS

Que.7: Mention some uses of Educational Technology in India.

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4.6 Summing Up:

* Educational Technology is that technology which applies the theories and principles of Technology in the field of education.

* It is the ethical practice of facilitating the learners and teachers to improve the learning environment with the appropriate use of resources.

* Educational Technology has three approaches namely-Hardware Approach, Software Approach and Systems Approach.

* Hardware Approach in Educational Technology refers to the application of the electro-mechanical equipments like motion pictures, tape recorders, teaching machines, computers, desktop, laptop, mobile tablets, model, charts, slides, projectors, video-tapes, Closed Circuit Television, radio, television, Epidiascope etc. in the teaching-learning process.

* Software Approach emphasizes on task analysis, writing objectives in behavioural terms, selection of the appropriate teaching strategies, reinforcement for correct responses and continuous evaluation. The other names of Software Approach are Teaching Technology, Instructional Technology or Behavioural Technology.

* According to Systems Approach education is a system which has to be analyzed systematically. This process includes Input, Process, Output and Analysis and Feedback. System Analysis, Systems design and development, and Systems operation and evaluation are three major steps in systems approach.

* The Hardware and Software approaches assist in solving the various educational problems or the problems related with the administrative and organizational aspect of the education system. They attempt to

help larger and larger groups of learners as far as possible with cost effective technology.

- E-learning, Virtual-learning, Instructional Technology, Information and Communication Technology (ICT), Multimedia learning, Technology Enhanced Learning (TEL), Computer-based Learning or Computer or Computer-aided Instruction (CAI), Internet-based Training (IBT), Flexible learning, Web-based Learning (WBT), Online Education, Digital Education Collaboration, Distributed Learning, Computer-Mediated Communication, Cyber-Learning, Multi-Modal Instruction, Video-Conferencing have improved the teaching-learning process to a great extent by opening up diversified learning environment.

- Hardware and Software Approach although are interrelated yet they differ from each other.

- In this current modern world of knowledge explosion, sharing of knowledge and information can be done within a few seconds that saves the time, money and energy of both the teacher and learner by the help of Educational Technology.

- The introduction of many new dimensions of training the teachers for effective teaching like Micro-teaching, Team teaching, Simulated teaching, Teaching Models etc. have greatly assisted in the modification of teaching-learning process.

- It is advisable to use High-Tech Education in near future as far as possible because the world is rapidly moving or sweeping towards highly advanced technologies. This would help the learners to quickly acquire the learning objectives in a modern systematic way. For this it is mandatory that the instructors be trained with technological experts from all over the world.

4.7 Answers to Check Your Progress:

Answer no.1- Educational Technology can be considered to be the valid and reliable use of applied education sciences, like equipment or devices and procedures and strategies derived from scientific research. It helps the

learners and teachers to interact positively promoting a more diverse learning environment.

Answer no.2- According to Dieuziede, Director General of UNESCO's Division of Methods, Materials and Techniques, "Educational Technology implies all the intellectual and operational efforts made during recent years to re-group, re-arrange and systematize the application of scientific methods to the organization of new sets of equipment and materials to optimize the learning process."

Answer no.3- Hardware Approach is called as "Borrowed Technology" because the hardware materials and equipments used in education are borrowed from the physical science and applied engineering.

Answer no.4- The other names of Software Approach are Teaching Technology, Instructional Technology or Behavioural Technology.

Answer no.5- Systems Approach is an important approach of Educational Technology. According to Systems Approach education is a system which has to be analysed systematically. This process includes Input, Process, Output and Analysis and Feedback. The Systems Approach is designed to understand and manage the education system technically and scientifically.

Answer no.6- Three uses of Hardware and Software Approach can be described below:

1) Hardware provides the devices and software provides the strategies to make the teaching-learning process easy, interesting and cost effective.

2) Hardware and Software Approaches emphasize on the individual differences of the students and meet with their educational needs.

3) In this current modern world of knowledge explosion, sharing of knowledge and information can be done within a few seconds that saves the time, money and energy of both the teacher and learner with the help of Hardware and Software Approach.

Answer no.7- The uses of Educational Technology can be pointed out as follows:

1) Educational Technology with its innovative techniques in education has played a pivotal role. The utilization of Radio in educational purpose is a good way to approach students in every corner of the country. The well planned educational programmes are broadcasted in the Radio which benefits the learners.

2) The use of Television in educational purpose is a step more than the radio as here it is possible for the learners to both watch and listen the telecasted programmes. Creative and constructive programmes telecasted in the Television helps in awakening the need of national development among the students, specially in the rural and remote areas.

3) The introduction of many new dimensions of training the teachers for effective teaching like Micro-teaching, Team teaching, Simulated teaching, Teaching Models etc. have greatly assisted in the modification of teaching-learning process.

4.8   Sample Questions:

1.   Explain the meaning of Educational Technology with examples.

2.   Discuss the approaches of Educational Technology.

3.   Differentiate between Hardware and Software Approach.

4.   Mention the significance of Hardware and Software Approach.

5.   Describe about the uses of Educational Technology in India.

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UNIT- 5
SYSTEM APPROACH

Contents:

5.0 Introduction:

Educational technology makes accessible a wide range of instructional media at the curriculum planning level. The instructional process has become so multifarious these days because of the shift in technological focus from the classroom to curriculum planning. The number of objectives to be reached because of the instructional programme has increased. The amount of material to be taught and the media to be utilised has also increased. The number of students and teachers involved in the total instructional system has also increased rapidly. In such a circumstances, there is great need for ample and thorough planning. The curriculum should not identify any student

behavioural objectives but should also put forward the strategies for helping the students to reach the objectives and evaluation instruments to measure their success. Thus system approach is an operational planning concept, hired from the engineering sciences and cybernetics, which deals with self-regulating and self-sustaining systems.

5.1 Objectives:

After going through this unit you will be able to–

- *identify* the meaning and definition of system,

- *understand* the nature and types of system,

- *discuss* the system approach in education,

- *elaborate* the components of instructional system.

5.2 Meaning and Definition of System:

In the context of history of ideas, the idea of a system is as old as European philosophy. The great Greek philosopher Aristotle's statement, *'The whole is more than the sum of its parts,'* is a definition of the system which is still suitable.

Systems perhaps natural, such as those found in nature – solar and environmental, or they may be manmade, such as those found in society – political and educational. Engineers are concerned with systems as practically related collectives of technological devices. Physiologists single out functionally related part of living organisms (circulatory, digestive and nervous systems). Social scientists speak of economic and political systems and philosophers about the system of thought. Educationists are mainly concerned with the educational system or the instructional system. Let us try to understand this term in the light of some definitions.

Angyal (1941) opines system as a holistic organisation. The parts that comprise a system are arranged (planned and interconnected) in some way that differentiates them from a single collection of objects.

According to R.L.Ackoff (1971), "A system is the set of interrelated and interdependent elements."

Crawford Roob (1973) states that, "System is a systematic organisation of the elements that operates in a unique way."

According to A.K. Jalaluddin (1981), "A system may be defined as a dynamic, complex, integrated whole consisting of self-regulating pattern of interrelated and interdependent elements organised to achieve the pre-determined and specified objectives."

5.3 Characteristics of a System:

1. A system is a general term appropriate to many fields including instruction and education.

2. A system is a vibrant and integrated whole. It is not merely sum of its components or elements.

3. A system represents a multifarious but efficient organisation of inter-related and co-dependent parts or elements.

4. In a system, all the components or elements have their relevant roles which have to be specified in relation to each other and in relation to the purposes to be reached by the system.

5. System, altogether, functions better and achieves better results than any sub-system/part or combination of the effects of individual parts.

6. System is a self-governing, self-maintaining and self-regulated composition.

7. The performance of the system is aimed to attain the specific purposes or stipulated objectives.

In this way, the term system perhaps understood as a self-maintaining and self-regulating tool consisting of inter-related and interacting elements or self-systems operating as a whole to achieve the pre-determined aims or goals with maximum efficiency, economy and productivity.

STOP TO CONSIDER

System perhaps understood as a self-maintaining and self-regulating tool consisting of inter-related and interacting elements or self-systems operating as a whole to achieve the pre-determined aims or goals with maximum efficiency, economy and productivity. The systems may be divided into two broad categories – Natural and Man-made systems.

5.4 Types of Systems:

The systems may be divided into two broad categories – Natural systems and Man-made systems.

Natural Systems like solar system, human body system etc. are the creation of nature or biological system. Mostly, their functioning is beyond the control of man and therefore, their behaviour cannot be foreseen or determined accurately.

Man-made systems or man-machine systems like telegraph system, refreezing system, education system etc. are deliberately designed or created systems. The elements as well as the implementation of these systems are quite controllable and therefore, their behaviour can be predicted and determined precisely.

5.5 Parameters of a System:

Any system may be explained in terms of the four basic parameters. These are:

(a) Input   (b) Process

(c) Output and   (d) Environmental context.

Example: Atlas cycle factory at Sonepat in Haryana is a man-machine system. Its aim is the reproduction of cycles. All the workers, technical and management personnel, machines and materials are its components or elements. Here the men and material employed in the

production of cycles may be referred to as inputs. What is going inside the factory for converting material into the product may be referred to as process and the production of cycle and its accessories etc as outputs. The factory operates in a definite social and physical environment and definitely controlled by these environmental restraints.

CHECK YOUR PROGRESS

Que.1: Define a system?

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....

Que.2: Write two characteristics of a system.

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Que.3: Systems are mainly classified into _____ types.

Que.4: Write the four parameters of a system

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....

5.6 System Approach:

System approach is a systematic attempt to synchronize all characteristics of a problem towards precise objectives. *Webster's* dictionary defines a system as *"a regularly interacting or independent group of items forming a unified whole."* The characteristics of a system may be described with the help of an example – various parts of the digestive system may be called as mechanisms of digestive system. Every part of the digestive system supports in functioning of the digestive system as a whole.

In the context of education, system is a unit incorporating all its aspects and parts, namely, pupils, teachers, curriculum, content and

evaluation of instructional objectives. The teaching-learning process is viewed as communication and manage taking place between the components of a system. In this case, the system is composed of a teacher, a student and a programme of instruction, all in a particular pattern of interaction.

The System Approach focuses primarily upon the learner and then course content, learning experiences, efficient media, and instructional strategies. Such a system incorporates within itself the ability of providing continuous self-correction and improvement. It is concerned with all essentials of instruction including media, including hardware and software. Its purpose is to ensure that the components of the organic whole will be obtainable with the proper characteristics at a proper time to contribute to the total system fulfilling the objectives.

In the system approach to instruction, the teacher has to plan completely the utilization of selected resource material and the classroom performance. The teacher should have a good overall outlook of the subject, know his/her limitations, know all his/her pupils and the individual differences in their learning capacities and plan accordingly. The system approach involves continuous evaluation of learning outcomes and utilization of knowledge gained by analysis of results of evaluation to suitably change the plan of approach to get the stated objectives.

5.7 Steps in System Approaches:

There are three major steps involved in a systems approach, namely

(i)   System Analysis

(ii) Systems Design and Development

(iii) Systems Operation and Evaluation.

(i) **System Analysis:** This step is concerned with the task of analysing a system in the form of identifying its elements, the organisation of these elements, the purpose or performance of these elements individually or as a whole in order to decide the need to make changes to ensure the achievement of system, namely, inputs, process, outputs and environmental constraints.

(89)

System analysis helps the designer of the system to recognize the constraints which interfere in the attainment of system objectives. Through this analysis, the appropriateness of the system objectives in views of the structure and functioning of the system may also be evaluated well.

(ii) System design and development: The first step is concerned with analysis, whereas the second step is related with the task of synthesizing. Here efforts are made to design and develop the system on the finding of the first step i.e. system analysis.

The main activities undertaken in this step may be outlined as below:

(i) Determination of the objectives of a system.

(ii) Selection of appropriate devices, methods, strategies and approaches.

(iii) Formulating a scheme of comprehensive programme for the working of the system in relation to its parameters and stipulated objectives.

(iii) System operation and evaluation: This step is concerned with the definite operation of a system and evaluation in terms of the stipulated objectives for providing necessary feedback to bring desirable improvement and change in the structure and functioning of the system. In case the outputs of a system meet the expectations or needs of the stipulated objectives or norms, the system can be allowed to carry on. If there is a discrepancy between the two, the need for bringing necessary modification or improvement in the system is felt. It can be done in some of the following ways:

(i) By manipulating the elements or inputs of the system.

(ii) By manipulating the purposes of elements or inputs.

(iii) By manipulating the procedure and interface among the elements of the system.

(iv) By manipulating environmental restrains of the system.

In this way, the system may be restructured, reorganised and its functioning may be re-planned, and re-operated in order of achieving better results. This process of operation, evaluation, feedback, modification,

restarting and reoperation is continued till the aim of getting best results in terms of the stipulated objectives with greater economy, exactness and precision is not achieved.

STOP TO CONSIDER

System approach is a systematic attempt to synchronize all characteristics of a problem towards precise objectives. The System Approach focuses primarily upon the learner and then course content, learning experiences, efficient media, and instructional strategies.

5.8 Advantages of System Approach:

i. System approach helps to recognize the suitability of the resource material to attain the specific goal.

ii. Technological advance could be used to make available integration of machines, media and people for attaining the defined goal.

iii. It helps to measure the resource needs, their sources and facilities in relation to quantities, time and other factors.

iv. It allows a systematic introduction of components demonstrated to be required for systems success in terms of student learning.

v. It stays away from rigidity in plan of action as continuous evaluation affords desired favourable changes to be made.

5.9 Limitations of System Approach:

i. Resistance to modification: Old conducts are not easy to remove. There is always resistance to any new technique or approach.

ii. Engages hard work: Systems approach requires hard and constant work on the part of school human resources. Some are not equipped for the extra load.

iii. Lack of understanding: Teachers and administrators are still not well-known with systems approach. Though it has been successfully executed in industry, it has still to make development in education.

CHECK YOUR PROGRESS

Que.5: What is a system approach?

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Que.6: Mention the steps of system approach.

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Que.7: Write three advantages of system approach.

....
....

Que.8: Write three limitations of system approach.

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....

5.10 Education System:

Education system is a man-made system. It may either be taken as a sub-system of the society as a system or an entire system of the society in itself. It may be diagrammatically represented as below:
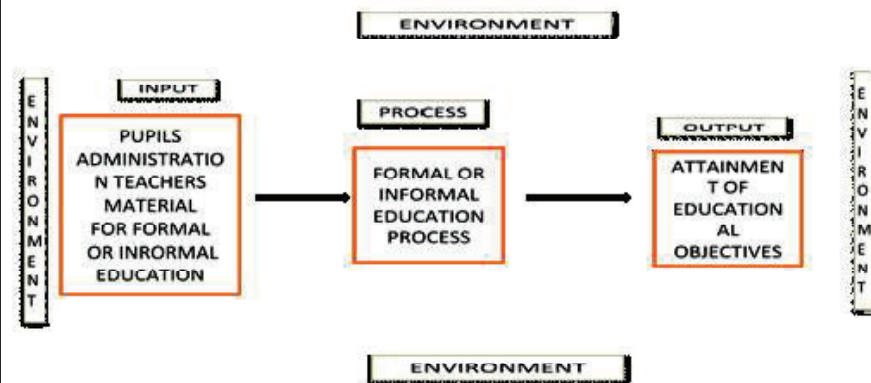

Fig: 3.1: Education System

On the same lines, the school system (a system of formal education through an educational institution) may be treated as a sub-system of the education system or a system complete in itself. It may have instructional (related with the cognitive development of pupils) and co-instructional systems as its sub-systems. However, both these systems, instructional and co-instructional may exist and function quite independently as a complete system in them.

5.10.1 System Approach to Education:

System approach refers to a well thought of system or rational approach for designing, controlling and using a system for realising the system objectives in the best possible ways. Its application in the field of education will surely make the system of education, self-maintaining with its essential parameters functioning systematically on the principles of feedback and equilibrium. As a result the system approach in education is likely to solve various educational problems related with the organisation and management of the process and products of education. In brief, the underlying principle served by systems approach in education may be summarised as ahead:

1. It can efficiently develop the instructional system.

2. It can help in controlling and improving the school affairs by bringing effectiveness in the school administration and management.

3. It may facilitate in seeking utmost effective utilization of the man, and material resources connected with the process of education.

4. It may facilitate in having organized educational planning (institutional, regional or national) in terms of long-range goals and specific short-range objectives.

5. It may assist in bringing enhancement in the examination and evaluation system.

6. It may facilitate in bringing up gradation in the organisation of co-curricular activities and other educational aspects of bringing connative and affective development of the pupils.

7. It may assist in maintaining controlling and improving the guidance services of the schools.

8. It may facilitate in improving training and development programmes. For example, Teacher Training (pre-service or in-service) may be efficiently improved with the help of system approach.

9. It may provide evidence an invaluable means for designing, controlling and improving the systems of non-formal and adult education.

10. In addition to it may provide valuable services in improving the quality of education in all its areas and dimensions.

5.10.2 Components of an Instructional System:

Systems approach is a systematic effort to coordinate all aspects of a problem towards specific objectives. In education, this means planned and organised use of all obtainable learning resources, including audio-visual media, to achieve the desirable learning objectives by the most efficient means possible. The system approach focuses first upon the learner and the performances required of him. Only then, it makes decisions regarding course content, learning experiences and the most helpful media and instructional strategies. Such a system incorporates within itself the ability of providing nonstop self-correction and improvement. It is concerned with all elements of instruction including media. Its purpose is to ensure that the components of the organic whole will be accessible with the proper characteristics at the proper time to contribute to the total system fulfilling the objectives.

The procedure steps of system approach in education are as follows:

1. Defining instructional goals, behavioural objectives and stating them in operational, calculable terms.

2. Determining roles related to the achievements of these goals by proper aids like films, recordings, videotapes etc.

3. Defining learner characteristics and requirements.

4. Choosing suitable methods suitable for effective learning of the topic.

5. Selecting suitable learning experiences from many alternatives available.

6. Selecting appropriate materials, facilities, equipment, resources, team teaching members – supporting personnel – students.

7. Defining and assigning appropriate personal roles – teachers – team teaching members – supporting personnel – students.

8. Executing the programme – test with a few pupils in typical and appropriate condition.

9. Testing and evaluating the result in terms of original objectives measured in student performance.

10. Refining and revising if necessary to get better production and efficiency of the system to improve student learning.

In an instructional system, the teacher or instructor and the resources made use of by him are included as components of the system. There is provision for constant evaluation and self correction, for realising the stated objectives. In the systems approach to instruction, the teacher has to plan completely the utilisation of selected resource material and the classroom activities (each pupil working alone; small groups of pupils, 4 to 6, working alone or with teacher guidance; large groups working alone; very large groups requiring the use of mass communication media). The teacher should have a good overall view of the subject, know his/her limitations, know all about his/her pupils and the individual differences in their learning abilities and plan accordingly. The system approach involves constant evaluation of learning outcomes and utilisation of knowledge gained by analysis of results of evaluation to suitably change the plan of approach to achieve the stated objectives.

In brief the systems approach applied to educational situations involves the following interlinked and interdependent stages: **(a)** Explicitly stated principles of output performances, including sequenced behavioural objectives and post- test; **(b)** Planned input and processes involving structural learning materials and methods suitably geared to the needs of a particular group of learners; **(c)** Monitored output which is used to revise, improve and evaluate the instructional system, providing feedback to the learner and teacher, and **(d)** A degree of in built flexibility to adjust to individual situations.
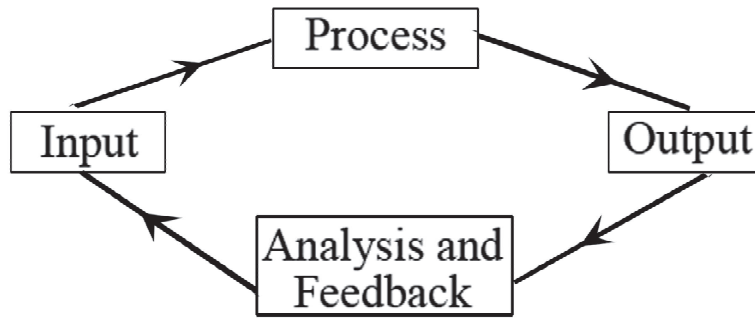
The parts of the instructional system noted above can be analysed into their possible components as follows:

Institutional planning – Application of systems approach – an example.

I. INPUT:

Pupils: (a) age

(b) Minimum prescribed entry qualification, attainments (entry behaviour) decided by (i) curriculum content (objectives) (ii) duration of the course.

(c) Desirable to consider (i) Attitude
(ii) Aptitude of pupils

Cost factor which in a constraint on input should also be considered in terms of its benefits.

(a) Job opportunities after passing out.

(b) Location of the institute – Rural/Urban

(c) Hostel facilities –cost-finance involved.

II. PROCESS:

1. Curriculum: ➤ need-based
➤ Well-defined objectives– anticipated behavioural changes in pupils
➤ Suggested strategy and lines of approach (media, methods)
➤ Evaluation procedures laid out

2. Institute: (a) Physical environment

III. FEEDBACK

    (a) Evaluation by public   Internal

           Organisation, boards   External

           Universities   Part internal and part external performance

    (b) Employees – Initiative- adequacy- of knowledge skill – adaptability and ability to apply knowledge to practical situation.

For maximum effectiveness, it is necessary to consider the system as a whole remembering the interaction and inter-dependence of the components of the systems. Full details and specifications about the interacting factors should be clearly defined. System approach in education may be applied to institutional planning and development in its varied aspects (Macro Level) or it may be used at the classroom level with its concern of a specified topic during a brief period (Micro Level).

Curriculum objectives in terms of anticipated change in student behaviour should be well-defined. Teacher and pupils should know what is expected upon completion of an instructional unit. The evaluation should aim to reflect pupils' skills, knowledge, concepts developed through available teaching material and the teacher. Based on evaluation results, more appropriate instructional materials and teaching strategies could be selected to ensure achievement of stated objectives. It may be necessary also to change the prescribed entry behaviour of input based on the results of evaluation. The curriculum should be modified if end-product is not suitable to fill in the need.

CHECK YOUR PROGRESS:

Que.9: Education system is a _____ system. (Fill in the blanks)

....

....

Que.10: Write three underlying principles of system approach in education.

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(97)

Que.11: What are the components of a system in an instructional system?

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....

Que.12: Write three procedure steps of system approach in education.

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5.11 Summing Up:

Systems perhaps natural, such as those found in nature – solar and environmental, or they may be manmade, such as those found in society – political and educational. Engineers are concerned with systems as practically related collectives of technological devices.

The systems may be divided into two broad categories – Natural systems and Man-made systems.

Any system may be explained in terms of the four basic parameters. These are —

(a) Input (b) Process (c) Output and (d) Environmental context.

System approach is a systematic attempt to synchronize all characteristics of a problem towards precise objectives. *Webster's* dictionary defines a system as *"a regularly interacting or independent group of items forming a unified whole."*

There are three major steps involved in a systems approach, namely: (i) System analysis, (ii) Systems design and development, and (iii) Systems operation and evaluation.

System approach refers to a well thought system or rational approach for designing, controlling and using a system for realising the system objectives in the best possible ways. Its application in the field of education will surely make the system of education, self-maintaining with its essential parameters functioning systematically on the principles of feedback and equilibrium.

Systems approach is a systematic effort to coordinate all aspects of a problem toward specific objectives. In education, this means planned and organised use of all obtainable learning resources, including audio-visual media, to achieve the desirable learning objectives by the most efficient means possible. The system approach focuses first upon the learner and the performances required of him.

5.12 Key Terms:

System Approach: Look at a problem precisely

Instructional Design: Learning Material

5.13 Answer to Check Your Progress:

Answer to Q.No. 1: According to R.L.Ackoff (1971), "A system is the set of interrelated and interdependent elements."

Answer to Q.No.2: (1) A system is a general term appropriate to many fields including instruction and education.

(2) A system is a vibrant and integrated whole. It is not merely sum of its components or elements.

Answer to Q.No.3: Two

Answer to Q.No.4: The four parameters of a system are as follows:

(a) Input   (b) Process
(c) Output   (d) Environmental context.

Answer to Q.No.5: System approach is a systematic attempt to synchronize all characteristics of a problem towards precise objectives. *Webster's* dictionary defines a system as *"a regularly interacting or independent group of items forming a unified whole."*

Answer to Q.No.6: There are three major steps involved in a systems approach, namely

(i)   System analysis

(ii) Systems design and development

(iii) Systems operation and evaluation.

Answer to Q.No.7: Three advantages of system approach are as follows:

i. System approach helps to recognize the suitability of the resource material to attain the specific goal.

ii. Technological advance could be used to make available integration of machines, media and people for attaining the defined goal.

iii. It helps to measure the resource needs, their sources and facilities in relation to quantities, time and other factors.

Answer to Q.No.8: Three limitations of system approach are as follows:

i. *Resistance to modification:* Old conducts are not easy to remove. There is always resistance to any new technique or approach.

ii. *Engages hard work:* Systems approach requires hard and constant work on the part of school human resources. Some are not equipped for the extra load.

iii. *Lack of understanding*: Teachers and administrators are still not well-known with systems approach. Though it has been successfully executed in industry, it has still to make development in education.

Answer to Q.No.9: Man-made

Answer to Q.No.10: The three underlying principle served by systems approach in education may be summarised as ahead:

1. It can efficiently develop the instructional system.

2. It can help in controlling and improving the school affairs by bringing effectiveness in the school administration and management.

3. It may facilitate in seeking utmost effective utilization of the man, and material resources connected with the process of education.

Answer to Q.No.11: In an instructional system, the teacher or instructor and the resources made use of by him are included as components of the system.

Answer to Q.No.12: The three procedure steps of system approach in education are as follows:

1. Defining instructional goals, behavioural objectives and stating them in operational, calculable terms.

2. Determining roles related to the achievements of these goals by proper aids like films, recordings, videotapes etc.

3. Defining learner characteristics and requirements.

5.14 Essay Type Questions:

Q.1 What do you understand by the term system? State its characteristics.

Q.2 Briefly describe the major steps involved in system approach.

Q.3 How can the system approach be applied to education? Discuss in the light of the major steps involved.

Q.4 Write short notes on:

(a) Parameters of a system

(b) System analysis

(c) System operation

(d) System design

(e) System approach to education

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